Supporting Research Papers

Contents

Print Entire Volume
[34.1 MB, 932 Pages]

QRMC Charter

Table of Contents

Preface

Part I. Military Compensation

Chapter 1. Military and Civilian Compensation: How Do They Compare?
James E. Grefer with David Gregory and Erin M. Rebhan
In this paper, the authors compare military and civilian compensation, looking at trends over the last decade, as well as compensation comparisons over the first 20 years of a career. The authors also evaluate the value to military personnel of the military health care benefit and the Federal Insurance Contributions Act tax advantage.

Chapter 2. The Effect of the Civilian Economy on Recruiting and Retention
John T. Warner
Successful recruitment and retention is essential to sustaining the all-volunteer force. Attracting and retaining sufficient numbers of high-quality individuals is affected by a number of factors, including military compensation and recruiting resources, as well as external factors such as the health of the civilian economy and the changing demographics of the general population. This paper reviews existing literature on military recruiting and retention to assess how these various factors affect accessions and reenlistments.

Part II. Special and Incentive Pays

Chapter 3. The Officer and Enlisted Special and Incentive Pay Analysis Model
Kim Darling, Patrick Mackin, and Joseph Mundy
This paper describes a model developed by the authors that analyzes the effect of changes in special and incentive pay policies on staff inventories, and calculates the costs of such policies. Excerpts from the model's user guide illustrate how users can adjust a series of inputs to tailor the model to their specific needs and circumstances.

Chapter 4. Analysis of Staffing and Special and Incentive Pays in Selected Communities
Paul F. Hogan, Kim Darling, Patrick Mackin, Joseph Mundy, Meredith Swartz, and John T. Warner
In its charter, the QRMC was directed to evaluate pay incentives for four critical career fields: mental health professionals, linguists/translators, remotely piloted vehicle operators, and special operations personnel. In this paper the authors analyze recruiting and retention patterns in the four fields, as well as civilian market alternatives, and the use of incentives to attract and retain personnel in these areas.

Chapter 5. Evaluation of the Effect of CSRB Offered to Retirement-Eligible Special Forces Personnel
John T. Warner
Since 2001, the Critical Skills Retention Bonus (CSRB) has been available to DOD to encourage retention among personnel with certain critical skills. In this paper, the author assesses the cost and retention impact of the CSRB program for Army Special Operations Forces, which directed bonuses at retirement-eligible personnel to address a shortage of these personnel.

Part III. Combat Compensation

Chapter 6. History of Combat Pay
Brandon R. Gould and Stanley A. Horowitz
Beginning with World War II, the United States has recognized the hazards and risks of serving in combat with a special pay for combat service. Since then, combat pay has evolved, reflecting both changes in policy as well as the changing nature of U.S. military missions. In this paper, the authors trace the history of combat pay, charting its progress from a pay reserved for the extreme hazards and hardships of frontline service to today's pay, which compensates personnel deployed to hostile environments that vary widely in degree of danger.

Chapter 7. History of the Combat Zone Tax Exclusion
Brandon R. Gould and Stanley A. Horowitz
The Combat Zone Tax Exclusion (CZTE) was established during World War I to exempt service members from the income tax increases required to finance military operations. Today, the CZTE relieves military members from paying federal income tax on all or most of the pay received while serving in a designated combat zone. This paper describes the evolution of the CZTE, detailing the policy and tax code changes that have weakened the link between risk and the level of CZTE benefits.

Chapter 8. Combat Compensation and Continuation in the Active and Reserve Components
Diana S. Lien and Molly F. McIntosh with Darlene E. Stafford
Military personnel deployed to combat zones are eligible for combat compensation in recognition of the additional risks associated with that deployment. In this paper, the authors examine how deployment affects retention of military personnel.

Chapter 9. Risk and Combat Compensation
Saul Pleeter et al.
Combat compensation is designed to recognize military personnel for the risks they face while serving in combat zones. In the past, there was a direct relationship between risk and the amount of combat compensation a member received. In this paper, the authors explore how that relationship has eroded over time, and evaluate how current combat compensation levels relate to the risk that military personnel actually face.

Chapter 10. Combat Risk and Pay: Theory and Some Evidence
Curtis J. Simon, Shirley H. Liu, Saul Pleeter, and Stanley A. Horowitz
The practice of compensating military personnel in recognition of the risks they face in combat goes back nearly 100 years, to World War I. In this paper, the authors examine the relationship between total cash compensation and risk in the military within the framework of wage theory.

Part IV. Wounded Warriors and Survivors

Chapter 11. Compensating Wounded Warriors: An Analysis of Injury, Labor Market Earnings, and Disability Compensation Among Veterans of the Iraq and Afghanistan Wars
Paul Heaton, David S. Loughran, and Amalia R. Miller
Since September 11, 2001, more than 1.7 million service members have deployed to support military operations in Iraq and Afghanistan. Thousands of those personnel have been injured while deployed. In this paper, the authors estimate the effects of injuries sustained during those operations on service member and spousal earnings, and the extent to which retirement and disability payments compensate for those lost earnings.

Chapter 12. Review of Survivor Benefits
Patrick Mackin, Richard Parodi, and David Purcell
Survivors of fallen service members receive an array of compensation benefits following the loss of their loved one. A number of these benefits have increased significantly since 2004, part of broader efforts to improve the financial well-being of deployed service members and their families. This paper provides an overview of survivor benefits provided to the families of active and reserve personnel, and compares those benefits to survivor benefits available in other occupations.

Chapter 13. Analysis of Financial Support to the Surviving Spouses and Children of Casualties in the Iraq and Afghanistan Wars
Amalia R. Miller, Paul Heaton, and David S. Loughran
Over the last decade, more than 6,000 of the service members deployed to Iraq and Afghanistan were killed during their deployment or as a result of injuries sustained during deployment. In this paper, the authors assess how the death of a service member during Operations Enduring Freedom and Iraqi Freedom affects the household earnings of survivors, and the extent to which survivor benefits offset those lost earnings.

Part V. Reserve Components

Chapter 14. Tailoring Active Duty Commitments for Reserve Component Service Members
David R. Graham et al.
The role of the reserve component has changed markedly since the attacks of September 11, 2001. Utilization of reservists, however, varies substantially across services, units, and occupations. In this paper, the authors examine the feasibility and potential benefits of commitment contracts tailored to match a reservist's specific service preferences.

Chapter 15. Healthcare Coverage and Disability Evaluation for Reserve Component Personnel
Susan D. Hosek
The role of the National Guard and reserve has changed significantly over the past decade. One of the most important benefits for members of the active and reserve components is health care. This paper analyzes healthcare coverage for reserve component members and the potential effects of national health reform on coverage rates, as well as disability evaluation outcomes for reservists injured due to military service.

Chapter 16. Reserve Participation and Cost Under a New Approach to Reserve Compensation
Michael G. Mattock, James Hosek, and Beth J. Asch
The greater use of reserve component members in an operational capacity has increased interest in how the guard and reserve are compensated. This paper explores transitioning the reserve components to a "total-force" approach to compensation. The force management effects and cost of the total-force compensation approach are evaluated, including its effects on reserve and active component retention.

Chapter 17. Overview of Reserve Component Compensation and Benefits
This chapter contains a detailed accounting of basic pays, special and incentive pays, benefits, and protections provided to members and eligible dependents of the reserve component. The tabular material includes a description of each element and shows eligibility under different types of duty.

Report of

The **Eleventh Quadrennial Review** of **Military Compensation**

Supporting Research Papers

June 2012

Preparation of this report/study cost the Department of Defense a total of approximately $9,133,000 in Fiscal Years 2010–2012.
Generated on 2012 May 09 1417 RefID: 3-80904F8

Report of

The **11th Quadrennial Review** of **Military Compensation**

Supporting Research Papers

June 2012

THE WHITE HOUSE

WASHINGTON

December 11, 2009

MEMORANDUM FOR THE SECRETARY OF DEFENSE

SUBJECT: Eleventh Quadrennial Review of Military Compensation

Under section 1008(b) of title 37, United States Code, every 4 years the President is required to complete a review of the compensation system for the uniformed service members of the Department of Defense, the Coast Guard, and the commissioned corps of the National Oceanic and Atmospheric Administration and Public Health Service. You will be my Executive Agent for this review, consulting me as required.

It is not the powerful weapons that make our Nation the strongest in the world. It is the spirit and skill of our men and women in uniform. The current military compensation system has allowed us to recruit and retain the highest caliber men and women in our Nation's history, and that system needs to be regularly validated for sufficiency and responsiveness.

In these times of unprecedented expectations and demands, our attention must be on the well-being of our personnel in uniform. The defense of the homeland and ongoing overseas operations require us to examine and determine whether compensation levels are sufficient to sustain current and future efforts to recruit and retain the right skill set and experience level.

I would like your review to focus on the following areas:

1. the compensation for service performed in a combat zone, combat operation, or hostile fire area, or while exposed to a hostile fire event;

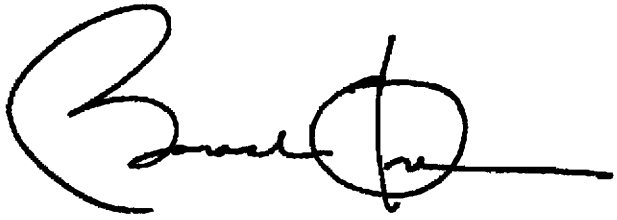
2. the Reserve and National Guard's compensation and benefits for consistency with their current and planned utilization;

3. the compensation benefits available to wounded warriors, caregivers, and survivors of those fallen service members; and

4. the pay incentives for critical career fields such as mental health professionals, linguists/translators, remotely piloted vehicle operators, and special operations personnel.

As the Executive Agent for the Eleventh Quadrennial Review of Military Compensation, you shall ensure that representatives of other relevant executive branch agencies, such as the Secretaries of Homeland Security, Commerce, and Health and Human Services, participate in this review, as appropriate. The review should be completed within 1 year of its initiation, with an update submitted to the President after 6 months, and a preview of the results 30 days prior to the end of the review period.

On behalf of the American people, I thank you in advance for your leadership in this area, your thoughtful resource analysis, and, more importantly, your sincere concern for our uniformed personnel and their families.



Contents

Part I. Military Compensation

Chapter 1. Military and Civilian Compensation: How Do They Compare? 3
James E. Grefer with David Gregory and Erin M. Rebhan

Chapter 2. The Effect of the Civilian Economy on Recruiting and Retention 71
John T. Warner

Part II. Special and Incentive Pays

Chapter 3. The Officer and Enlisted Special and Incentive Pay Analysis Model 95
Kim Darling, Patrick Mackin, Joseph Mundy

Chapter 4. Analysis of Staffing and Special and Incentive Pays in Selected Communities 107
Paul F. Hogan, Kim Darling, Patrick Mackin, Joseph Mundy, Meredith Swartz, John T. Warner

Chapter 5. Evaluation of the Effect of CSRB Offered to Retirement-Eligible Special Forces Personnel 179
John T. Warner

Part III. Combat Compensation

Chapter 6. History of Combat Pay 207
Brandon R. Gould, Stanley A. Horowitz

Chapter 7. History of the Combat Zone Tax Exclusion 267
Brandon R. Gould, Stanley A. Horowitz

Chapter 8. Combat Compensation and Continuation in the Active and Reserve Components 301
Diana S. Lien, Molly F. McIntosh with Darlene E. Stafford

Chapter 9. Risk and Combat Compensation 359
Saul Pleeter, Alexander O. Gallo, Brandon R. Gould, Maggie X. Li, Shirley H. Liu, Curtis J. Simon, Carl F. Witschonke, Stanley A. Horowitz

Chapter 10. Combat Risk and Pay: Theory and Some Evidence 411
Curtis J. Simon, Shirley H. Liu, Saul Pleeter, Stanley A. Horowitz

Part IV. Wounded Warriors and Survivors

Chapter 11. Compensating Wounded Warriors: An Analysis of Injury, Labor Market Earnings, and Disability Compensation Among Veterans of the Iraq and Afghanistan Wars 453
Paul Heaton, David S. Loughran, Amalia R. Miller

Chapter 12. Review of Survivor Benefits 543
Patrick Mackin, Richard Parodi, David Purcell

Chapter 13. Analysis of Financial Support to the Surviving Spouses and Children of Casualties in the Iraq and Afghanistan Wars 603
Amalia R. Miller, Paul Heaton, David S. Loughran

Part V. Reserve Components

Chapter 14. Tailoring Active Duty Commitments for Reserve Component Service Members 647
David R. Graham, Colin M. Doyle, Joseph F. Adams, Robert J. Atwell, Ayeh Bandeh-Ahmadi, John R. Brinkerhoff, William R. Burns, H. T. Johnson, Yevgeniy Kirpichevsky, Drew Miller, Timothy Ni, Michael F. Niles, Steven B. Walser

Chapter 15. Healthcare Coverage and Disability Evaluation for Reserve Component Personnel 695
Susan D. Hosek

Chapter 16. Reserve Participation and Cost Under a New Approach to Reserve Compensation 761
Michael G. Mattock, James Hosek, Beth J. Asch

Chapter 17. Overview of Reserve Component Compensation and Benefits 889

Preface

Every four years, the president directs "a complete review of the principles and concepts of the compensation system for members of the uniformed services."[1] The First Quadrennial Review of Military Compensation (QRMC) was convened in 1965. Since that time, nine subsequent reviews have taken place, with the most recent—the 10th QRMC—issuing its report in 2008.

In December 2009, President Barack Obama directed the secretary of defense to conduct the Eleventh Quadrennial Review of Military Compensation (11th QRMC). In his charge to the secretary, the president stated:

> It is not the powerful weapons that make our Nation the strongest in the world. It is the spirit and skill of our men and women in uniform. … In these times of unprecedented expectations and demands, our attention must be on the well-being of our personnel in uniform. The defense of the homeland and ongoing overseas operations require us to examine and determine whether compensation levels are sufficient to sustain current and future efforts to recruit and retain the right skill set and experience level.

The reality of "unprecedented expectations and demands" was a constant influence as the QRMC conducted its deliberations. The experiences gained during ten years of combat operations in Iraq and Afghanistan had a direct bearing on the topics selected for examination by the 11th QRMC. Moreover, the expectation that demands will remain high in the future, and that the effects of this war will endure long after the last troops leave the battlefield, shaped our recommendations.

Many topics addressed by the 11th QRMC have been in the policy spotlight in recent years—either under study by other groups or the subject of legislative or regulatory proposals. The QRMC's deliberations benefited from these previous efforts. For example, our assessment of reserve compensation and benefits and the reserve duty system applied analytical rigor to further the review conducted by the 2008 Commission on the National Guard and Reserve, as well as the department's Comprehensive Review of the Future Role of the Reserve Component, completed in 2011. Both of these efforts provided useful insights into the challenges facing the reserve components and areas of change that could realize widespread benefits for the future.

The subject of veterans and wounded warriors has been high on the Obama administration's agenda, not surprising after a decade of war in the Middle East. Congress has passed many legislative initiatives related to health care, education and training, and a wide range of benefits

1. United States Code, Section 1008(b), title 37. The seven uniformed services are: United States Army, United States Marine Corps, United States Navy, United States Air Force, United States Coast Guard, United States Public Health Service Commissioned Corps, and National Oceanic and Atmospheric Administration Commissioned Corps.

for members and their families—a number of which have measurably increased compensation for wounded warriors, caregivers, and survivors. Were the QRMC's review of this topic conducted even five years ago, the outcomes presented in this report would likely have been far less encouraging.

The research papers included in this volume were written in support of the 11th QRMC. They include more detailed discussion of the topics addressed in the main report, to include description of the data sets and methodology used in the various analyses. The views expressed in these papers represent those of the authors and are not necessarily those of the Department of Defense.

Part I

Military Compensation

Chapter 1

Military and Civilian Compensation: How Do They Compare?

James E. Grefer
with
David Gregory
Erin M. Rebhan

Executive summary

Background

Every 4 years, the Department of Defense (DOD) conducts a review of military compensation. Among its objectives, DOD wants to evaluate whether military compensation is provided in the amounts and types of payments that ensure that servicemembers are adequately rewarded and that DOD budgets are efficiently and effectively spent. In addition, DOD must compete with private-sector firms and other government organizations for qualified personnel. Compensation is an important tool for meeting this competition.

Consequently, a thorough comparison of military and civilian compensation will help DOD evaluate and set pay to help meet its strategic objectives. The purpose of this study, one in a series that informs the 11th Quadrennial Review of Military Compensation (QRMC), is to directly compare active duty military and civilian compensation.

Approach and findings

Traditionally, researchers and DOD have compared Regular Military Compensation (RMC) and civilian wages. In the first section of this study, we continue this tradition by analyzing the trend in RMC over the decade of the 2000s versus the wages of equivalent civilians for enlisted personnel and officers. We also look at 2009 data on how RMC compares with civilian wages over the first 20 years of service for enlisted, senior enlisted, and officers.

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

In the second section of this study, we estimate the values to servicemembers of two noncash benefits—the military health care benefit and the Federal Insurance Contributions Act (FICA) tax advantage—relative to what equivalent civilians receive. Neither of these benefits is part of RMC, but both are received by all servicemembers. For this reason, understanding the value of these benefits provides greater context to the compensation comparisons presented in the paper.

RMC

RMC is a useful metric for comparing military and civilian compensation. Its strength is in analyzing trends because it is generally not vulnerable to the ups and downs of the national economy (as are continuation bonuses) or to variations and changes in the supply of various skill sets and changes in technology (as, for example, special pays for foreign language skills or hazardous duty are). In addition, its components are available in some form for all servicemembers. Finally, it has been around in some form since the early 1980s, and so it is likely to be well understood among servicemembers.

We estimate average RMC for enlisted personnel in 2009 at $50,747 and for officers at $94,735. These amounts corresponded to about the 90th percentile of wages for enlisted equivalent civilians and to about the 83rd percentile of wages for officer equivalent civilian wages. RMC has trended up over the last decade, both in real value[1] and in terms of the corresponding percentile of civilian wages.[2] In 2001, for example, *real* average RMC for enlisted personnel was about $42,110, corresponding to the 84th percentile of wages for equivalent civilians. For officers in 2001, *real* average RMC was about $86,843 and corresponded to the 80th percentile of wages for equivalent civilians. Conversely, we found that real wages have been flat or have even fallen for civilians at all education levels.

So, why has RMC grown relative to civilian wages in the decade? The largest components of RMC—Basic Pay (BP) and Basic Allowance for Housing (BAH)—both grew at rates faster than the growth of civilian wages by design. By acts of Congress, BP rose at the Employment Cost Index (ECI), which is the Bureau of Labor Statistics (BLS) estimate of national civilian wage growth, plus 1/2 point from 2000 to 2009.

1. We present all estimates of military and civilian compensation throughout this report in real (2009) dollars.
2. The corresponding percentile of RMC is the point at which a certain proportion of the civilian population makes less than that value.

DOD raised real BAH by over 40 percent for enlisted and about 27 percent for officers from 2001 to 2009. This was in response to their goal to reduce servicemember out-of-pocket housing expense to zero at the median of home rental prices in each military housing area. The outcome of these policies has been that RMC grew from the 84th to the 90th percentile of civilian wages for enlisted and grew from roughly the 79th to the 83rd percentile of civilian wages for officers.

Health care benefit and FICA tax advantage

Most civilians receive some kind of employer health care benefit, as do all servicemembers. However, of the more than 80 percent of full-time workers who do receive an employer-paid health care benefit, a large majority still pay a substantial share of health insurance premiums and/or cost of medical treatments, whereas servicemembers and their families receive all their medical care at no cost. We estimate that the average full-time enlisted equivalent civilian worker pays between $3,000 and $7,000 per year out of pocket for health insurance and medical care, depending on their family size. Officer equivalent civilians pay between $2,000 and $4,800 per year. Note that the real value of these expenses has grown by 60 to 75 percent over the decade, far faster than the rise in civilian wages or even the rise in RMC. These are costs that all servicemembers avoid; therefore, they are a valuable portion of their total compensation package.

All servicemembers also receive a FICA tax advantage that accrues because BAH and BAS are not subject to this tax. The calculation of this advantage factors in both the FICA tax that is avoided and the value of future Social Security benefits that are foregone. Using actuarial estimates of 1.9 to 2.5 percent expected return on the Social Security tax, and 10 to 12.5 percent personal discount rate for officers and enlisted, respectively, we estimated the expected, discounted *net* values of the FICA tax advantage to be around $2,042 per year for enlisted and $1,922 per year for officers.

Conclusion

These numbers do not, by themselves, determine whether military pay is too high or too low. Other factors, such as recruitment and retention, risk of war, the expected level of personnel tempo, and the desired quality level of military personnel, must also be considered when determining whether military pay levels are adequate.

While we do not directly address all of the potential factors here, our method provides a way to contextualize compensation so that decision-makers can decide how much and in what form DOD should pay its servicemembers.

Introduction

Background

Title 37 of the United States Code (U.S.C.) requires that every 4 years the President direct a complete review of the principles and concepts of the compensation system for members of the uniformed services.[3] The President has designated the Secretary of Defense as the executive agent for the 11th Quadrennial Review of Military Compensation (QRMC).

Like past reviews, the 11th QRMC is made up of multiple studies that examine various topics, including pay incentives for critical career fields, hostile fire and combat payments, and benefits available to wounded warriors [1]. CNA's part of the QRMC is to address how active duty military compensation compares with that of equivalent civilians.

Regular Military Compensation (RMC)

DOD has a long tradition of comparing RMC[4] and civilian compensation. In 1962, the Gorham Commission established the concept of RMC as a "rough yardstick to be used in comparing the compensation of members of the uniformed services to the compensation of civilian-sector employees." While the definitions of the four components of RMC have seen multiple transitions since then, for almost 50 years, DOD and military researchers have compared RMC with the average wages of equivalent civilians [2, 3, 4, and 5].

RMC is often chosen as an appropriate metric for a couple of reasons. First, because it has been around for so many decades, and because it is published annually by DOD [6], it is familiar to most servicemembers—something akin to the gross income or salaries of military personnel.[5]

Second, all servicemembers are eligible for all four components of RMC, either in cash or in-kind [4, 5, 6, and 7]. Reenlistment and continuation bonuses are typically available only to servicemembers in high demand job communities. Special and incentive pays are given to servicemembers for specific types of skills, duties, or geographic locations.

Third, as a comparison metric, RMC is relatively stable over time and across paygrades and years of service and, therefore, lends itself to trend analysis. RMC

3. U.S.C., Title 37, Chapter 19, and Section 1008(b).
4. RMC consists of military Basic Pay (BP), the military Basic Allowances for Housing (BAH) and Subsistence (BAS), plus the federal income tax advantage that accrues because BAH and BAS are not taxed.
5. For a brief history of RMC, see Appendix A.

is not as vulnerable to the ups and downs of the state of the U.S. economy, as are, for example, reenlistment and continuation bonuses. Nor is RMC vulnerable to the variations of the skills sets and quality levels of the labor market, as special and incentive pays can be.

Other factors of compensation

In addition to the comparisons that are made using RMC, there is value in understanding the role that other factors of compensation play. The other factors we examine are as follows.

First, servicemembers receive additional pay in the form of higher BAH when they have dependents. To determine if this influences comparisons of military and civilian pay, we separate servicemembers with and without dependents and analyze the RMC of each group against the median wages of equivalent civilian groups.

Second, for various reasons, some servicemembers are not eligible for BAH or BAS. For most of this analysis, we assume that the value of the military housing benefit is equal to BAH and BAS. But, we discuss the ongoing conversation and DOD's policies regarding the value of onbase housing and meals relative to BAH and BAS.

Third, we examine the value of two in-kind benefits that are received by all servicemembers and can be considered a generally expected part of compensation: the health care benefit and the FICA tax advantage.

Organization of this paper

In the first section, we conduct an empirical analysis of how RMC compares with civilian wages. It has three subsections: (1) our method for constructing the comparison groups so we're comparing like persons, (2) our method for estimating RMC and civilian wages using the available data, and (3) empirical results of the comparisons.

In the second section, we explore the role that other factors of compensation play. This is also in three parts: (1) a formal model of comparing military and civilian compensation, (2) our methods for estimating the value of the military and civilian health care benefit and the FICA tax advantage, and (3) empirical results of these estimates.

In the final section, we summarize and put into context the findings of our analysis.

Empirical analysis of RMC and civilian wages

RMC is the traditional metric used in comparisons of military and civilian compensation because all servicemembers are eligible to receive the four components of RMC: (1) Basic Pay (BP), (2) Basic Allowance for Housing (BAH), (3) Basic Allowance for Subsistence (BAS), and (4) the federal income tax advantage (TA) because BAH and BAS are not taxed as income [2, 3, 5, 7, and 8].

In this section, we describe a critical first step to ensure that military and civilian comparison groups are matched as closely as possible. We need to compare equivalent individuals in similar jobs. For practical purposes, this would ensure that the job-related characteristics, technical skills, and job experience are roughly the same. As a result, we could infer that both compensation levels and standards of living of the people in the comparable groups should be roughly the same. If we find that compensation isn't the same, we can explore the differences.

In view of that, we begin by describing our process of constructing military and civilian comparison groups. We divide civilians into groups based on their level of education to proxy the civilian equivalent of enlisted personnel and officers. We weight civilian populations by age to correspond to the experience profiles of military personnel.

We describe the methods we use to estimate the components of military and civilian compensation. RMC is a straightforward calculation by paygrade (PG), year of service (YOS), and family status (with or without dependents). For civilians, we use data from the 2001–2009 Current Population Surveys (CPS) to estimate median wages for full-time workers, by age and education level.[6]

Next, we show the results of the empirical findings, comparing military and civilian compensation (a) over the first 20 years of service in 2009 and (b) by trend in military compensation relative to civilian wages from 2001 to 2009.

Finally, we summarize the empirical analysis and discuss the inferences from our findings.

Comparable military and civilian groups

There are three broad characteristics of servicemembers and civilians that we use to make the groups comparable.

First, we proxy the level of technical skills of civilians with their education levels. We then compare the wages of civilians with high school diplomas, those with some

6. We include in civilian wages all hourly pay, salaries, overtime pay, tips, and bonuses. Servicemembers also receive bonuses, however they serve a different set of purposes than bonuses in the civilian sector.

college, and those with 2-year degrees with RMC for enlisted personnel. We compare the wages of civilians with Bachelor's degrees and those with Master's degrees and higher with RMC for officers.

Second, we use YOS as the proxy for military experience and civilian age as a proxy for civilian experience. Since job experience begins at different ages for civilians, depending on their level of education, we use the civilian age, minus the normative number of years of education for whatever degree they have, minus 7 (the oldest year most children are in the first grade) as the proxy for civilian workforce experience.

Third, because the military is the primary, full-time job for servicemembers, we consider only full-time, full-year civilian workers, and we calculate wages only from their main job and not other sources of income, such as from a second job.

We discuss each of these in detail.

Education levels

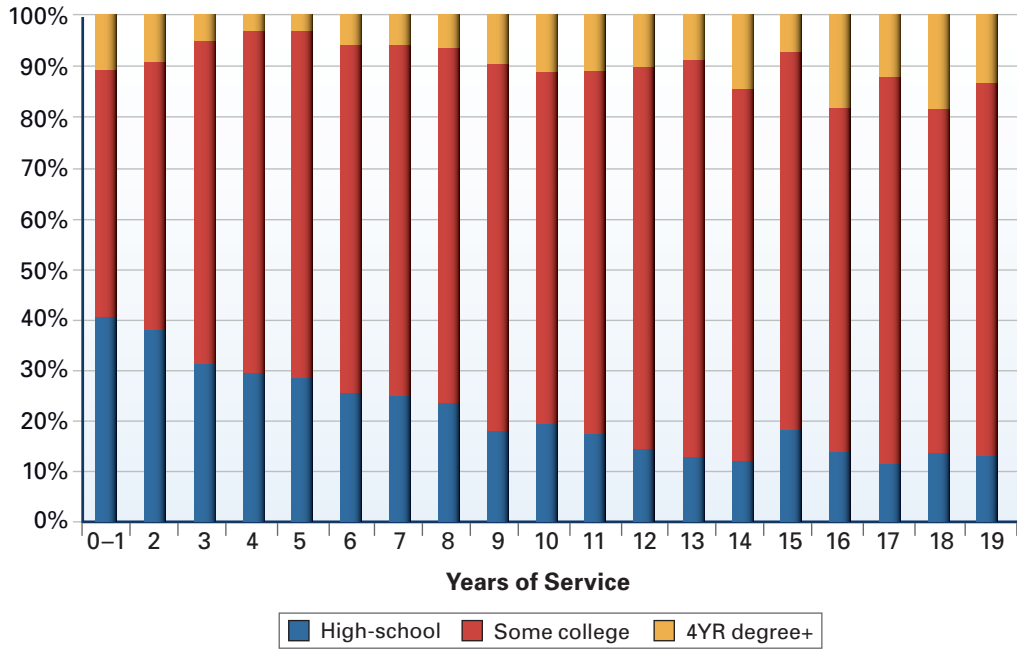
Ideally, we would like to compare individual military occupations with equivalent civilian jobs, but it is impractical in this study for two reasons. First, our focus is on DOD overall. To do an accurate comparison would require looking at many or all military occupations in all services.[7] Second, a large number of military occupations have no civilian equivalent. For example, Army and Marine Corps infantry or Navy antisubmarine warfare specialists are occupations that would be difficult to compare in the civilian workforce.

Nonetheless, to properly compare compensation, we need to match servicemembers and equivalent civilians by some proxy for technical skills. Traditionally, DOD and the military services have used education bands to represent civilian equivalents to military enlisted and officer personnel. The reasoning is twofold.

First, while there is not much information on higher education levels of military personnel, we know a few things. In general, officers need at least a Bachelor's degree to qualify for the officer corps, and officers often obtain higher education (Master's level or higher) in order to receive promotions. For enlisted, we have data from the 2006 Status of Forces survey (see figure 1), which show that the vast majority of new recruits have a high school diploma or some college.[8] Further, we see that the proportions of enlisted who receive some college and college degrees rise with YOS.

7. References [9 and 10] compared military compensation with civilian wages for medical personnel.

8. As we see in the chart, a small proportion of enlisted personnel have 4-year degrees. The fact that the proportion shrinks in the first 5 YOS suggests that only a few with Bachelor's degrees reenlist in the first term. The growth in the proportions after 5 YOS shows that some enlisted personnel are finding the time to get their degrees while in the service.



a. Source: Status of Forces Survey–Active, 2006.

Figure 1. Education levels of enlisted personnel by YOS[a]

Unfortunately, the data do not give us information about 2-year degrees.

The second reason is simpler to explain. Military training itself is considered by many to be equivalent to some college-level training.

For these reasons, we chose to follow the traditional route and use education levels as a proxy for enlisted and officer equivalence. Using the information in the CPS data, we separate civilians by education level, assuming that those with a high school diploma, some college, or a 2-year (Associate) degree are equivalent to military enlisted personnel, and that those with a 4-year degree (B.A.) or a graduate-level degree (M.A. or higher) are equivalent to military officers.

YOS/age/experience profiles

Comparing servicemembers and civilians who have roughly the same level of job experience is the next step. The data highlight two important differences.[9]

First, the age/experience profile is different for civilians and servicemembers. For example, the age/experience profile of enlisted equivalent civilian workers is much older than enlisted either with or without dependents. The median age of full-time

9. For a more detailed analysis of these age/experience profiles for servicemembers and civilians, see figures 21–24 in Appendix B.

enlisted equivalent civilian workers is about 36. For enlisted servicemembers without dependents, the median YOS is roughly 3, implying a median age of about 22. For servicemembers with dependents, the median YOS is about 8, implying a median age of about 27.

In addition to the differences in median age, the relative proportions of servicemembers at each YOS get smaller as YOS gets larger. This is because servicemembers leave but do not enter at high YOS. Among civilians, however, we see that the proportions get *larger* with age, until they reach about the middle forties. This is because, rather than leaving the workforce as they get older, civilians are more likely to enter full-time work.

Because servicemembers are younger than equivalent civilians (by age/experience), unweighted estimates of average wages would overstate the value of civilian compensation relative to military compensation. Therefore, for both enlisted and officers, we use a weighting algorithm on civilian data to simulate the military's experience profile in our estimates of median civilian wages. Essentially, we estimate the median civilian wage at each age. Then we calculate a weighted average of these values, where weighting is designed to make the civilian age profile look like the military profile. Also, we use separate weighting algorithms for calculating comparable wages for singles and those with dependents.

We use civilian age minus estimated normative years of education, minus 7 as a proxy for work experience—equivalent to military YOS.[10] Others have studied this proxy [11 and 12] and have commented on its relative strengths and weaknesses. The primary concern is that, since experience in the civilian sector is subject to labor mobility—moving in and out of the labor market or from one job to the next[11]—the age minus education proxy can overestimate actual work experience.

Another concern is that wages are subject to individual choice of hours worked, which changes with age itself. This is why civilian wages tend to decline for people in their late forties and early fifties—a result of declining hours worked rather than directly declining wages. However, since most servicemembers will have separated before that age, we're not as concerned about this effect on our study of wage comparisons in the first 20 YOS.

Another important consideration in forming the comparison groups is that the gender profiles of military personnel and civilian populations are not the same.

10. This assumes that civilians are in first grade at age 7, finish high school at 19, and achieve a 2-year degree at 21 or a 4-year degree at 23.

11. Moving from one job to another, even within similar occupations, can slow the building of actual job experience to the extent that there are firm-specific tasks that take time to learn.

Nearly half (48 percent) of full-time civilian workers are women, while about 15 percent of servicemembers are women. To compensate for the difference, we weight the civilian data by military profiles of gender and age/experience to provide equivalency to the military.[12]

Estimating RMC and civilian compensation from the data

Here we describe how we use the data to estimate the dollar amounts of military and civilian compensation. In the first part, we describe RMC and how we estimated the components of RMC. In the second part, we describe how we estimated the wages for equivalent civilians, specifying the assumptions we used for each of the civilian groups we defined earlier.

RMC

Regular Military Compensation is the base point from which we begin the analysis of military compensation. Using the data that we describe below, we estimate the average RMC for each servicemember and aggregate to calculate average RMC by YOS and the overall weighted average of RMC for enlisted and officers for 2001 through 2009.

Here we define each component of RMC and how we constructed RMC estimates with the data. Total RMC is equal to:

$$RMC = BP + BAH + BAS + TA ,$$

where:

BP = Basic Pay is the largest component of military compensation and is based entirely on a servicemember's PG and YOS.

BAH = Basic Allowance for Housing, the second largest component of RMC. It is a function of PG and whether the servicemember has dependents. BAH varies by military housing area (MHA) of the servicemember's unit. We assume that the value of the housing benefit is equal to BAH for all servicemembers. Because the personnel data do not have a specific MHA for many servicemembers who do not collect BAH,

12. In the 9th QRMC, military compensation was compared with wages of *male* civilians [13]. The logic was that, while civilian women entered and left the workforce more often than civilian men, military women gained experience at the same rate as military men. As a result, experience profiles of military women resembled those of civilian men more than civilian women.

    We argue that a major objective of compensation comparisons is to reveal civilian wage opportunities of military personnel. So, while it's true that military men and women gain experience at the same rate, military women nonetheless face the civilian opportunities of other civilian women, not those of civilian men. In any case, the male-female weighting is 85:15 and doesn't have a large effect on our overall results.

we used DOD's average of BAH in the United States for each paygrade, with and without dependents.

BAS = Basic Allowance for Subsistence, a cash allowance for subsistence that is based only on whether the servicemember is officer or enlisted.

TA = the federal income tax advantage, which is based on the amount a servicemember receives in BAH and BAS and his or her federal income tax rate. It is the total value of the tax savings that servicemembers receive because their BAH and BAS are not taxed. To estimate each servicemember's federal income tax advantage, we needed the marginal tax rate for each servicemember's gross wage, which is BP + BAH + BAS. We use family size from personnel records, and tax rates from 2001 through 2009.[13]

Civilian wages

We use data from the Current Population Survey of the U.S. Bureau of Labor Statistics from 2001 through 2009 to estimate the median wages of full-time civilians. The CPS gives a representative sample of the civilian workforce from which we can make reasonable comparisons with military servicemembers. The CPS has information about work status, age, and education levels, which allows us to form groups of civilians that are comparable with military personnel. It also contains data on wages, bonuses, and employer provision of health care coverage, from which we estimate earnings from work.

We look at civilians who are equivalent as defined by the criteria discussed earlier. For civilian wages, we show the *median* rather than the mean average (as we did for military compensation) because civilian wages are skewed, which causes the mean average to be biased higher than the distribution's actual central tendency.[14]

Military wages are not skewed, because no servicemembers receive an inordinately high wage based on RMC. As a result, the mean and median are roughly the same. However, because military promotions occur at relatively consistent YOS, the trajectory of RMC is somewhat discontinuous over a 20 year career. So, in our calculations of RMC, we use the mean average, which makes a smoother trajectory of observations than the median, yet without biasing the results.

13. Federal tax rates, by family type and income level from 2001 to 2009, were compiled by www.taxfoundation.org using IRS tax schedules.

14. The distribution of civilian wages is skewed as a result of a small proportion of the population who make very high wages.

Results of empirical analysis of RMC

Previously, we discussed how we defined our comparison groups and how we estimated military and civilian wages. Here, we use this information to show how military and civilian wages compare, considering both enlisted personnel and officers. We show these comparisons from two perspectives: by YOS over the first 20 YOS (i.e., a *career perspective*[15]) and over the 2001–2009 period in a *trend perspective*.[16]

Within each of these two perspectives, we describe and illustrate comparisons of compensation in the traditional method of comparing RMC with wages for all enlisted equivalent and all officer equivalent civilians.

Empirical analysis: career perspective (2009)

Enlisted and enlisted equivalent civilians: career analysis

Average annual RMC for enlisted personnel in 2009 ranged from around $37,000 in the first YOS to about $75,000 in the 20th year. For equivalent civilians, median wages ranged from $20,000 per year for high school graduates in the beginning of their work life to about $50,000 annually for those with 2-year degrees and around 18 to 20 years of work experience.

In figure 2, we show the 2009 career trajectories of RMC for enlisted personnel and the median wages for each of the three groups of equivalent civilians: those with 2-year degrees (AAs), those with some college, and those with high school (HS) diplomas.[17]

For enlisted servicemembers, RMC is larger than median wages for all three groups of enlisted equivalent civilians by a range of 44 percent higher than equivalent civilians with 2-year degrees, and upwards to 87 percent higher than those with high school diplomas. We also see that after about 15 or so years of experience, civilian wages begin to either flatten or rise at a less steep rate. Conversely, RMC continues to rise linearly with experience, expanding a positive pay gap late into the 20-year military career.

15. We use 20 years because that is the point at which servicemembers become eligible for the military retirement. Comparisons of compensation are different for members past 20 YOS since they can stay and receive military pay or retire and receive civilian wages plus a pension.

16. Congressional legislation has required that military Basic Pay grow at a rate that is faster than the growth of average civilian wages from 2000 to 2009. In addition, servicemembers have received large raises in the military housing benefit in response to a DOD decision to grow BAH until servicemembers have zero out-of-pocket expenses at the median of local home rental prices for equivalent civilians.

17. We show civilian wages separately for each of the three education groups, rather than postulate an algorithm in which the average education level rises over years of experience. We do this because no available data accurately show education levels possessed by military personnel in a way that accounts for the training received while in the military.

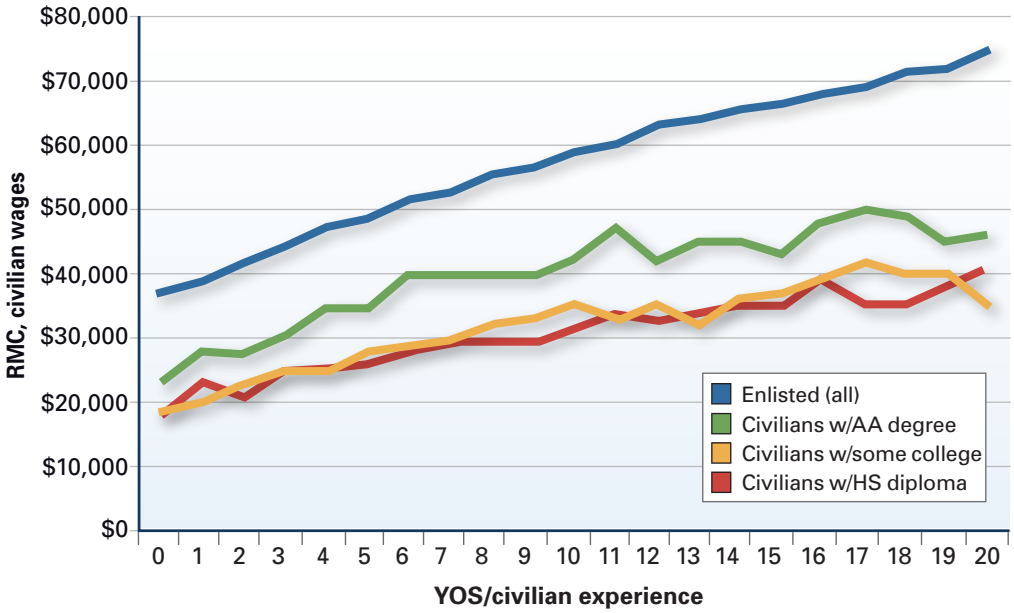


Figure 2. Average enlisted RMC and median wages of enlisted equivalent civilians, by YOS/civilian experience (2009)

Senior enlisted and civilian equivalents

In a separate evaluation, we look at RMC for senior enlisted personnel (those who are E-8 and E-9) from YOS 14, in which all are E-8, to YOS 29, in which nearly all are E-9.

In figure 3, senior enlisted are compared with civilians who have 2- and 4-year degrees. This reflects the concept that military service is equivalent to higher education in its influence on wages. The results show that, during the period of 15 to 30 years of experience, civilian wages tend to flatten, while senior enlisted RMC rises linearly and relatively steeply with YOS. Much of this rise is a result of senior enlisted being promoted from E-8 to E-9; at YOS 14 all of the senior enlisted in our data are E-8, but by YOS 29 nearly all are E-9.

Officers and equivalent civilians: career analysis

The career trajectory for officers begins with a steep slope in RMC, from nearly $55,000 in YOS 1 to over $81,000 by YOS 4 (figure 4). To the extent that the productivity of officers rises with YOS in the first years of service, this trajectory could represent the value of productivity. Because the cost of training officers is high, however, and because officers generally have a commitment in the first years

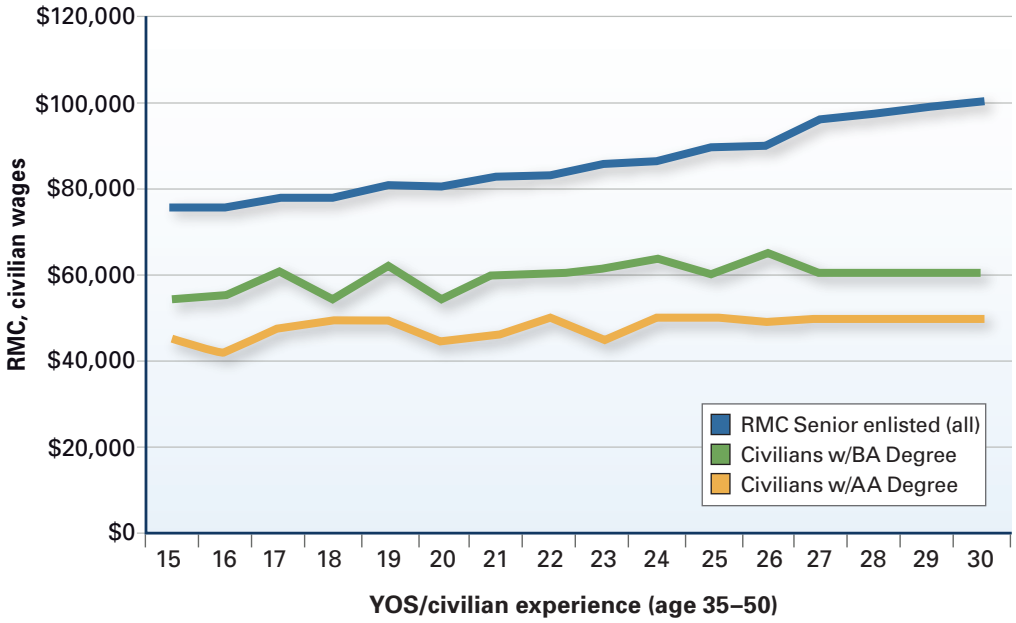


Figure 3. Average senior enlisted (E8-E9) RMC and median wages of civilians with college degrees, by YOS/civilian experience (2009)

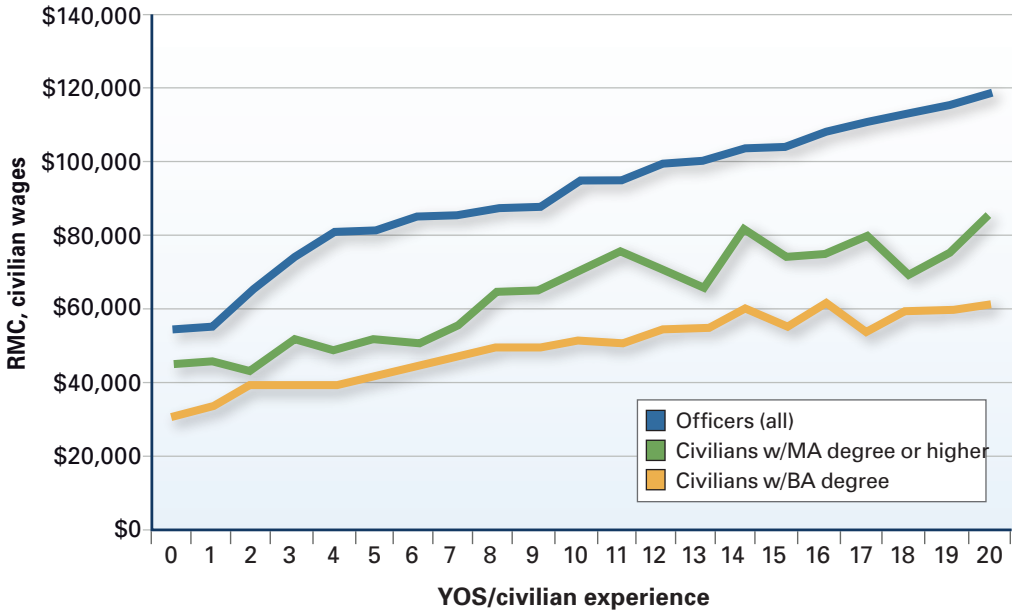


Figure 4. Average officer RMC and median wages of officer equivalent civilians, by YOS/civilian experience (2009)

of service, this type of pay trajectory could be a way for DOD to recoup some of the training investment. After the 4th year of service, RMC rises almost linearly from $81,000 to over $118,000 annually at the 20th year of service.

Officer RMC is, on average, more than 80 percent higher than wages for civilians with Bachelor's degrees, ranging from 60 higher to about twice as high through the 20-year career. Compared with median wages for civilians with graduate-level degrees, officer RMC is, on average, about 40 percent higher, ranging from about 20 percent higher in early YOS to more than 60 percent higher at later YOS.

Empirical analysis: trend perspective

Trend 1982–1999

In his analysis for the 9th QRMC, the author in [13] compared average RMC with average wages of *male* civilians from 1982–1999. The author looked at several specific groups of servicemembers and equivalent civilians. Here is a brief summary of his findings.

Looking at E-4s with 4 YOS, the author found that RMC had grown from about the 50th to the 72nd percentile of wage for male civilians age 22–26 with high school diplomas. At the same time, RMC for E-4s at 4 YOS grew from about the 50th to the 60th percentile of males with some college, as a result of high growth in returns to college during the period.

For officers, RMC for O-3s with 8 YOS actually *fell* from roughly the 75th to the 64th percentile of wages for male civilians age 28–31 with Bachelor's degrees during the same period. Similarly, O-4s with 10 YOS saw RMC fall from the 68th to the 58th percentile of wages for male civilians age 32–36 with Bachelor degrees during the period.

Trend 2001–2009

With the new century came important changes in the relative value of military and civilian compensation. Military compensation grew at a faster rate than civilian wages since the beginning of the decade because three of the four components of RMC grew faster than civilian wages *by design*.

In response to recruitment and retention problems that transpired in the late nineties, Congress enacted Title 37, Chapter 19, section 1009, entitled "adjustments of monthly basic pay," published in [14]. As a result of this new law, military Basic Pay, the largest component of RMC, grew at the Employment Cost Index plus ½

percent from 2000 to 2006. After that period, Congress chose to continue raising BP by ECI plus ½ percent in 2007, 2008, and 2009. The ECI roughly represents the average annual growth in civilian wages; thus, military BP grew faster in this period than average civilian wages.

In addition, BAH, the next largest component of RMC, and its tax advantage, have grown even faster in the last decade than BP, as a result of DOD's explicit objective to raise the military housing benefit until it reaches the level at which servicemembers have no out-of-pocket housing costs at the median rental price in each military housing area [15]. We describe the factors in the trend in RMC and civilian wages from 2001–2009 in more detail in the next subsection.

Military and civilian pay trends, the ECI and the CPI

The ECI for wages and salaries is estimated by the U.S. Department of Labor's Bureau of Labor Statistics. The index directly shows the change in the costs to employers of wages and salaries. It indirectly measures the annual change in average civilian wages and salaries.

The ECI showed positive growth in the last decade; for example, the ECI used for military raises in the last 3 years was 2.3 percent in the third quarter of 2005 (for the 2007 military raise), 3.0 percent in 2006 (for the 2008 raise), and 3.4 percent in 2007 (for the 2009 raise).

The ECI has been used by the military to set pay raises. In 1999, the U.S. Congress legislated that military Basic Pay should rise by ½ percentage point *above* the base ECI each year for the 2000–2006 period. In addition, from 2007 to 2009, Congress raised Basic Pay by ECI + ½ point in each of those years.

The Consumer Price Index (CPI), also published annually by the BLS, represents the average of overall prices (weighted by the items in a simulated market basket). It represents the relative price "level" in the United States from one period to another. Inflating prior-year dollars by the CPI allows us to judge changes in buying power, rather than just the changes in dollars.

Thus, the ECI tells us the growth in wages and salaries, while the CPI tells us the growth in the cost of living. If the ECI is higher, civilian workers are able to buy more, and vice versa.

Growth rates in BAH

As noted earlier, DOD's goal has been to reduce servicemember out-of-pocket housing costs to zero at the median of rents in each military housing area. Rental

prices have grown considerably but civilians do not receive increases in wages as a result of changes in housing prices. On the contrary, when housing prices rise, civilians often find themselves with less discretionary income, at least in the short term.

BAH rose considerably both in nominal and in real terms in the 2001–2009 period.[18] For example, the average increase in the nominal value of BAH was 5.7 percent in 2007, 4.7 percent in 2008, and 5.0 percent in 2009.[19] In all three of those years, increases in BAH were far above the cost of living as defined by the CPI. Although the CPI is not the metric that DOD uses to determine BAH rates, the fact is that both BP and BAH grew faster than the CPI.

Real versus nominal RMC (2001–2009)

As we show in figure 5A, average enlisted RMC was nearly $35,000 in 2001, and nearly $51,000 in 2009, both in *nominal* terms. By "nominal," we mean that these were the actual dollar amounts that servicemembers received in 2001 and 2009. When comparing the two amounts, however, our interest is in what servicemembers can buy, or the purchasing power of their compensation. That's why we make the RMC comparisons only in real dollars.

To be specific, enlisted RMC in 2001, presented in 2001 dollars, was $34,783. Inflating by the CPI, we see that *real* 2001 RMC (presented in 2009 dollars) was around $42,110, meaning that $34,783 in 2001 could buy the same amount of things that $42,110 could buy in 2009.

Similarly, while nominal officer RMC went from $71,732 in 2001 to $94,735 in 2009, real officer RMC (in 2009 dollars) grew from $86,843 in 2001 to $94,735 in 2009 (figure 5B).

In the following discussion of our analysis of RMC and civilian wages, we present the 9-year trend of real RMC for enlisted and officers, and compare them with the real wages for the civilians in each of the education groups that represent the comparable groups.

In addition to showing the trend lines in real dollar amounts, we also have calculated and present the percentile of civilian wages to which RMC corresponds.[20]

18. To clarify, "nominal" values are those presented in same-year dollar values (e.g., 2001 RMC presented in 2001 dollars). "Real" values are those inflated by the CPI and presented in 2009 dollars values (2001 RMC inflated and presented in 2009 dollars).

19. These calculations are averages weighted by YOS.

20. For example, when we say that RMC corresponds to the 80th percentile of wages for equivalent civilians, it implies that RMC is higher than the wages of 80 percent of equivalent civilians.

Figure 5A

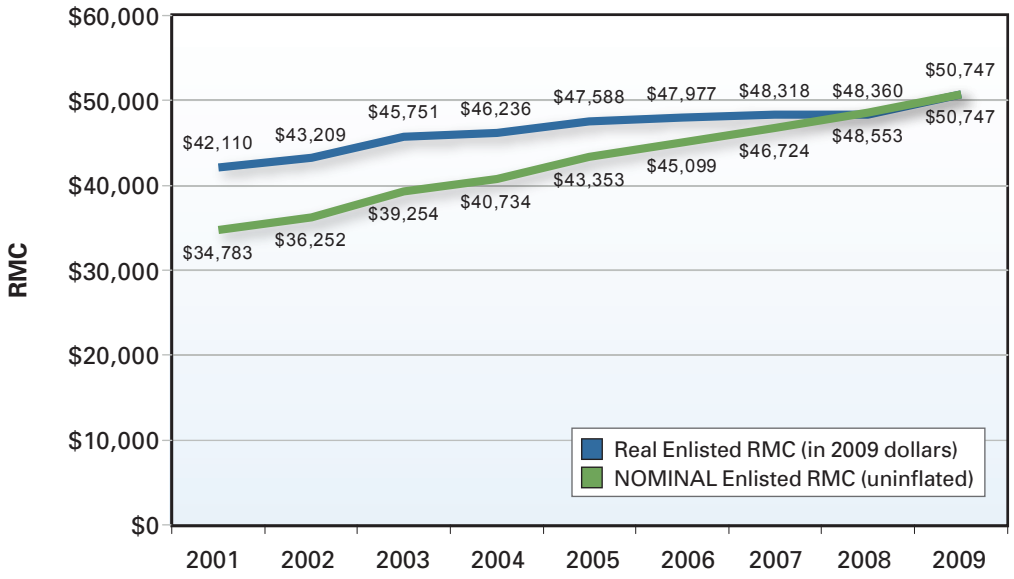


Figure 5B

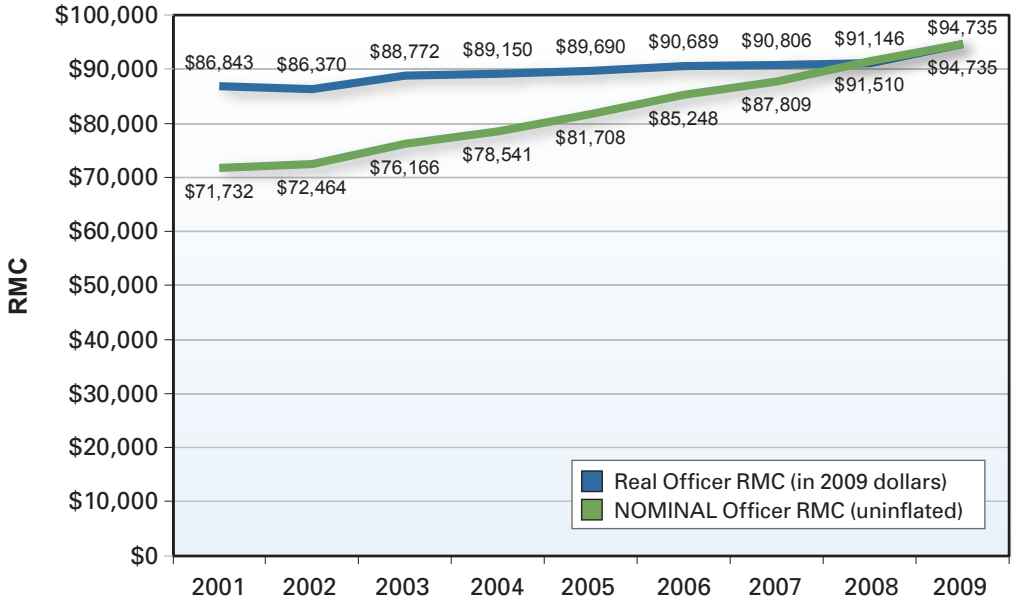


Figure 5. A. Real versus nominal enlisted RMC (2001–2009)
B. Real versus nominal officer RMC (2001–2009)

Enlisted personnel: trend analysis

Real trends in RMC for enlisted personnel and wages for equivalent civilians

In figure 6, we show trends in real RMC (in 2009 dollars) for enlisted personnel from 2001 to 2009, compared with real equivalent civilian wages. Although RMC has grown substantially over the decade, and real RMC in 2009 was greater than in 2001, RMC was relatively flat from 2004 through 2008, rising only early in the decade and in 2009. Real civilian wages dropped slightly over the decade for all three education groups.

From 2001 to 2009, real enlisted RMC grew by over 20 percent, from $42,110 to $50,746; civilian wages did not grow much at all for any of the three enlisted equivalent groups. In fact, for most of the decade, real median civilian wages fell, only growing in the last 3 years or so to become roughly equal with 2001 wages in 2009. Enlisted RMC corresponded to the 84th percentile of equivalent civilian wages in 2001 and grew to correspond with the 90th percentile of civilian wages by 2009.[21]

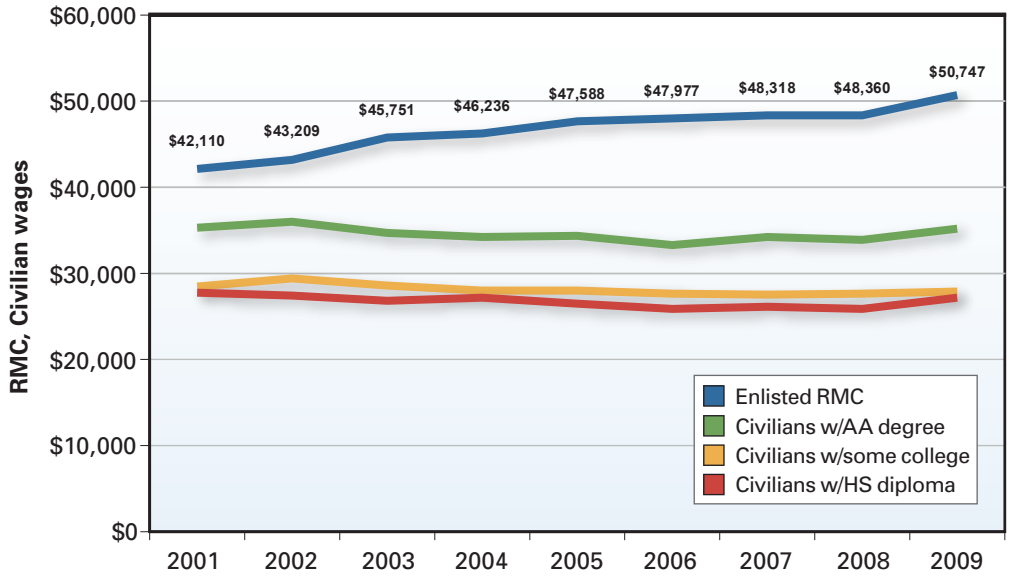


Figure 6. Real trend in average RMC for all enlisted personnel and real trend in median wages for enlisted equivalent civilians (2001–2009)

21. In our charts, we separate the three enlisted equivalent civilian education groups, but, for the percentile calculations, we combined the three groups into one composite "civilian equivalent" group. By necessity, the estimates from the composite groups are weighted by the civilian education profiles (since data on military education profiles don't exist).

Officers: trend analysis

Real trends in RMC for officers and wages for equivalent civilians

In figure 7, we show trends in real RMC for officers from 2001 to 2009, compared with real equivalent civilian wages. As with enlisted personnel, *real* RMC for officers has been relatively flat, rising only early in the decade and in 2009.

We see here that civilian wages for more educated civilians, whom we call "officer equivalent" civilians, did not fall as much over the decade as they did for the "enlisted equivalent" civilians. As a result, the gap between officer RMC and equivalent civilian wages did not grow as much as it did for enlisted RMC.

Real officer RMC grew by over 9.1 percent from 2001 to 2009, from roughly $86,840 to about $94,735. During the same period, civilian wages for those with 4-year degrees didn't grow at all; for civilians with graduate-level degrees, real wages grew by just over 1 percent. For officers, RMC corresponded to the 80th percentile of equivalent civilian wages in 2001, and grew to correspond to the 83rd percentile of civilian wages by 2009—a significant rate of growth, though not as large as for enlisted.

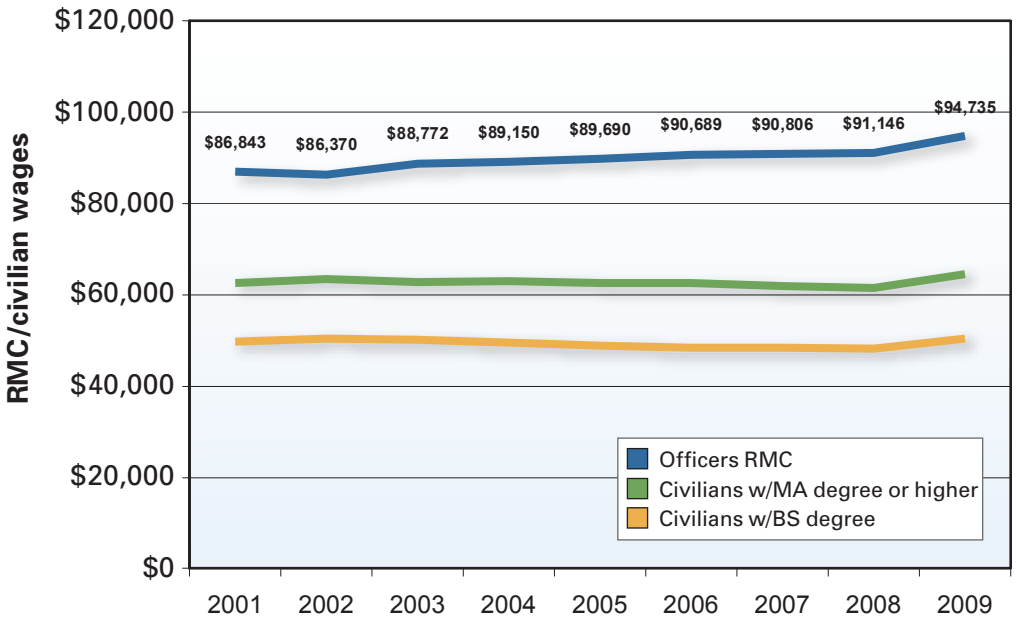


Figure 7. Real trend in RMC for all officers and real trend in median wages for officer equivalent civilians (2001–2009)

Concluding remarks on RMC

From the career perspective, average RMC tends to grow consistently through a 20-year career, compared with civilians for whom average wages grow consistently for about the first 10 years, but grow only moderately or are flat in the second 10 years of work life.

We see this in figures 2 and 4 (2009 data), where RMC for enlisted personnel grows at an average of about $1,875 per YOS for the 20-year career. Officers experience rapid growth in RMC at first (about $26,000 in the first five years), and then moderate growth of $2,000–$2,500 per year for the remaining 15 YOS.

Average wages of civilians, however, tend to grow moderately in the first 6 to 10 years of experience—around $1,600 (HS graduates) to $3,000 (Associate degrees) and about $2,000 per year for civilians with Bachelor's degrees—before seeing wage growth flattening out after 8 to 10 years of experience. Conversely, civilians with graduate-level degrees see moderate growth of wages in the first 10 years and then quite rapid growth, averaging about $5,000 per year after year 10.

From the trend perspective, average RMC rose during 2001 through 2009. Enlisted servicemembers saw average RMC rise considerably relative to the median wages of equivalent civilians. For enlisted personnel, RMC rose from the 84th to the 90th percentile of wages for equivalent civilians. For officers, average RMC rose from the 80th to the 83rd percentile of equivalent civilian wages.

These values do not, by themselves, determine whether military pay is too high or too low. Other factors, such as recruitment and retention, risk of war, the expected level of personnel tempo, and the desired quality level of military personnel, must also be considered when determining whether military pay levels are adequate. Still, this analysis suggests that military pay is relatively stable and growing over a military career and over time.

Exploring other factors of compensation

Modeling discretionary income

RMC is the traditional metric used in comparisons of military and civilian compensation because all servicemembers are eligible to receive the four components of RMC.

However, there are other factors of compensation that could be considered in developing a fuller picture of servicemember compensation. To identify which other factors are most important to focus on, we developed a formal model to deduce

and test a metric for comparing military and civilian compensation. The purpose of this excursion is not to undermine RMC as a comparison metric but to enhance comparisons of military and civilian pay by considering non-RMC components that are typically perceived as compensation.

The model is based on two traditional inferences from basic economic models of labor in a market economy. First, workers who are alike in technical skill and job experience, and whose jobs are also alike, will receive similar total compensation. Second, workers and families who receive the same total compensation will have roughly similar standards of living and approximately the same basic living expenses.

The corollary from these inferences, and by the definition of discretionary income, is that the metrics used to compare military and civilian compensation should lead servicemembers and equivalent civilians to have roughly the same discretionary income.

Therefore, we suggest that, when comparing the incomes of two groups, what matters is not gross pay, or even disposable income, but discretionary income. We will define discretionary income and evaluate its usefulness as an objective here.

Discretionary income is normally defined as the average amount of money available for a worker to spend after taxes and basic living expenses have been paid [16, 17, 18, 19, and 20]. Note that discretionary income differs from disposable income, which is net pay after taxes.

Why do we care about equalizing discretionary income in the model? There are many definitions of income; gross income, net income, and disposable income are just a few examples. Why discretionary?

Differences in tax laws can make what appears to be equal gross wages result in differing discretionary incomes. In addition, some employers pay part of compensation in the form of noncash benefits. Employers may vary in the balance of cash and noncash compensation, depending on the tax rules and the various costs to employers of providing benefits.

Further, some workers may receive a varying amount of the benefit for reasons that are unrelated to their productivity in the labor market. For example, servicemembers receive a greater housing benefit if they have a family. Similarly, employer-provided health insurance often is a greater benefit to employees with families.

Servicemembers benefit from both of these factors: (1) a significant share of their compensation is not taxed as ordinary income, and (2) they receive relatively high-value benefits in the form of in-kind compensation.

A formal model of military and civilian compensation

We present here a theoretical model of compensation, in order to deduce a set of metrics for comparing military and civilian wages that are more comprehensive than RMC in isolation.

We begin the model with gross cash wages for equivalent servicemembers and civilians. We subtract out the tax burden (which will differ for military and civilians) and basic living expenses to obtain discretionary income. Our objective is to deduce measures of military and civilian compensation that equalize discretionary income, given gross wages, tax burdens, and basic living expenses.

We make the following four assumptions in this model. The first two assumptions relate to how we must divide the populations into suitable comparison groups. The next two assumptions are related to the value of the military BAH and BAS and/or the value of onbase housing and meals, for those who don't get BAH or BAS. The four assumptions follow:

1. The people in each of the comparison groups have roughly the same job experience and technical skill levels. This implies that the value on the labor market would be roughly the same.
2. The people in each of the comparison groups have the same standard of living. This implies that, on average, the total cost of basic living expenses would be roughly the same.
3. Each servicemember in the model is eligible for military BAH and BAS, or servicemembers who do not receive BAH and BAS receive onbase housing and meals of the same value.
4. *BAH* + *BAS* is roughly equal to expenditures for housing and food for servicemembers.[22]

In the first phase of the formal model, we further assume that taxes, housing, and food are the only basic living expenses. Then, in the next phase, we include estimates of noncash benefits not included in RMC, focusing specifically on employer-paid health care benefits and the FICA tax advantage.

Mechanics of the formal model

For purposes of modeling the relationship between military and civilian compensation, we propose a representative agent model in which we consider two

22. Combining assumption 4 with assumption 2 implies that civilian housing and food expenses are also equal to military BAH and BAS. However, civilian housing and food expenses are not called out separately because they are embedded in civilian wages rather than applied as allowances (as they are for servicemembers).

people—one civilian and one servicemember—who are the same in job-related characteristics (job experience and technical skills) and who have the same basic living expenses (that is, they have the same standard of living).[23]

We begin by postulating the gross income of each representative. Civilians earn wages and bonuses, and servicemembers receive Basic Pay and Basic Allowances for Housing and Subsistence (BAH and BAS).

The algorithm for discretionary income is gross wages (W) minus income taxes (t), minus basic living expenses (E). Gross wages for civilians are salaries (or hourly pay) plus bonuses. For servicemembers, *gross wages* are *BP* + *BAH* + *BAS*.

For servicemembers, discretionary income is equal to the military gross pay (W_M) minus income tax on Basic Pay (t_B), minus living expenses (E):

$$D_M = W_M - t_B - E\,.$$

For civilians, discretionary income is equal to civilian gross pay (W_C, which includes both wages and bonuses), minus income taxes on all pay (t_W), minus living expenses (E):

$$D_C = W_C - t_W - E\,.$$

Note that income taxes are different for military and civilian income because, while civilians pay tax on all income, servicemembers pay only on BP. Also note that, by assumption two, E in this simple model is the same for both military and civilians. We relax this assumption in the next subsection.

We postulate a military wage-setting goal with one of two objectives, either to (1) set military gross wages to be equal to the gross wages of equivalent civilians (i.e., $W_M = W_C$), or (2) set military gross wages such that military and civilian discretionary income are the same (i.e., $D_M = D_C$). First, equal *gross wages* implies that:

$$(D_C + t_W + E) = (D_M + t_B + E)\,.$$

Since $t_B < t_W$, then $D_M > D_C$. The servicemember's discretionary income is *higher*, in the case of equal gross wages, because servicemembers pay income taxes only on Basic Pay, whereas the civilian pays on his or her entire wage. There is no particular reason to suppose that servicemembers or workers would prefer the tax savings to more gross pay.

23. The mathematical presentation of this formal model is in Appendix C.

However, when military compensation is such that the *discretionary income* of servicemembers and civilians are equal (i.e., when $D_M = D_C$), we find that:

$$W_C = W_M + r * (BAH + BAS)/(1 - r) .$$

The right-hand side of this equation is the military gross wage plus the tax advantage on BAH and BAS. If r were the marginal federal rate only, that would be RMC. However, since servicemembers also don't pay FICA tax on BAH or BAS, $r = (t + f)$, where t is the federal income tax rate, and f is the FICA tax rate. Consequently, the right-hand side is greater than RMC by at least the amount of the FICA tax advantage as long as the federal income tax is greater than zero.

This final equation tells us that if (1) the technical skills and job experience levels of servicemembers and civilians are the same, (2) housing and food are the only basic living expenses, and (3) basic living expenses, including all taxes, are the same for both servicemembers and civilians, discretionary income for servicemembers and civilians will be equal when civilians wages are equal to RMC.

What if assumptions in the formal model don't hold?

But what if the conditions and/or assumptions do not hold? We will consider each of our four assumptions in turn and will also consider the outcome when the assumption doesn't hold.

As we described in an earlier section, to simulate assumption 1, we construct equivalent comparison groups. Several other studies have focused on particular technical or professional groups [9, 10, 21, 22, and 23]. However, this study looks broadly across DOD, and so we construct broad-based comparison groups based on education levels, age/experience, gender, and full-time work status.

But the reason this matters is that, when comparison groups are the same, we expect that their value in the labor market, and thus their wages, will be the same. The fact that servicemembers who are otherwise identical are paid differently for having a family breaches this assumption. We will address this in the next subsection by analyzing compensation separately for servicemembers with and without dependents.

Assumption 2 states that servicemembers and civilians within comparison groups have the same basic living expenses (i.e., $E_M = E_C = E$). As we described in an earlier section, this is based on the premise that workers with the same skill and experience base will earn roughly the same incomes and thus be in roughly the same social class.

This concept is helpful in this study because the purpose of many inkind fringe benefits is to reduce out-of-pocket living expenses. Employer-paid health insurance,

life insurance, pensions, and other retirement contributions are all examples of benefits that reduce living expenses. But, as we'll see, since servicemembers receive free medical and most civilians don't, the assumption of equal living expenses doesn't hold. If E_M is not equal to E_C, setting discretionary income equal means that:

$$W_C = W_M + t_S/(1 - r) + (E_C - E_M) .$$

This states that discretionary income will be equal when civilian wages are equal to RMC plus the difference in the living expenses.

Assumption 3 says that all servicemembers either receive BAH and BAS or they receive onbase housing and meals that are valued at roughly BAH and BAS. This may be a debatable assumption because only two-thirds of servicemembers receive BAH and BAS. Further, of those who live on base, more than 60 percent are young (E-1 to E-4 or O-1) and single, and many of them are in training and living in multiperson housing.

The main issue here is whether the value of the military housing benefit is the same for servicemembers of the same rank and family status. For those not eligible for BAH or BAS, average RMC could overstate the value of compensation. This would be true to the extent that there are differences in the quality of onbase housing relative to off-base housing, and to the extent that servicemembers prefer the money to an in-kind benefit.

Two programs of the Office of the Secretary of Defense (OSD)—the Military Housing Privatization Initiative (MHPI) and OSD's Partial BAH—may have had the effect of partly narrowing any existing gap between the perceived value of BAH and military housing. The first does this by improving the quality of onbase housing. The second does this by providing a small cash reimbursement to servicemembers who live on base.[24] The MHPI program transfers part of the construction and management of onbase housing to private firms. The firms can increase profits if servicemembers choose to live on base rather than collect BAH.[25] They will be successful to the extent that this improves the quality of housing and narrows the preference gap.

24. Partial BAH was not originally created for this purpose. The 1977 DOD Appropriation Act. Public Law 94-361, section 303(b), 90 Stat 923.925 provided that a portion of the annual military pay raise in 1977 would go to BAQ. Partial BAQ was authorized to compensate servicemembers who were not eligible for BAQ and whose pay raise that year would have otherwise been less than servicemembers who collected BAQ.

25. For more details on DOD's Military Housing Privatization Initiative, see: http://www.acq.osd.mil/housing/overview.htm.

Finally, assumption 4 depends largely on the extent to which DOD is successful at matching BAH to the median cost of local housing for servicemembers in each paygrade. Another study could confirm or reject this. But, this is what we assume.

BAS, however, was never meant to feed the entire family—only the servicemember. Thus, for those with dependents, this assumption does not hold. As a result, while BAS reduces basic living expense for food, it does not reduce it to zero for military families.

Health insurance coverage and FICA

We address two large noncash benefits, which all servicemembers receive and which reduce basic living expenses. Specifically, we (1) analyze the effect of the military health care benefit since, unlike civilians, servicemembers and their families receive all medical care free of cost, and (2) the FICA tax advantage, which all servicemembers receive and civilians don't.

Most full-time working civilians also receive some type of health care benefit, either from an employer, a spouse's employer, or the government, and yet they still pay a large portion of health care expenses. Additionally, those who do not receive employer benefits will pay for their own health insurance and/or medical expenses out of pocket.

In order to include these basic living expenses that civilians have but servicemembers don't, civilian discretionary income is equal to wages, minus taxes, housing and food expenses, and expected health care expenses. We use the term "expected" to denote the probability that that the health insurance of civilian workers will be partially paid for by their employers.

The algorithm for discretionary income when housing, food, *and* health care are basic living expenses is:

$$D - W - t - E - HC\,.$$

The important point here is that, for servicemembers, $HC = 0$. In other words, health care is free. So, for them, discretionary income is the same as before:

$$D_M - W_M - t_B - E\,.$$

However, for civilians, expected health care expenses depend on both the probability (π) that they will have some kind of employer or government coverage and their out-of-pocket costs for either case:

$$D_C - W_C - t_W - E - \{\pi * HC_{C1} + (1-\pi)* (HC_{C2})\} .$$

The result is that military and civilian discretionary income will be equal when:

$$W_C = W_M + \{\pi * [r/(1-r) * (BAH + BAS) + HC_{C1}] + (1-\pi) * [r / (1-r)* (BAH + BAS) + HC_{C2}/(1-r)] .$$

When civilian wages (W_C) are equal to military gross wages plus the income tax advantages, plus the expected value of the military health care cost avoidance.[26]

Conclusions from the formal model

The model clearly shows that, when our four assumptions hold, discretionary income will be equal when RMC is equal to average wages for equivalent civilians. The four assumptions are strong, however, and may not hold. Assumption 1 doesn't hold because servicemembers receive different pay for having dependents. We will address this by separating those with and without dependents and analyzing them individually.

The second assumption doesn't hold because servicemembers all receive free medical care and a FICA tax advantage, while equivalent civilians pay a portion of their medical costs and FICA tax on all their income. We address this by estimating the expected value of servicemembers' health care cost avoidance and the FICA tax advantage.

For the third and fourth assumptions, we assume that DOD's use of MHPI and Partial BAH will continue to narrow any remaining gap that exists between the value of onbase housing and BAH.

Empirical analysis of other factors of compensation

We address each of these with the following empirical analyses by applying data to the results of the formal model to examine how military and civilian compensation compare.

In the first subsection, we separate servicemembers into four groups, enlisted with dependents, enlisted without dependents, officers with dependents, and officers

26. An empirical study of the military health care cost avoidance (and other non-RMC benefits) in this formulation was developed by the author in [8], reported by the 10th QRMC in [3], and reviewed by the General Accounting Office (GAO) in [24 and 25].

without dependents. These categories are based on the observation that servicemembers with dependents are paid more than those without, even when they are alike in every other way. We don't compare single military with single civilians because, aside from the health care benefit, civilians don't get paid differently just because they have families. However, we do note that single military are substantially younger than those with dependents, so we compare them with a proportionately young civilian group.

In the next part, we estimate the difference in value of the military and civilian health care benefits. Using data from 10 years of annual Kaiser Reports on employer health benefits, we estimate the expected average out-of-pocket health care expenditure for covered and uncovered civilians. From 10 years of CPS data, we estimate the proportions of equivalent civilians whose health care is covered by employer or government plans. Using these results, we estimate an expected value of health care cost avoidance that servicemembers receive because they get their medical care free.

Finally, we estimate the tax advantage that servicemembers receive because they don't pay FICA taxes on their BAH or BAS. This benefit is made complex by the fact that today's FICA tax advantage can entail lost Social Security benefits in the distant future. We consult the literature for information about expected returns to the Social Security and the rate at which people might discount future financial benefits in order to estimate a net tax advantage, which considers both the tax advantage and potential lost benefits.

With and without dependents: career RMC

An important characteristic of servicemembers must be considered when comparing military and civilian compensation. Among like servicemembers—those who have the same skills and experience—those who have dependents receive total compensation that is higher than those who are single. The same is largely not the case among civilians.

As a consequence, while single servicemembers and single civilians will have the same basic living expenses, single civilians will typically receive the same wages as civilians who have families (all else equal). The result is that, when average RMC and civilian wages are the same, discretionary income will be higher for the single civilians than for single servicemembers. Conversely, since servicemembers with dependents receive a higher RMC, equivalent civilians with families will have a lower discretionary income.

To address this, we conduct separate comparisons of the wages of civilians with the wages of single servicemembers and with the wages of servicemembers with dependents.

Enlisted with and without dependents: career perspective

We show enlisted servicemembers with and without dependents separately in figure 8. Annual RMC is a little higher, about $3,200 on average, for enlisted personnel *with* dependents since they receive a higher housing allowance and its consequent federal income tax advantage. This ranges from about $2,700 in the early and mid years of service to around $3,800 at the higher YOS. The difference ranges from around 4.7 to 8.5 percent of RMC.

As discussed earlier, RMC for both those with and without dependents is substantially larger than median wages for enlisted equivalent civilians in all three education groups. As we'll see in more detail in the next subsection, the percentile ranking of RMC against civilian wages is not substantially affected by the difference in BAH payments by dependent status, at any given YOS.

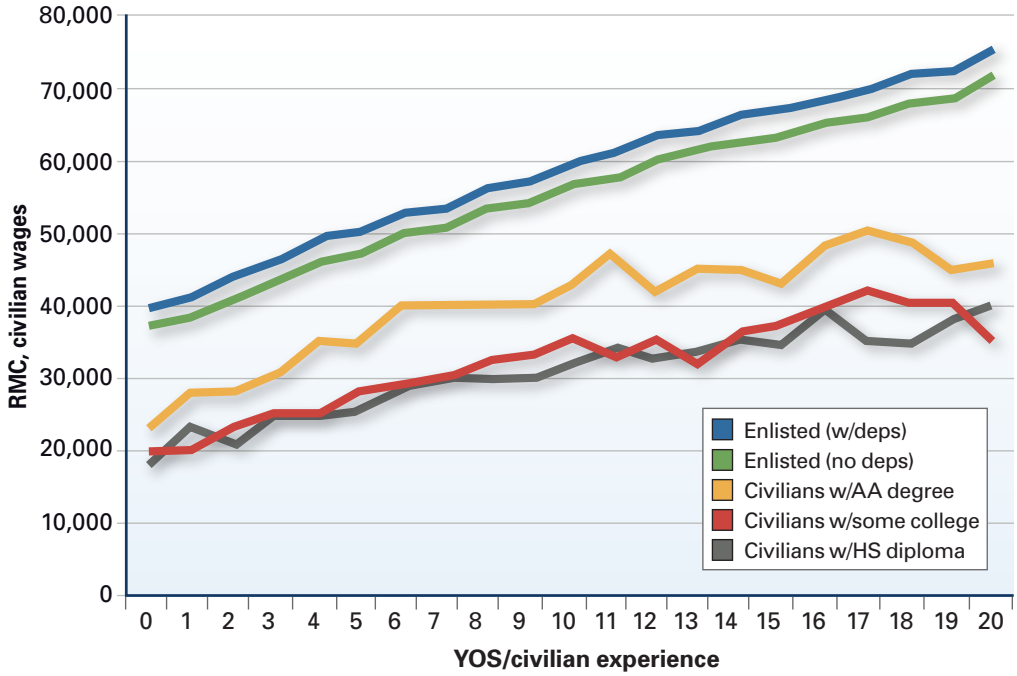


Figure 8. Average enlisted RMC, separating those with and those without dependents, and median wages of enlisted equivalent civilians, by YOS/civilian experience (2009)

Senior enlisted with and without dependents: career perspective

As with all enlisted, the difference between RMC for senior enlisted with dependents and those without dependents is small relative to overall military compensation—an average of roughly $1,500, ranging from about $700 to $2,900. This is an average of less than 2 percent of RMC (figure 9).

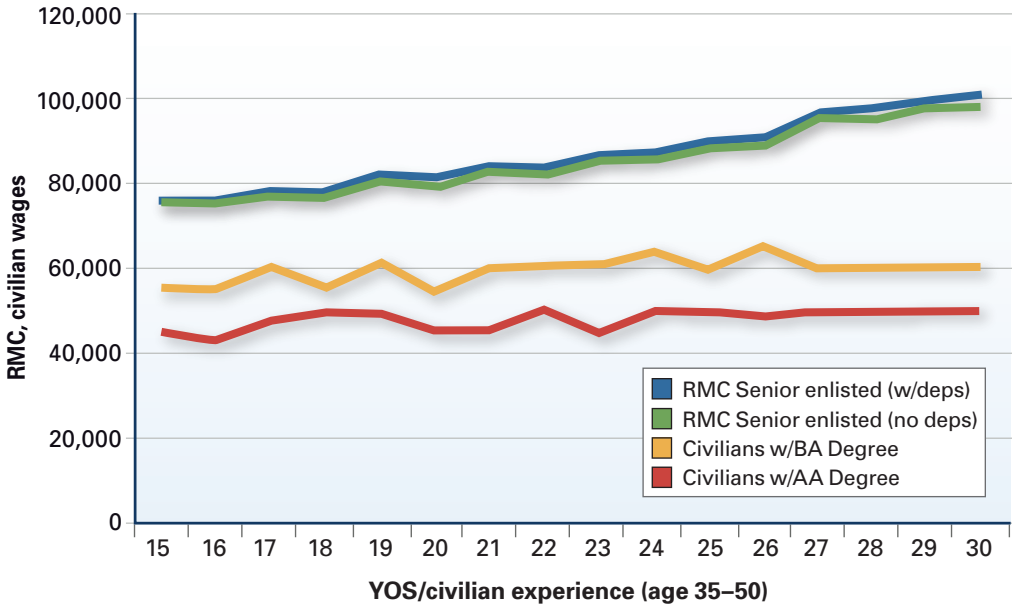


Figure 9. Average senior enlisted (E8-E9) RMC, separating those with and those without dependents, and median wages of civilians with college degrees, by YOS/civilian experience (2009)

Dependent status has a negligible effect on the percentile ranking of senior enlisted against wages for equivalent civilians at any given YOS.

Officers with and without dependents: career perspective

In figure 10, we see that officers with dependents made more on average than their single colleagues in 2009. However, almost all the difference occurs in the first 3 years of service, where officers with dependents make from about $2,750 to $5,700, or 4.3 to 10.7 percent more than their single colleagues.

After the third year of service, the difference in RMC is only about 2 to 3 percent of RMC.

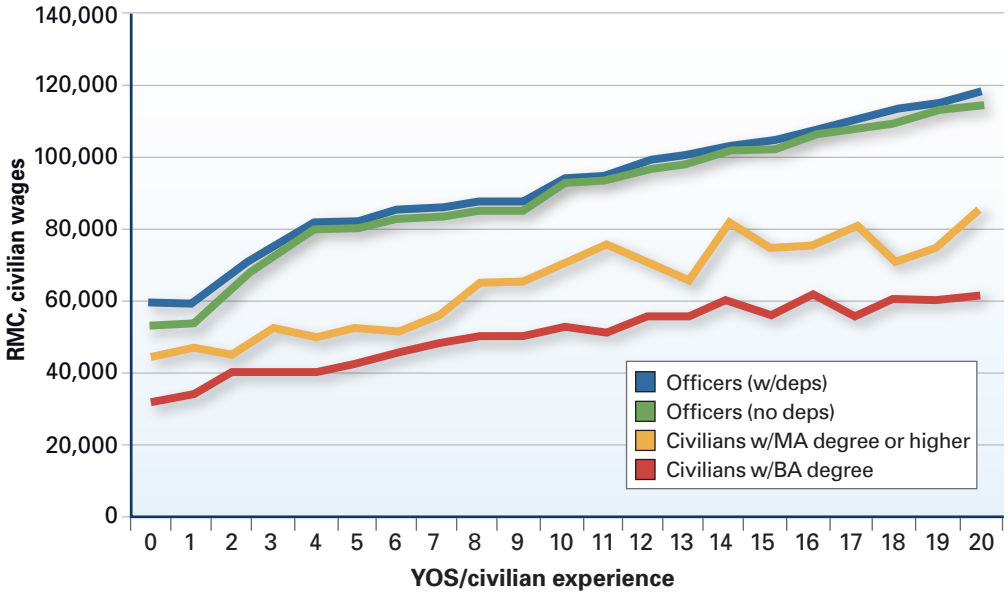


Figure 10. Average officer RMC, separating those with and those without dependents, and median wages of officer equivalent civilians, by YOS/civilian experience (2009)

As we saw in the previous section, for both officer groups, RMC is substantially higher than median wages for equivalent civilians for most of a 20-year career, where equivalent civilians are those who have either Bachelor's or graduate-level degrees.

With and without dependents: 2001–2009 RMC trends

Enlisted with and without dependents: trend perspective

Looking at servicemembers with and without dependents separately is revealing. Comparing the results in figures 11 and 12, we see first that *average* RMC is substantially less for servicemembers without dependents than for those with dependents. For example, average RMC in 2009 for those with dependents was $56,519 (figure 11), while we estimated it was $42,080 for those without dependents (figure 12).

This seems to conflict with the results presented in figure 8, which shows that the difference between the two groups is only about 4.7 to 8.5 percent of RMC. However, those numbers were estimated for servicemembers at a given YOS. In our trend estimates, the difference is almost entirely explained by the fact that servicemembers without dependents are substantially younger than those with dependents.

The median YOS for enlisted servicemembers *with* dependents is about 7, suggesting a median age of about 25 or 26, while the median YOS of those *without*

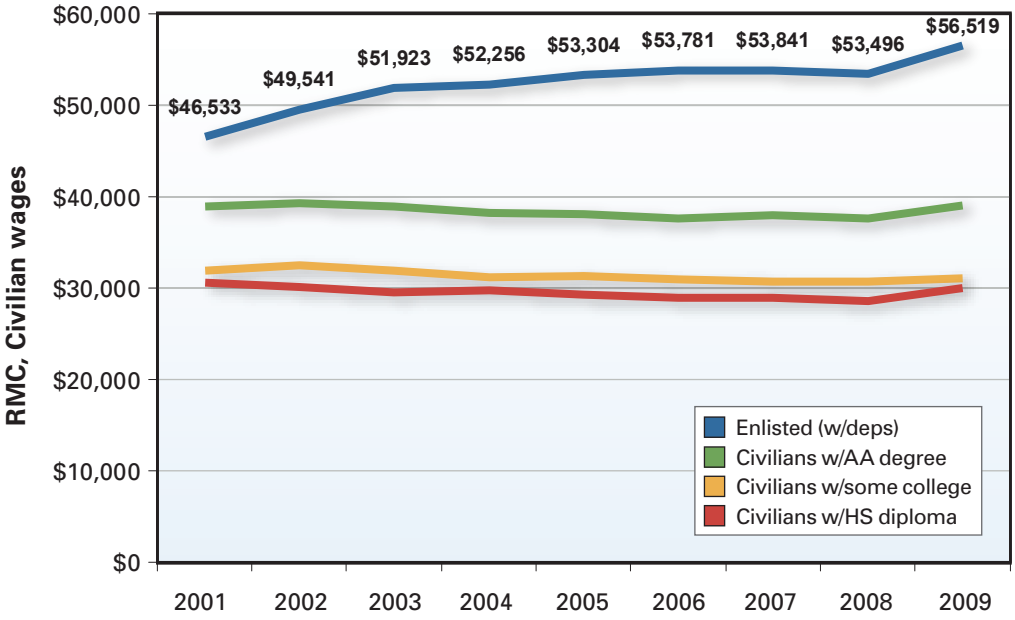


Figure 11. Real trend in average RMC for enlisted personnel with dependents and real trend in median wages for enlisted equivalent civilians (2001–2009)

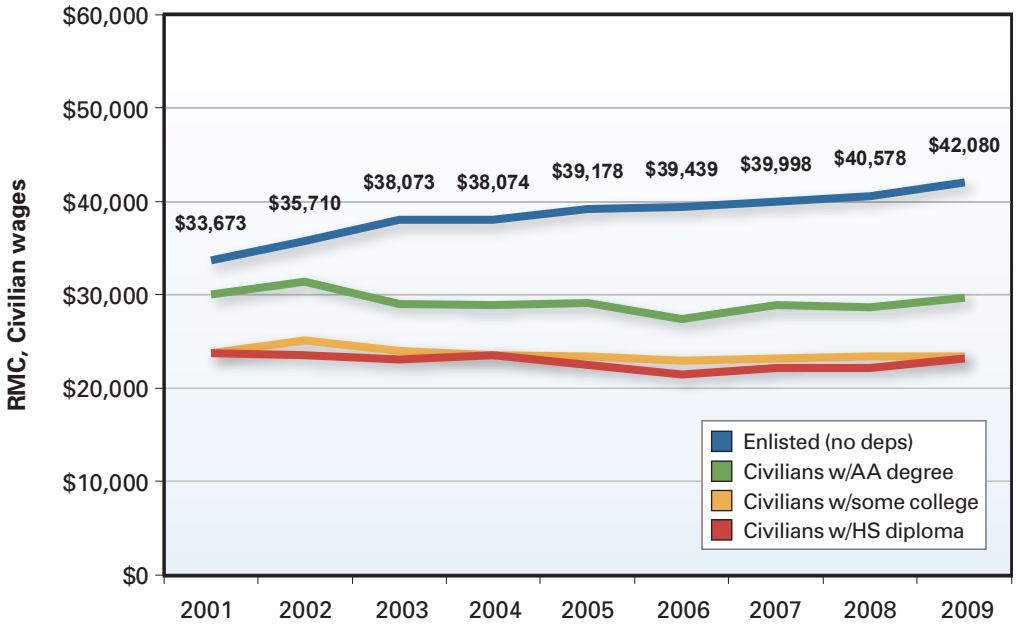


Figure 12. Real trend in average RMC for enlisted personnel without dependents and real trend in median wages for enlisted equivalent civilians (2001–2009)

dependents is about 3, suggesting a median age of around 22. Since RMC rises with YOS, average RMC will be higher for servicemembers with dependents.

Consequently, in the trend estimates, we weighted the civilian estimates by military YOS profiles when comparing wages, so that we make appropriate comparisons of military and civilian populations. So, percentile ranking reveals that RMC for both servicemembers with and without dependents corresponded in 2009 with roughly the 90th percentile of median wages for their equivalent group, as it does for the military at large.

We find that RMC corresponds to roughly the same percentile of wages for equivalent civilians for both groups of servicemembers. RMC for enlisted with dependents corresponded with the 84th percentile of wages for equivalent civilians in 2001 and rose to about the 90th percentile in 2009. This was similar for servicemembers with no dependents, whose RMC also corresponded with the 84th percentile of equivalent civilians in 2001 and rose to the 91st percentile in 2009 (figures 11 and 12).

Looking at the RMC trends for enlisted, we see that average real RMC for enlisted with dependents grew from over $46,500 in 2001 to over $56,500 in 2009 (figure 11). Average real RMC for enlisted without dependents (figure 12) grew from nearly $33,700 in 2001 to just over $42,000 in 2009.

Officers with and without dependents: trend perspective

Just as we saw with enlisted RMC, average RMC for officers without dependents is much smaller than RMC for those with dependents. For officers with dependents, average real RMC grew from $89,900 in 2001 to nearly $102,000 in 2009. For officers without dependents, average real RMC was about $64,370 in 2001 and grew to nearly $75,800 by 2009 (see figures 13 and 14).

As with enlisted personnel, this occurs for the same reason: officers without dependents are, on average, much younger. The median YOS for officers without dependents was around 5, suggesting a median age of 28 or 29. For officers with dependents, the median YOS was closer to 14, implying a median age of 37 or 38.

As before, we compared RMC with equivalent civilians whose age distribution corresponded with their comparative group, servicemembers with or without dependents. As a result, real RMC for officers without dependents corresponded with the 74th percentile of real wages for equivalent civilians in 2001 and rose to the 83rd percentile by 2009. For officers with dependents, real RMC corresponded with the 79th percentile of real wages for equivalent civilians in 2001 and rose to the 83rd percentile in 2009.

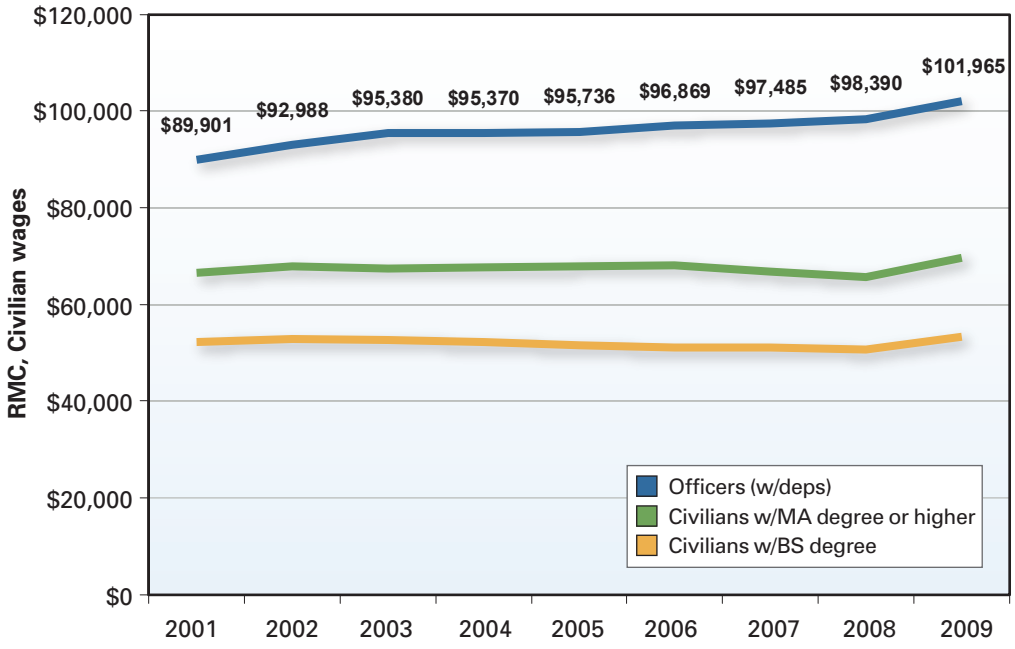


Figure 13. Real trend in average RMC for officers with dependents and real trend in median wages for officer equivalent civilians (2001–2009)

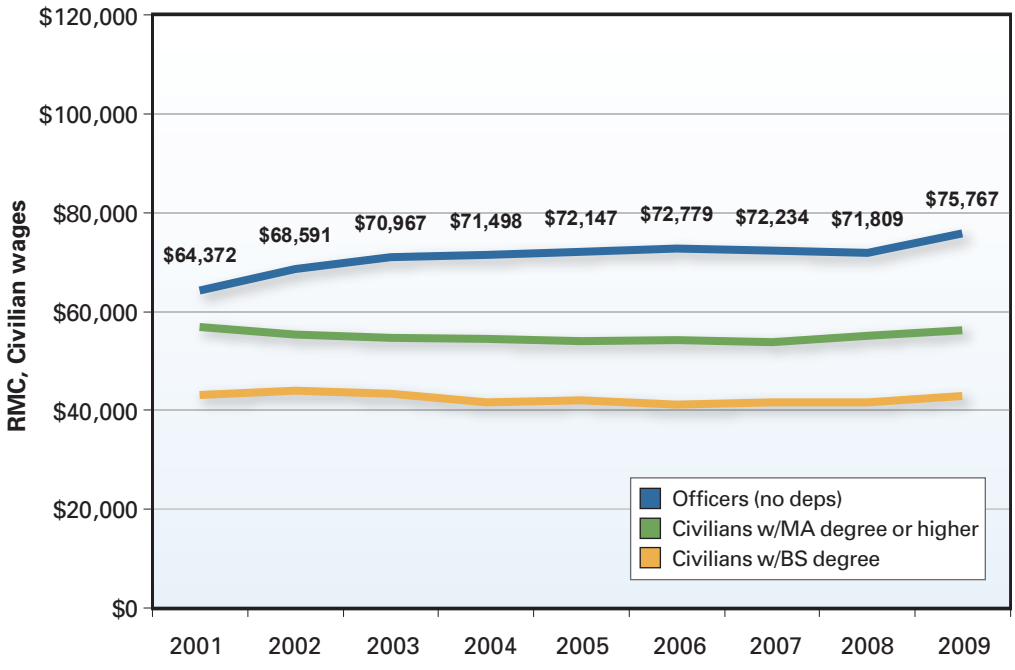


Figure 14. Real trend in average RMC for officers without dependents and real trend in median wages for officer equivalent civilians (2001–2009)

Closing remarks

We see that differences in BAH and the consequent tax advantage result in nontrivial differences in RMC for servicemembers with and without dependents. Nonetheless, comparing RMC with wages of equivalent civilians, the differences do not appear to have a substantial effect on the percentile ranking for either group of servicemembers.

We therefore conclude that, for purposes of comparing military and civilian pay, the differences in pay between those with and without dependents is relatively small.

To be clear, our conclusion is based on one criterion, that wages for servicemembers with and without dependents correspond to roughly the same percentile as wages for civilians in their education and experience levels. Others could argue that by some other criterion—fairness or retention—these are substantial differences.

Value of the military health care benefit

Up to now, we have assumed that basic living expenses include housing and food. Many, however, would consider medical care a basic living expense.

The reason one might consider that health care expenses are a basic living expense is that most workers in the United States have health insurance. According to the U.S. Centers for Disease Control and Prevention, about 78.9 percent of American adults under 65 have some sort of health insurance coverage [26]. And, according to Kaiser surveys on employer coverage, about 61 percent have some form of employer-paid health insurance, making health insurance the most common and the most expensive noncash benefit offered by employers.[27]

So, if nearly everyone buys some health care, it is, by definition, a basic living expense. As with all living expenses, the amount spent on health care will vary from person to person, but the average expenditure within a group is the best estimate of the basic expense.[28]

While most civilians pay for a portion of the cost of their health care, servicemembers and their families get their health care free. In this subsection, we take a brief look at how military and civilian health plans differ. After that, we discuss how the comparative value of the military health plan is equal to the out-of-pocket costs

27. For some employees, the retirement benefit is more valuable and/or more costly to employers than the health care benefit. For the large majority of employees, however, the retirement benefit is in the form of employer contributions to a 401(k) or 403(b). This puts most retirement plans in the category of cash payments, even if it's deferred cash.

28. Reference [27] presents evidence that employees sacrifice some wages to get employer coverage, so they are actually paying more for health care than estimates of out-of-pocket costs would suggest.

that civilian workers can expect to pay since we would expect that servicemembers would pay them if they worked in the private sector.

Finally, we estimate these values for the four military groups: enlisted with dependents, enlisted without dependents, officers with dependents, and officers without dependents. As we did with comparisons of RMC and civilian wages, we make estimates in both the career perspective and the trend perspective in our empirical analysis.

Comparing military and civilian health care plans

Military health plans. All servicemembers and their families are beneficiaries of the military's TRICARE health coverage in one of three forms. First is TRICARE Prime, which is essentially free of charge but restricts the choice of providers to those at the Military Treatment Facilities (MTFs). Thus, TRICARE Prime is the military's version of a closed Health Maintenance Organization (HMO) along the lines of a civilian HMO, such as Kaiser Permanente.[29]

The dependents of servicemembers are also eligible for TRICARE Standard and Extra, which offer greater choice of providers but carry small out-of-pocket expenses. Standard and Extra are akin to the civilian Point of Service (POS) health plans, in which the primary provider is an HMO but some specialty care outside the HMO is allowed at higher cost, and the Preferred Provider Organization (PPO), which is a health insurance contractual arrangement in which medical care is normally given by providers within a provider network.

Civilian health insurance coverage. According to the Kaiser Family Research Foundation Report on Employer Health Benefits [28], about 61 percent of civilian workers were offered health coverage by their employer. However, they aren't the only workers who are covered. Another 20 percent of workers whose employers don't offer health insurance coverage are nonetheless covered by a spouse's or a parent's employer. Other workers are covered by a government plan, such as the Department of Veteran Affairs or TRICARE for military retirees and their families.

According to the responses in the CPS data, roughly 85 percent of full-time workers are covered by their employer, a spouse's employer, or the government. This varies somewhat by level of education, job experience, and whether workers have families.

That workers with families are more likely to have employer coverage is most likely from a selection effect, resulting from both the greater financial need for health

29. See [8 and 29] for more details about the military TRICARE plans.

insurance of those with families and from the fact that the value of health insurance is more valuable for those with families, providing further incentives to accept positions with companies that offer health insurance.[30]

In figure 15, we show that the proportion of servicemembers who have dependents grows steeply with YOS in the first 10 or 12 years of service and then levels off at around 85 or 90 percent. Although these rates are roughly similar for officers and enlisted, enlisted servicemembers appear to have families a little more rapidly with YOS than do officers.[31]

About 60 percent of enlisted equivalent civilians with dependents have employer health insurance coverage in the first few years of job experience. This proportion of coverage grows steeply before it levels off at about 80 percent coverage by year 9 or 10 (see figure 16). For enlisted equivalent civilians who are single, coverage remains at around 60 percent and doesn't rise by much, on average, until about year 12 or 13, when the proportion of coverage grows to about 70 percent.

For officer equivalent civilians who have families, an average of 85 percent are covered, and this proportion grows with experience and levels off at over 90 percent coverage at year 7. For officer equivalent civilians who are single, the proportion of coverage is about 80 percent at all years of experience.

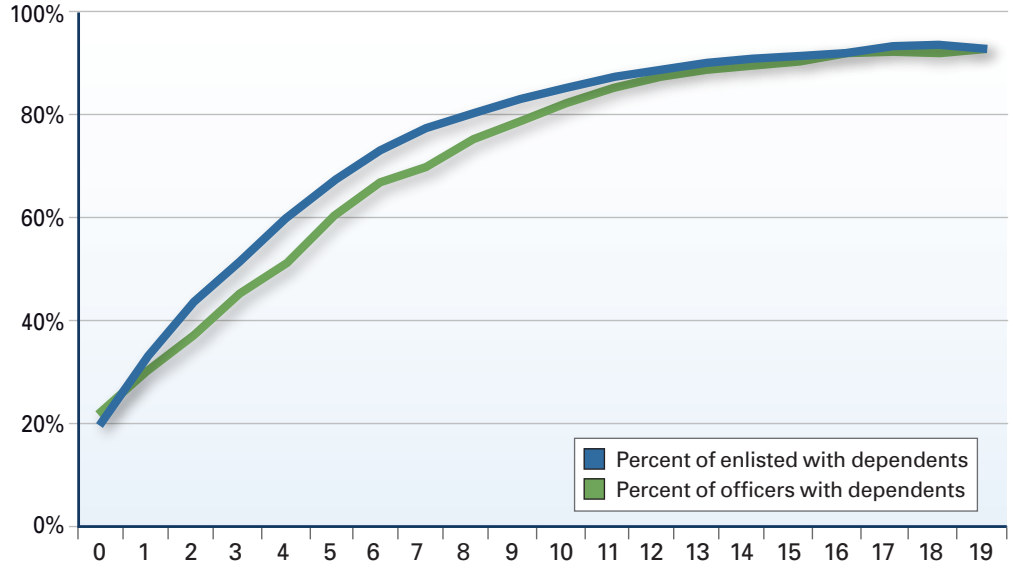


Figure 15. Percentage of servicemembers who have dependents, by YOS (2009)

30. The first point will be correct to the extent that workers sacrifice wages for health insurance *among firms*, and that singles prefer cash. The latter point is correct to the extent that workers with families do *not* sacrifice wages for health insurance benefits *within the same firm*.

31. This is true even though officers are 3 to 4 years older, on average, at the same YOS as enlisted.

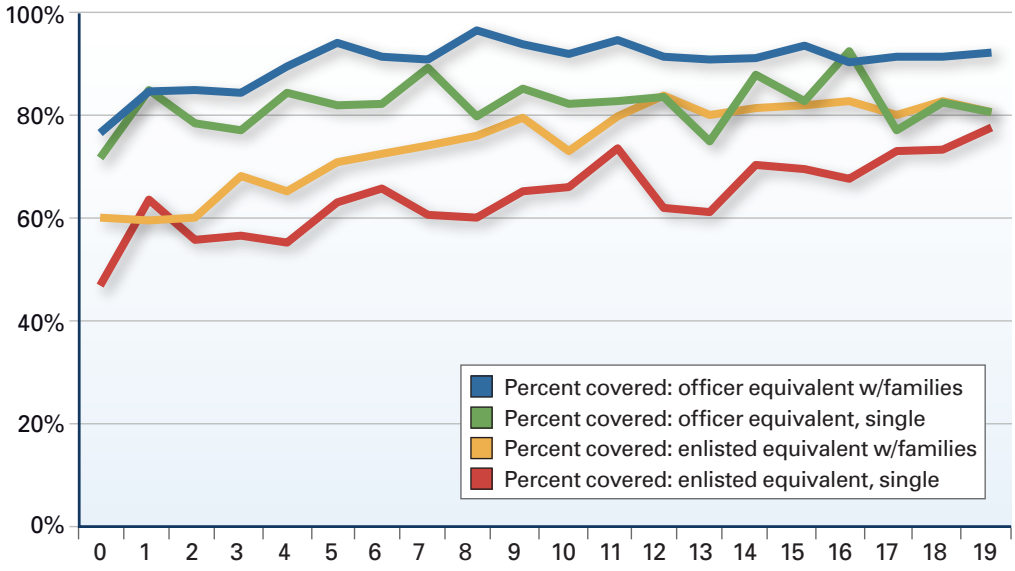


Figure 16. Percentage of civilians with health coverage by an employer, a spouse's employer, or a government health plan, by YOS (2009)

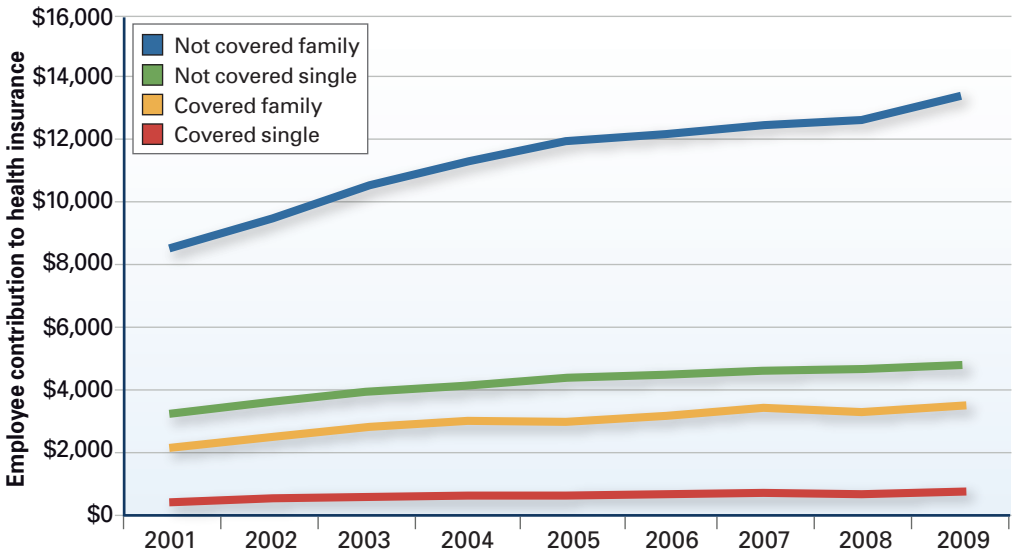
Health insurance premiums and other health care costs

Here we describe and illustrate the costs of health insurance. The data on these costs come from the Kaiser Foundation Reports of Employer Health Benefits from 2001 to 2009. We see that, on average, the cost of health insurance premiums rose by roughly 20 percent annually from 2001 through 2009 (see figure 17).[32]

Most civilians pay all or part of the insurance premium, deductibles, copayments and other out-of-pocket (OOP) costs for medical visits. About 5 percent of the CPS respondents were covered by an employer group plan but still paid 100 percent of insurance and medical costs. About 17.5 percent of full-time workers had no access to employer or government coverage and paid *all* health insurance and/or medical costs.

Families who are not covered by an employer or government plan and thus must pay for their own health insurance (or their own medical care), pay an average of over $13,000 per year for family coverage [28]. This is up from a little over $7,000 in 2001, an increase of over 85 percent in 8 years. Families who have employer or government coverage pay an average premium share of less than $4,000, which is a

32. Health insurance premiums will be roughly the same regardless of the education level of workers. However, the average *share* of premium that covered workers pay could be different *among* firms, to the extent that some employees tend to prefer to receive higher wages to health insurance coverage. The data don't provide this level of detail, and so we combine all employees and show only the differences among the four groups—uncovered singles, uncovered families, covered singles, and covered families.



a. Source: Average health insurance premiums, Kaiser Surveys of Employer Health Coverage, 2001–2009
b. This assumes that those who are not covered by an employer or government plan pay the entire health insurance premium themselves.

Figure 17. Trends in health insurance premium costs facing workers who are and are not covered by employer or government plan[a,b]

little less than one-third of the full cost of the health insurance premium but also nearly double the average share in 2001.

Single civilians pay a much smaller average premium, and, though those singles who are covered pay a similar *share* of the premium as their colleagues with families, it is a share of a much smaller premium. Those singles who are covered paid an average of about $780 in 2009, up from about $360 in 2001. Singles who were not covered and paid the entire premium paid well over $4,000 in 2009, up from about $2,650 in 2001.

On average, health insurance premium costs nearly doubled from 2001 to 2009, ranging from about an 80- to 90-percent increase for those not covered by their employer to a 95-percent increase for covered families and a 110-percent increase for covered singles. Of course, the overall cost of living increased as well in the same period by a little over 20 percent. Dividing the rise in health insurance costs by the CPI, we see that the *real* cost of health insurance rose a little over 60 percent from 2001 to 2009.

In the next subsection, we'll use these data on the costs civilians pay, on average, for health care and estimate the value to military personnel of avoiding these costs by

being in the military. Throughout this discussion, we assume that, if servicemembers were in the private sector rather than in the military, they would expect to be covered by employers or the government in the same proportions as full-time equivalent civilians with the same family status.

Expected value of health care cost avoidance

We now present the excursion where we include in our model the average civilian out-of-pocket costs of health care that servicemembers avoid. As we did with RMC, we show the results from both a career perspective (YOS 0–19) and a trend perspective (2001–2009).

The algorithm for the expected value of health care cost avoidance (VH) is as follows:

$$V_H = \pi * (Prem_{Share} + OOP) + [(1-\pi)/(1-r) * (Prem_{All} + OOP)] ,$$

where:

π = probability that the civilian has employer-paid or government health insurance.

r = the marginal federal tax rate; this calculation stems from the fact that civilians who are covered by an employer pay their out-of-pocket costs out of pretaxed dollars, and thus receive a tax advantage on their health care benefit. Civilians who are not covered pay out of after-tax dollars and receive no tax advantage.

$Prem_{Share}$ = the percentage of health insurance premium that employer-covered civilians pay.

$Prem_{All}$ = the entire insurance premium if the civilian is not covered by an employer or government (this is a proxy for the cost of all medical care for them.)

OOP = all other out-of-pocket expenses, such as deductibles and copayments.

Note that, because the algorithm contains a probability (π), it would be considered an "expected value."

This is the basic algorithm for health care cost avoidance that we use for both the career and trend perspectives. In the trend perspective, we add to the algorithm the weighting mechanism that controls for the differences in the YOS/experience profiles of civilians and servicemembers, and of servicemembers with and without dependents.

Health care results from a career perspective (2009)

The expected value of health care cost avoidance for servicemembers falls with YOS, largely because for civilians the probability of having employer coverage increases as job experience rises (see figure 18).[33] As we saw in figure 15, for enlisted equivalent civilians who have families, the probability that they'll be covered rises from 60 percent at 1 to 3 years of experience to about 80 percent by their 11th year of experience.

Note that the expected value of health cost avoidance is quite a bit higher for enlisted personnel than for officers. This is again because officer equivalent civilians are more likely to have jobs with employer health coverage (from 80 to 90 percent coverage, depending on experience and family status) than are enlisted equivalent civilians (from 60 to 80 percent coverage).

Thus, we can say that the expected value of the military health benefit is substantially higher for enlisted servicemembers than for officers relative to what they could expect to receive in the civilian workforce. Furthermore, the value remains higher for enlisted throughout a 20-year career.

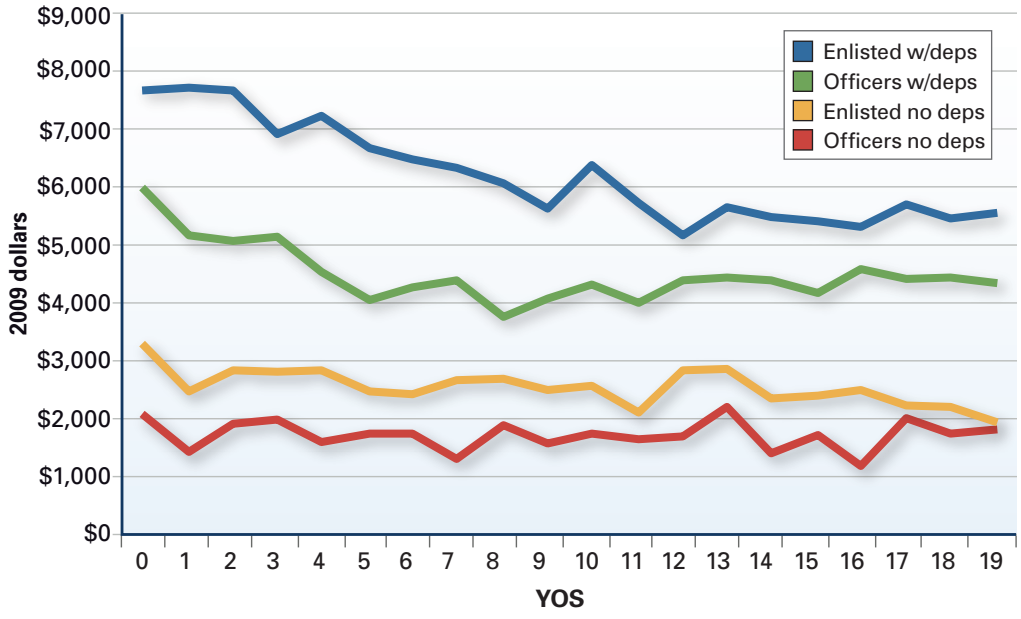


Figure 18. Expected value of health care cost avoidance, by YOS (2009)

33. Servicemembers from YOS 20 and after are eligible for health care with very low out-of-pocket costs when they retire. As a result, we assume that the value of health care cost avoidance for servicemembers after YOS 20 is zero.

Health care results from a trend perspective (2001–2009)

The basic algorithm for calculating the overall average of expected health care cost avoidance in a particular year is much the same as the algorithm for each YOS. Here, however, just as we did with estimates of military versus civilian wages, we weighted values by each of the military YOS profiles to get a weighted average of the expected value of military health cost avoidance for the four military groups: enlisted with dependents, enlisted without dependents, officers with dependents, and officers without dependents.

For enlisted servicemembers with dependents, health care cost avoidance rose from just under $4,500 in 2001 to almost $7,000 in 2009 (figure 19). This was almost entirely a result of increasing health premiums; civilians with families pay a lot, even when they have coverage. But even officer equivalent civilians with families, 90 percent of whom are covered, still pay an average of nearly $5,000 a year of out-of-pocket costs.

The value of military health cost avoidance rose by about 55 percent from 2001 to 2009. Contrast this with the overall cost of living, measured by the CPI, which grew by just over 20 percent in the same period.

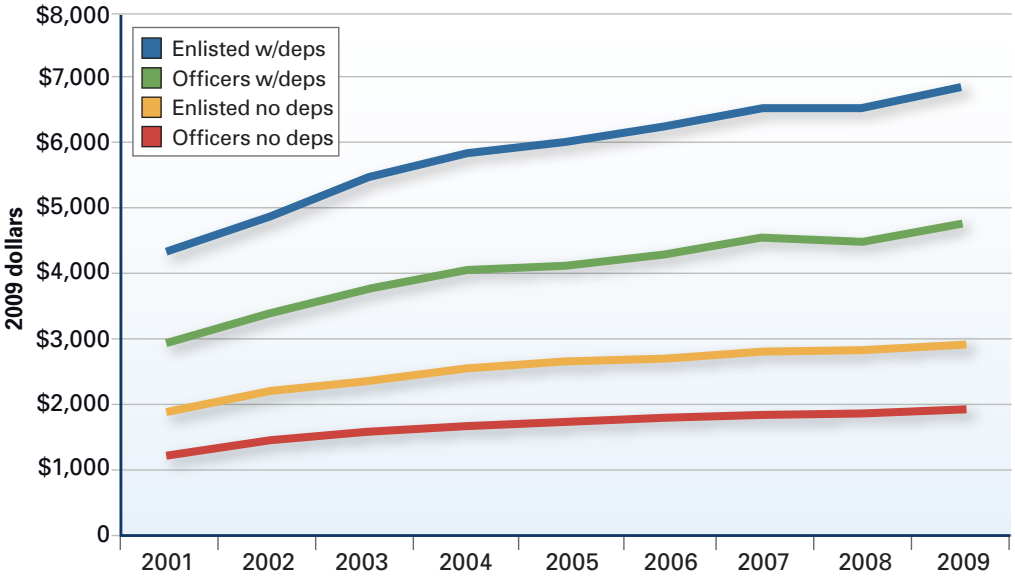


Figure 19. Trends in estimates of the value of military health care cost avoidance (2001–2009)

FICA tax advantage (TA)

The federal income tax advantage, which is one component of RMC, is not the only source of tax savings. Military allowances are also not taxed by any of the 50 states, nor are they taxed by the FICA.

The tax advantage on FICA and the state is more complicated. Seven states charge no income tax to any of its citizens, and two more charge no income tax to any military income at all. For servicemembers in these states, there is no state-level tax advantage. For this reason, we do not consider state-level tax savings as a generally expected source of compensation. But the FICA TA goes to all servicemembers; as a result, at least a portion of it can be considered part of military compensation.

The complicating issue for the FICA tax advantage is that the Social Security portion of FICA payments contributes directly to the future benefit. Specifically, the amount of Social Security benefit accrued by an eligible retiree depends on the size of his or her contributions during his or her working years.

Nonetheless, economic theory would suggest that servicemembers prefer having the tax advantage over the future benefits. The TA is part of current income, while the Social Security benefits are far in the future. As we showed earlier, the median age of an enlisted servicemember is about 24, and the median age for officers is about 31. This means that, at the median age, an enlisted person will wait more than 40 years before he or she is eligible to collect Social Security, and thus sustain any lost benefits from past tax advantages. Even at relatively low personal discount rates, the value of the expected lost benefit will be far less than the value of the current TA.[34]

Officers' personal discount rates may be lower, and officers are closer to retirement age. In spite of this, they would still have about 35 or so years before being eligible for Social Security benefits and would thus prefer the TA even at low discount rates.

Of course, at low discount rates, these lost benefits can absorb a large percentage of the tax advantage. For example, at a 5-percent personal discount rate, for a 25-year-old servicemember, the discounted value of the lost benefit can be as much as a third of the tax advantage.[35] Studies of personal discount rates suggest that a discount rate

34. Personal discount rate is an economic concept describing a person's preference for current versus future earnings. It is generally thought that people discount future benefits as a result of two factors: (1) impatience (a desire to enjoy consumption sooner rather than later) and (2) uncertainty about the future events that influence earnings. A lower discount rate suggests a greater willingness to postpone earnings to the future.

35. Complicating the calculation of the expected value of lost Social Security benefit, however, is the 35-year rule, in which only the highest 35 years of income are included in the Social Security benefit algorithm [8 and 30]. Thus, for servicemembers under age 30, the FICA tax of early years of service may not even count toward Social Security benefits, and so the *net(TA)* is equal to the gross TA.

of 5 percent is low. But this shows the sensitivity of estimates of the value of TA to assumptions about personal discount rates.

The *net* FICA tax advantage, which we will call the net TA, is equal to the current year's *gross* FICA tax advantage minus the expected discounted value of the lost future Social Security benefits. Here we present our steps for estimating the net TA.

The total FICA tax rate (f) is equal to the social security tax rate ($t_s = 0.062$) plus medicare tax rate ($t_m = 0.0145$).

$$f = (t_s + t_m) .$$

Because BAH and BAS are not considered taxable income for either of the FICA taxes, servicemembers receive a Social Security tax savings (TS_s)[36] and a Medicare tax savings (TS_m):

$$TS_S = min[0.062*(BAH+BAS), 0.062*(106{,}800-(BP))] .$$

$$TS_m = 0.0145*(BAH + BAS) .$$

The total FICA tax savings (TS) is equal to the sum of the two tax savings amounts:

$$TS = TS_s + TS_m .$$

The amount of the current FICA tax *advantage*, which we call the Gross TA, is:

$$\text{Gross } TA = TS/(1-f) .$$

Next, we estimate the value of the Social Security benefit that would accrue from the Social Security tax savings by the age of eligibility (which we assume to be age 66). The undiscounted expected value of this future benefit depends upon the expected return on the Social Security tax amounts, and upon the rate at which servicemembers discount future benefits relative to current benefits.

Using the results derived by the authors in [30], we assume that the rate of return for Social Security taxes (R) is 2.5 percent for enlisted and 1.9 percent for officers. We also assume that the servicemembers will be eligible for future benefits at age 66, which is (66–YOS–A) years in the future, where A is the year of accession, A=19 for enlisted and A=23 for officers. Thus, the amount of the future benefit is:

$$B = TS_s*(1+R)^{(66-YOS-A)} .$$

36. Note that the Social Security tax only applied to total gross income up to $106,800 in 2009. In our formula for calculating the tax on Social Security tax savings, we assume that BP+BAH+BAS is total gross income, and so the only income subject to the tax is BP (i.e. special and incentive pays aren't addressed here).

Because servicemembers discount future relative to current benefits, the discounted value of B at discount rate $d=0.125$ for enlisted and $d=0.10$ for officers is:

$$dB = B/(1+d)^{(66-YOS-A)} .$$

Finally, the net tax advantage is equal to the gross TA less the expected, discounted value of the future Social Security benefit that would be lost as a result of the TA.

$$Net\ TA = Gross\ TA - dB .$$

The net TA is the number we consider part of total compensation and the number we present here.

We choose internal rates of return on the Social Security portion of the FICA TA of $R = 2.5$ percent for enlisted and 1.9 percent for officers? Why did we chose these rates? According to [30], expected internal return on FICA taxes in the United States ranged from about 1.4 percent for high-income single men to about 4.2 percent for medium-income one-earner couples. The range is a result of two factors. First, Social Security benefits are progressively determined, with higher expected returns accruing to low-income workers than to high-income workers. Second, a nonworking spouse in one-earner families is eligible for the benefits accrued to his or her spouse, raising the expected total family return of the FICA tax for the working spouse.

We used the expected return for two-earner couples from this data, which was about 2.5 percent for enlisted and 1.9 percent for officers.

Empirical results of FICA TA estimates

We illustrate our estimates of average enlisted and officer net TA over a 20-year career.[37] Using an estimate of the Social Security expected return of $R = 2.5$ percent for enlisted personnel, and a personal discount rate of $d = 12.5$ percent, our estimate of the range of the net FICA TA for enlisted is \$1,638 to \$2,238 (figure 20). The mean average was about \$2,042 in 2009.

For officers, using our estimated expected rate of return of $R = 1.9$ percent and that a personal discount rate of $d = 10.0$ percent, we found that the range of the net FICA TA for officers is \$1,593 to \$2,060; the mean average was about \$1,922 in 2009.

37. We only show the FICA TA from the career perspective. Because the FICA tax is 7.65 percent of wages every year, and because the income cap on the Social Security tax is raised by formula each year, the FICA tax advantage will have grown over time at approximately the rate of BAH and BAS themselves.

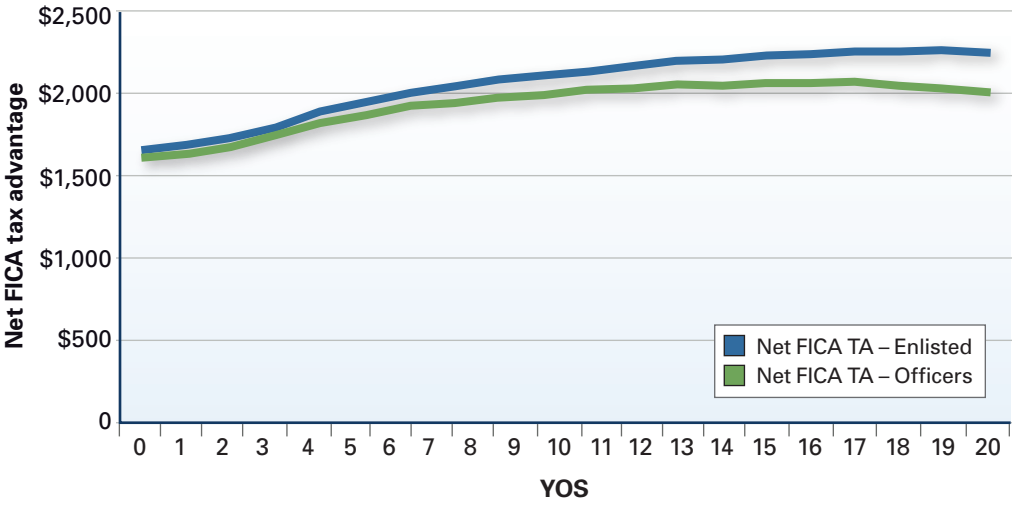


Figure 20. Net FICA tax advantage for enlisted and officers, by YOS (2009)

Concluding remarks: health care and FICA TA

We estimate that annual out-of-pocket costs for health insurance and medical care (depending on family size) are $3,000 to $7,000 for the average full-time enlisted equivalent civilian worker and between $2,000 and $4,800 for officer equivalent civilians. These costs are avoided by servicemembers and can be included in military compensation. In addition, we estimate that the discounted value of the FICA tax advantage is around $2,042 per year for enlisted and $1,922 per year for officers.

Together the health care and FICA TA add between $4,000 and $9,000 to servicemembers' compensation. These amounts can range from roughly 5 to 20 percent of RMC, depending on paygrade, years of service, and family size. As a result, they make a substantial contribution to the total value of the military compensation package.

Interpretations and conclusions

In this section, we summarize and put into context the three most important findings of our analysis:

1. Military pay is higher than civilian pay, and the differential between military and civilian pay widened over the last decade.
2. The difference in pay between servicemembers with and without dependents is not trivial, but it has a relatively small effect on military and civilian wage comparisons.
3. The added value of the military health care benefit and the FICA tax advantage is large.

For each finding, we summarize our results and offer our thoughts about why we see what we see and how that might influence policy.

Military pay is higher than civilian pay

We see that RMC has been growing relative to civilian pay and now corresponds to the 83rd percentile of civilian wages for officers and the 90th percentile for enlisted personnel.

This difference between military and civilian pay could be related to remuneration for the additional risk and hardship taken by servicemembers. Research has shown that servicemembers work long hours and often many more days a year then equivalent civilians.[38] In addition, they are often deployed away from their homes in dangerous and unpleasant work environments.

It is also possible that this difference is related to the quality of DOD servicemembers. DOD strives to recruit and retain high-quality people-—that is, those who have higher aptitude test scores, have higher levels of physical fitness, and are less likely to have been involved in criminal activity. To attract higher quality personnel from the private sector, DOD will need to make military pay attractive relative to private-sector wages.

Finally, it is possible, perhaps even likely, that the market for servicemembers is not subject to many of the competitive pressures that exist in the private sector. We see an example of this in a U.S. Congressional Act in 1999 (Public Law 105-65, Oct, 1999), which, in response to recruitment and retention problems of the 1990s, and concern over the "...level of compensation provided to service members and their families," mandated that annual increases in military basic pay be ½ percentage point above the ECI for a 6-year period.[39] Private-sector firms responded to similar recruitment and retention problems stemming from the favorable economy with short-run increases in wages that quickly subsided when the U.S. economy returned to average growth rates at the turn of the century.

We see another example of this in the large annual increases in the military housing allowances following rising housing prices in the 2000s. Unlike military wages, civilian wages did not change in response to rising housing prices. Homeowners, not workers, received both the perceived gains in wealth from rising

38. References [8 and 31] and results from the 2006 Status of Forces Surveys all suggest that deployments, changes in OPTEMPO, and other duties require servicemembers to work many more days per year and more hours per day than most civilians.

39. National Defense Authorization Act for Fiscal Year 2000, Report of The Committee on Armed Services House of Representatives on H.R. 1401 (House Report 106-162), May 1999.

National Defense Authorization Act for Fiscal Year 2000, Senate Report 106-50, May 1999.

housing prices and the consequent losses when housing prices returned to normal following the collapse.

In our formal model, we stated that, if military and civilian groups are comparable, and their jobs are comparable, compensation should be roughly the same. Yet, the empirical model shows that this is not the case. To the extent that higher pay for servicemembers compensates them for higher risk and more arduous duty, and to the extent that it is necessary to pay servicemembers more to attract and retain high quality personnel, military pay will need to be higher than wages for otherwise equivalent civilians. However, to the extent that military pay is high as a result of political decisions by legislators and other leaders, military pay runs the risk of being higher than necessary.

The effect of differences in RMC between those with and those without dependents is relatively small

For both enlisted personnel and officers, we find that, while servicemembers with dependents make more than those without dependents, the effect of the difference on military and civilian wage comparisons is relatively small.

The absolute value of the difference is not small, however. When we compare their compensation at the same YOS, the difference in RMC is an average of around 5 percent for enlisted. The average difference is a little over 2.5 percent for officers, though it varies from 8 to 11 percent in the first two YOS and 1 to 3 percent of RMC in the remaining 18 YOS.

We also observed that the overall average RMC (in 2009) for enlisted servicemembers with dependents was just over $56,000, while the overall average RMC for enlisted without dependents was just over $42,000. The overall average RMC in 2009 for officers with dependents was nearly $102,000, compared with the overall average for officers without dependents of around $75,800.

The difference in RMC, however, is driven almost entirely by the difference in the relative YOS of servicemembers with and without dependents. Recall that these are *weighted* averages, which control for the fact that servicemembers with dependents are substantially older, on average, than those without dependents.

Confirming this, when we compare RMC with equivalent civilians whose age/experience profile mirrors the YOS profiles of servicemembers with and without dependents, their RMC corresponds to roughly the same percentile of equivalent civilian wages. So, for the purpose of comparing military and civilian compensation, it is not problematic to combine servicemembers with and without dependents.

Nonetheless, there are consequences that DOD should consider. First, providing more pay for servicemembers with families will most likely increase the proportion of servicemembers who have families. Higher pay can incentivize servicemembers to get married at higher rates than in the civilian sector. The authors in [32], for example, found that, although only 5 percent of 20-year-old civilians were married, 15 percent of 20-year-old Marines were married. Second, higher pay can provide an incentive for servicemembers with families to stay in the military at higher rates than single servicemembers.

The added value of military health care and FICA TA is substantial

The military health benefit is substantially more valuable than the health benefit available to most civilians. The reasons are twofold.

First, only about 80 percent of civilians, depending on education level and job experience, are provided a health care benefit by their employer. Civilians without this benefit buy their own health insurance and/or their own medical care directly. Most civilians who receive an employer health care benefit still pay a substantial portion of the cost of the insurance premium and some direct copayments for medical treatments.

Second, health insurance is expensive. For single civilians, it can cost more than $4,000 per year. For civilians with families, it can cost more than $13,000 per year. Furthermore, health insurance premiums have risen considerably faster than the overall cost of living—nearly doubling from 2001 to 2009—while the cost of living rose about 22 percent over the same period.

Servicemembers and their families receive this benefit free, but they would pay similar out-of-pocket costs if they were in the private sector. As a result, this is a benefit that can be considered part of their overall compensation. Doing so increases the value of their compensation package by about $3,000 for single enlisted personnel and up to nearly $7,000 for enlisted personnel with dependents. The benefit for officers ranges from $2,000 for single officers to nearly $5,000 for officers with dependents.

Next, the net value of the tax advantage servicemembers receive because they don't pay FICA tax on allowances adds roughly $1,500 to $2,200 to compensation for both enlisted and officers.

Together, health care cost avoidance and the net FICA tax advantage add from $4,000 to $9,000 in value to the military compensation package, which would place servicemembers' pay at an even higher percentile ranking than just considering RMC alone.

Concluding remarks

While we found that servicemembers, in general, receive higher pay than comparable civilians, that does not, in isolation, tell us why we see these results. Our modeling approach and the discussions in this final section provide some context for the results we presented throughout this paper. DOD leaders will want to take into account both the results and the context of the results in any future deliberations of compensation policy.

Appendix A: A brief history of RMC

Two important concepts came out of the Hook Commission in 1948 [5, 33, and 34]. First, it proposed that military compensation should be roughly the same as wages for civilians who have similar skills and who work in similar jobs. This concept was made law with the Career Compensation Act of 1949. Second, the Hook Commission Report established the structure of pay that the military currently uses, Basic Pay, allowances, and special and incentive pays.

In 1962, the military established and began using RMC as the metric for comparing military and civilian compensation. Developed in a study convened by Secretary of Defense Robert McNamara, and proposed in the Gorham Report, RMC provided a rough metric for the major compensation components that all servicemembers receive either as cash, a cash allowance, or an in-kind benefit. The concept of RMC was formalized in Public Law 93-419 as Basic Pay, Basic Allowance for Quarters (BAQ), Basic Allowance for Subsistence (BAS), and a federal income tax advantage because BAQ and BAS were nontaxable.

RMC has gone through several transitions and transformations. In 1980, the definition of RMC was broadened to include variable housing allowance (VHA) and the overseas, or "station," housing allowance (SHA), both of which were additional allowances for servicemembers living in high-cost-of-housing areas.[40] This meant that it seemed no longer conceptually defined by the criteria of all servicemembers receiving it. In 1998, BAH replaced BAQ, VHA, and SHA, and RMC again included the four major components.

The Defense Authorization Act of 1967[41] required that the increases in military Basic Pay would be determined by equating RMC to general schedule (GS) salaries of civil service employees. Since Basic Pay was about 75 percent of RMC, the raises in Basic Pay were greater than concurrent raises in civilian government worker pay.

40. Military Pay and Allowances Benefits Act of 1980, Public Law 96-579, §11, 94 Stat. 3359, 3368-3369 (1980).

41. Codified in Public Law 90-207, §8, 81 Stat. 649, 654-655 (1967).

This proved to be costly because Basic Pay was connected to other forms of pay—notably, the military retirement benefit. Also, connecting the GS to raises in all components of RMC had the effect of disconnecting changes in housing and subsistence allowances from their original purpose, which was to provide housing and subsistence to servicemembers [5].

In 1974, Congress changed the law so that, rather than incorporate the entire raise in RMC to Basic Pay, the raise would be distributed equally among the three cash components of RMC: Basic Pay, BAQ, and BAS. This solved part of the cost problem but did not address the disconnect between BAH and BAS and the cost of housing and food.

In the 1985 Defense Authorization Act,[42] the BAQ and VHA programs were restructured. The act pegged the BAQ at 65 percent of national median housing costs. Where local housing costs were above 80 percent of the median national housing price for their paygrade, the VHA would apply. Each servicemember was therefore expected to pay 15 percent of local housing costs out of pocket, a rule that was colloquially referred to as the "15-percent formula" [5].

In 1990, the Federal Employees Pay Comparability Act (Public Law 101-159) tied civil service pay to the Employee Cost Index (ECI) of the Bureau of Labor Statistics (BLS).[43] This act left in place the connection of military pay and the GS schedule; as a result, military pay became indirectly tied to an index that applied to the general civilian population.

In 1999, Congress enacted legislation, published in the FY 2000 National Defense Authorization Act (NDAA), which directed that pay raises for 2000 through 2006 would automatically be 0.5 percent above the private-sector wage increases, as measured by the ECI. Congress authorized raises to Basic Pay in 2007, 2008, and 2009 also to be ECI plus one-half point.[44]

In 2000, Secretary of Defense William Cohen announced a goal of fully eliminating servicemembers' out-of-pocket housing expenses by 2005. In support of this goal, the NDAA for FY 2001[45] removed the 15-percent formula. This legislation authorized the Department of Defense to "prescribe housing allowance rates applicable to grade, dependency status, and location, and comparable to costs incurred by civilians with similar income levels" [5].

42. Codified in Public Law 98-525 (1985).

43. The ECI for wages and salaries is an indirect index for average civilian wages and salaries. BLS Series ECU20002A is available at the following link: http://data.bls.gov/cgi-bin/surveymost.

44. Reference: http://www.fas.org/man/congress/1999/sr050.htm.

45. Codified as Public Law 106-398 (2001).

Appendix B: Military and civilian age/experience profiles

Figures 21 through 24 compare the YOS/age/experience profiles of officers and equivalent civilians. Here we outline the differences in YOS/age profiles between ser vicemembers and civilians, and between servicemembers with and without dependents.

First, the age/experience profile is different for civilians and servicemembers. Specifically, the age/experience profile of enlisted equivalent civilian workers is much older than enlisted either with or without dependents. The median age of full-time enlisted equivalent civilian workers is about 36. For enlisted servicemembers without dependents, the median YOS is roughly 3, implying a median age of about 22. For servicemembers with dependents, the median YOS is about 8, implying a median age of about 27.

In addition to the differences in median age, the relative proportions of servicemembers at each YOS get smaller as YOS gets larger. This is because servicemembers leave but do not enter at high YOS. Among civilians, however, we see that the proportions get *larger* with age, until they reach about the middle 40s. This is because, rather than leaving the workforce as they get older, civilians are more likely to enter full-time work.

Because servicemembers are younger than equivalent civilians (by age/experience), unweighted estimates of civilian wages would overstate their value relative to military counterparts. Therefore, we use a weighting algorithm on civilian data to simulate the military's experience profile in our estimates of median civilian wages. Essentially, we estimate the median civilian wage at each age. Then, we calculate a weighted average of these values, where weighting is designed to make the civilian age profile look like the military profile. Also, we use separate weighting algorithms for calculating comparable wages for singles and those with dependents.

Second, the YOS profile of servicemembers is different for those with and without dependents. Enlisted servicemembers without dependents are, on average, markedly younger than enlisted servicemembers with dependents. As a consequence, their compensation is, on average, substantially less. When we average civilian ages for all enlisted equivalent civilians, we use the age-weighting formula differently depending on whether we are comparing their wages with RMC of servicemembers with or without dependents.

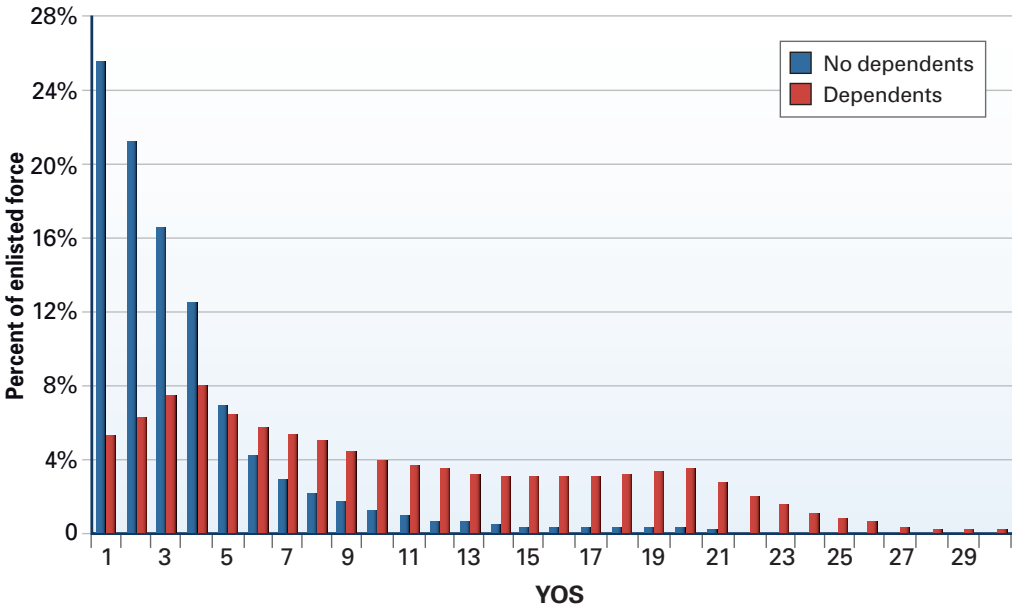


Figure 21. YOS profile of enlisted

We use civilian age minus estimated normative years of education, minus 7 (assumes first grade at age 7), as a proxy for work experience—equivalent to military YOS. Others have studied this proxy [11 and 12] and have commented on its relative strengths and weaknesses. The primary concern is that, since experience in the civilian sector is subject to labor mobility—moving in and out of the labor market or from one job to the next[46]—the age minus education proxy can overestimate actual work experience.

Another concern is that wages are subject to individual choice of hours worked, which changes with age itself. This is why civilian wages tend to decline for people in their late forties and early fifties—a result of declining hours worked rather than directly declining wages. However, since most servicemembers will have separated before that age, we're not as concerned about this effect on our study of wage comparisons in the first 20 YOS.

In forming the comparison groups, bear in mind that the gender and age profiles (or distributions) of military personnel and civilian populations are not the same.

46. Moving from job to job, even within similar occupations, can slow experience to the extent that firm-specific tasks take time to learn.

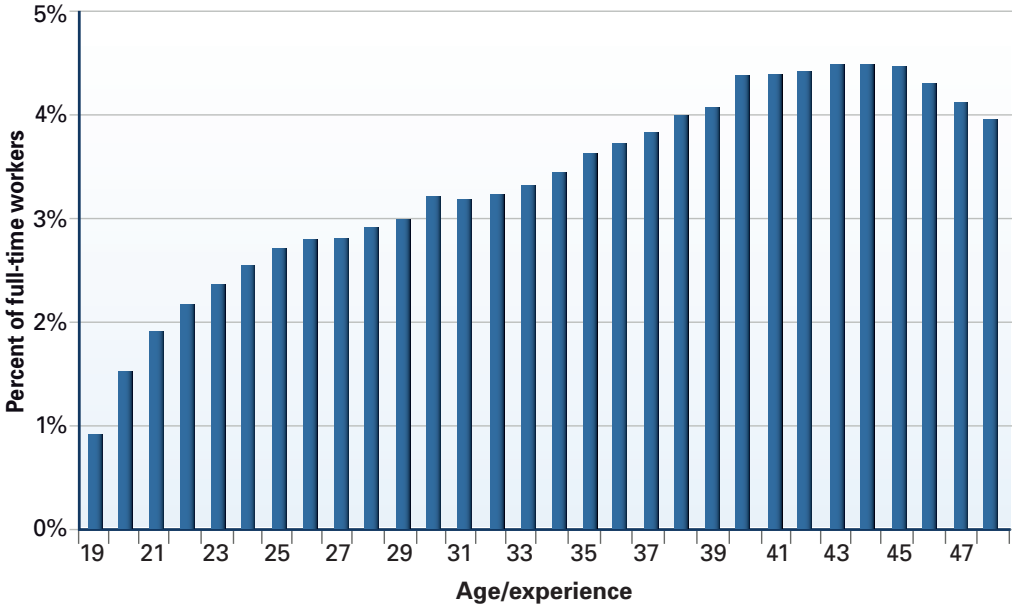


Figure 22. Age/experience profile of enlisted equivalent civilians

Nearly half (48 percent) of full-time civilian workers are women; about 15 percent of servicemembers are women. For civilians between the ages of 19 and 55, about half are over 30, but the median age of enlisted servicemembers is closer to 24.

To compensate for the difference, we weight the civilian data by military profiles of gender and age/experience to provide equivalency to the military. To make the civilian workforce look like the military workforce, we weight the civilian age distribution and male-female proportions by those of military personnel for each of the four military groups: enlisted with and without dependents, and officers with and without dependents.

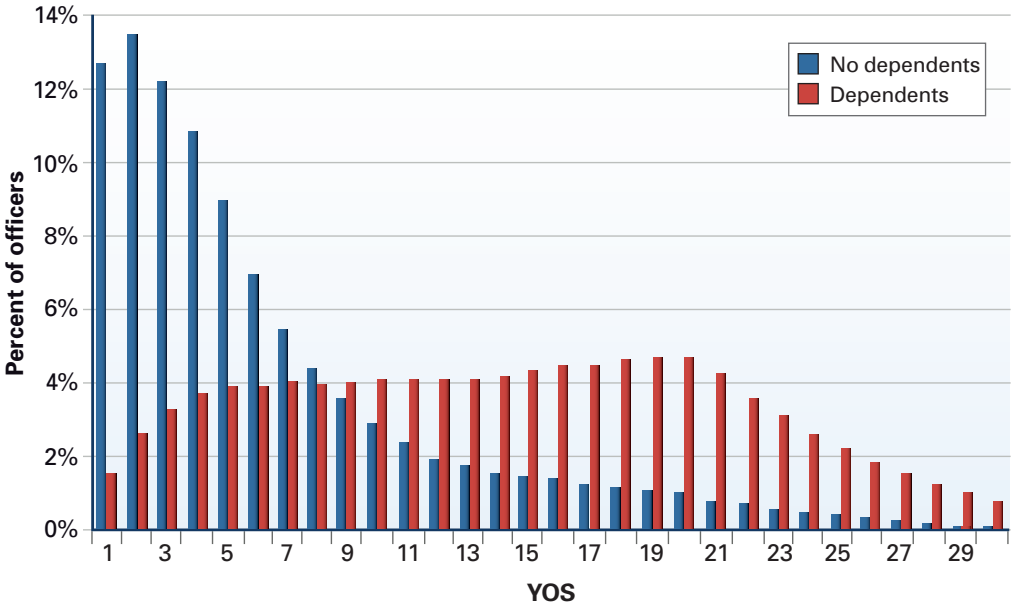


Figure 23. YOS profile of officers

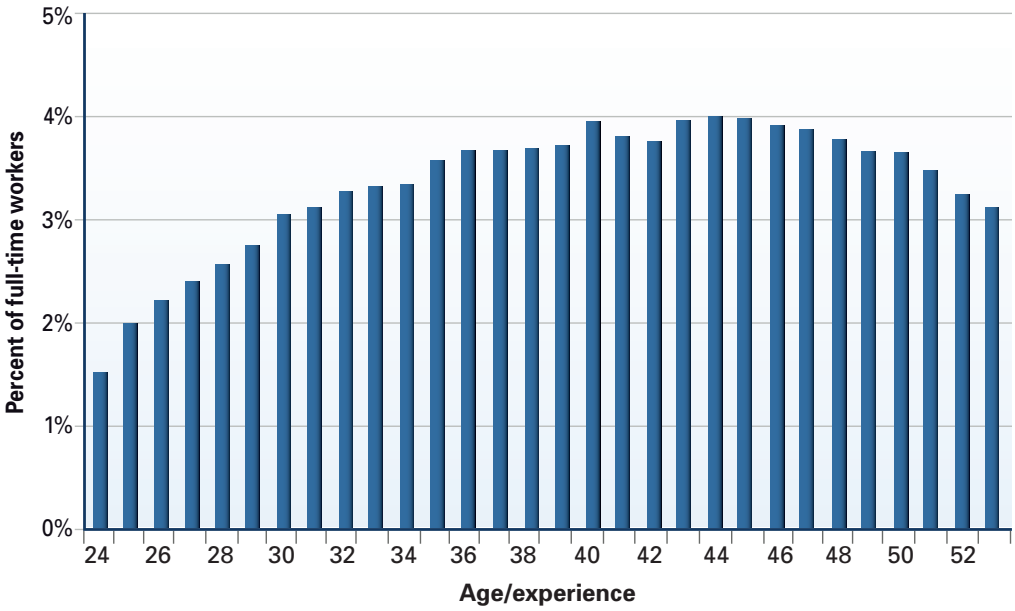


Figure 24. Age/experience profile of officer equivalent civilians

Appendix C: Theoretical model of wage comparisons

This appendix contains the mathematical equations underlying the model developed in the section called "Exploring other factors of compensation: A formal model of military and civilian compensation." For the purposes of this model, consider two people—one civilian and one servicemember—who are the same in job-related characteristics (job experience and technical skills) and who have the same basic living expenses (standard of living).

RMC, civilian wages, and discretionary income

Civilians

Let's look at the civilian first. He or she receives gross wages (W_C), where W_C = civilian gross earnings from labor.

From that, the civilian pays out the following expenses:

t_W = the income taxes on the civilian wage, and

E_C = expenditures the civilian must pay out of his wage for rent[47] and food.

Finally, after taxes and housing and food expenses, the civilian has discretionary income:

$$D_C = W_C - t_W - E_C . \quad (1)$$

Equation (1) is the civilian's discretionary income.

Military

Now let's look at the servicemember. He or she receives gross wages (W_M):

$$W_M = BP + BAH + BAS , \quad (2)$$

where:

BP = Basic Pay

BAH = Basic Allowance for Housing[48]

BAS = Basic Allowance for Subsistence.

From this, the servicemember must pay income taxes on basic pay only, but must also pay housing and food expenditures. Thus, the servicemember's discretionary

47. We also assume that, all else equal, rent is equal to mortgage and other costs of owning.

48. We will assume that this servicemember is eligible to get BAH and BAS. We'll relax this assumption later in the analysis.

income is:

$$D_M = W_M - t_B - E_M, \quad (3)$$

where:

t_B = the income tax on BP

E_M = the servicemember's housing and food expenditures. Equation (1) implies that, for the civilian:

$$W_C = D_C + t_W + E_C.$$

That is, the civilian's wage is equal to discretionary income plus the tax on total wages plus the expenditures on housing and food.

Equation (3) implies that, for the servicemember:

$$W_M = D_M + t_B + E_M.$$

That is, the servicemember's wage is equal to his or her discretionary income plus the tax on basic pay (only) plus expenditures on housing and food.

From this point on, we will assume that expenditures for food and housing are the same for servicemembers and equivalent civilians.

What if military and civilian gross wages were equalized?

First, let's consider the case where $W_C = W_M$, that is, the civilian's and servicemember's gross wages are the same. This implies that

$W_C = [D_C + t_W + E] = W_M = [D_M + t_B + E]$, or just simply,

$[D_C + t_W + E] = [D_M + t_B + E]$, which implies that

$$[D_C + t_W] = [D_M + t_B]. \quad (4)$$

Since $t_W > t_B$, then $D_C < D_M$, that is, the servicemember's discretionary income is higher, in this case, because he only pays income tax on basic pay, whereas the civilian pays income tax on his or her entire wage.

In a simple world (versus the complex reality of the tax code), the difference in the tax amounts can be calculated as follows. Civilian tax is equal to the tax rate times the wage:

$t_W = R * W_C$,

where:

R = the tax rate

$t_B = R * B_P = R * (W_M - BAH - BAS)$.

Then:

$t_W - t_B = R * W_C - R * (W_M - BAH - BAS)$

$= R * (W_C - W_M + (BAH + BAS))$.

Since we care about what happens if $W_C = W_M$,

$t_W - t_B = R * (BAH + BAS) = t_S$. (5)

Thus, the difference in the tax amounts between the civilian and the service-member when their gross wage is the same is the tax savings from BAH and BAS not being taxed.[49]

From equations (4) and (5), we get that the difference in discretionary income is:

$t_W - t_B = D_M - D_C = t_S$.

Thus, if DOD were to set military gross wages (BP + BAH + BAS) to be equal to civilian gross wages, the result would be that military discretionary income would be greater than civilian discretionary income by the amount of the tax savings on BAH and BAS.

What if discretionary incomes were equalized?

Because economic theory suggests that people should care more about discretionary income than gross income, perhaps it would be better for DOD to set military pay to equalize discretionary incomes. Equalizing discretionary wages means:

$D_M = D_C$. (6)

From equation (1), we have $D_C = W_C - t_W - E_C$, and

from equation (3), we have $D_M = W_M - t_B - E_M$.

49. The tax saving is different from the tax advantage, as we will see.

Thus, equation (6) implies that:

$$W_C - t_W - E_C = W_M - t_B - E_M .$$

If we assume that $E_C = E_M$ (i.e., food and housing expenses are the same), then

$$W_C - t_W = W_M - t_B . \quad (7)$$

In order to set gross income (W_M) relative to W_C, such that discretionary incomes are equal, we need to know what the tax rates are relative to gross incomes.

$$t_W = r * W_C \quad (8)$$

$$t_B = r * B_P = r * (W_M - BAH - BAS) , \quad (9)$$

where r is the marginal tax rate.[50]

By equations (7) through (9) we have:

$$(W_C - r * W_C) = (W_M - r * (W_M - BAH - BAS)) ,$$

which implies that:

$$(1 - r) * W_C = (1 - r) * W_M + r * (BAH + BAS)$$

$$(1 - r) * (W_C - W_M) = r * (BAH + BAS)$$

$$(W_C - W_M) = r * (BAH + BAS)/(1 - r)$$

$$W_C = W_M + r * (BAH + BAS)/(1 - r) . \quad (10)$$

Since $r * (BAH + BAS)$ is the tax savings, on BAH and BAS, then $r * (BAH + BAS)/(1 - r)$ is the tax advantage on BAH and BAS,[51] and the right-hand side of equation (10) is RMC.

Equation (10) tells us that when (1) the technical skills and job experience levels of servicemembers and civilians are the same, (2) housing and food are the only basic living expenses, and (3) basic living expenses are the same for both servicemembers and civilians, then discretionary income for servicemembers and civilians will be equal when civilians wages are equal to military gross wages plus the tax advantage—RMC.

50. In this model, we assume that the marginal tax rate (r) is the same for both military BP and the civilian gross wage, though rates could be different at income levels close to where marginal rates change.

51. This is how DOD calculates the tax advantage on BAH and BAS, which is included in RMC.

Thus, under these assumptions, RMC and civilian wages are directly comparable when civilian wages equal RMC.

In the next subsection, we will recap the model and deduce the extent to which RMC and civilian wages are comparable when these assumptions are not met.

What if our assumptions didn't hold?

To recap, the four assumptions in this model follow:

1. Members in each of the comparison groups have roughly the same technical skill and job experience characteristics.
2. Members in each of the comparison groups have roughly the same basic living expenses. Algebraically, this means that $E_{mil} = E_{civ} = E$.
3. Each servicemember is eligible for military BAH and BAS, or else consider the value of onbase housing and meals equal to BAH and BAS.
4. BAH + BAS = E_{mil}, that is, the housing and subsistence allowances are equal to expenditures for housing and food for servicemembers.

To empirically test the model, we need to simulate assumption 1. To do that, we compare civilians and servicemembers who are as alike as possible within the constraints of the data. We look at only civilians who are full-time workers, and we look only at wages, not investment or other types of nonlabor income. We consider civilians to be equivalent to enlisted servicemembers if they have a high school diploma or some college. We consider them equivalent to officers if they have a Bachelor's degree or higher.

In the private sector, there are gender-related differences in average wages, so we weight the civilian data by the male:female proportions in the military (roughly 86:14 for enlisted, 84:16 for officers).

Assumption 2 is not always the case, especially for those who are single and young (by paygrade). In fact, we found that, in 2009, about 17.5 percent of enlisted servicemembers are single E-1 through E-3 and around 15 percent of officers are single O-1 and O-2. They may not be eligible to receive BAH and BAS, but instead must live in bachelor quarters and eat at military mess halls on base. They will not receive either BAH or BAS, although it is possible that they would prefer (and thus value more highly) having the choice (of receiving BAH and BAS or military quarters and mess). For them, the military wage is not equal to BP plus BAH plus BAS, but is instead just BP. However, because they are given onbase quarters and food, the value of the military wage plus free food and housing is probably worth more, perhaps a lot more, than just simply BP.

Assumption 4 is probably pretty close for single servicemembers who are eligible to receive BAH and BAS. However, about two-thirds of the military force are married and/or have children. RMC is higher for servicemembers with dependents due to higher BAH and the subsequent higher TA. Nonetheless, having larger families than single members, their housing expenditures will also be higher. Thus, for them, BAH probably will still be approximately equal to their expenditure on housing.

The BAS, however, does not change with dependents. In the simple model, we assume that BAH + BAS = E_{mil}, but, for those with dependents, that won't be the case. In fact, for them, BAH + BAS < E_{mil} since BAS does not grow with family size and, thus, will probably not equal family food costs.

Other basic living expenses: the case of health insurance

In the foregoing model, we assume that expenses for basic necessities are the same for both military and civilian workers—that is, that $E_{mil} = E_{civ} = E$. But is that correct?

Consider health insurance and medical expenses. Are they part of basic necessities? If so, the discretionary income is

$$D = W - t - E - HC,$$

where HC is expenditures on health insurance and medical.

Discretionary income for civilian workers is:

$$D_C = W_C - t_{W2} - E - HC_C. \tag{11}$$

Note that t_{W2} is not equal to t_W from the previous section since many health care costs for civilians come out of nontaxed funds.

And for the servicemember, it is:

$$D_M = W_M - t_B - E - HC_M. \tag{12}$$

Setting $D_M = D_C$ here, we have

$$W_C - t_{W2} - E - HC_C = W_M - t_B - E - HC_M.$$

Recall that E = expenditures on housing and food and is the same for both military and civilians. Also note that, since military personnel and their families pay no health insurance or medical expenses, $HC_M = 0$. Thus,

$$W_C - t_{W2} - HC_C = W_M - t_B \,. \tag{13}$$

Civilians with employer-paid health insurance

Civilians whose health insurance coverage is provided by their employers won't pay taxes on most of the amounts they pay out of pocket for health insurance or medical treatments. For them, income tax is on their gross wage minus the health insurance expenditure:

$$t_{W2} = r * (W_C - HC_{CI}) \,. \tag{14}$$

Servicemembers pay income tax on only basic pay and not their entire gross wage:

$$t_B = r * BP = r * (W_M - BAH - BAS) \,. \tag{15}$$

Consequently, if equal discretionary income were the rule, DOD would need to set W_M such that:

$$W_C - r * (W_C - HC_{CI}) - HC_{CI} = W_M - r * (W_M - BAH - BAS) \,, \tag{16}$$

which implies that

$$(1 - r) * (W_C - HC_{CI}) = (1 - r) * W_M + r * (BAH + BAS)$$

$$(1 - r) * (W_C - HC_{CI} - W_M) = r * (BAH + BAS)$$

$$(W_C - HC_{CI} - W_M) = (r * (BAH + BAS))/(1 - r)$$

$$W_C = W_M + (r * (BAH + BAS))/(1 - r) + HC_{CI} \,. \tag{17}$$

Recall that:

$W_M = BP + BAH + BAH$ is the servicemember's gross pay, and

$(r * (BAH + BAS))/(1 - r)$ is the tax advantage because BAH and BAS are not taxable.

The right-hand side of equation (17) is RMC plus the civilian's health care expenses, for civilians with employer health coverage.

Thus, RMC plus the out-of-pocket civilian health care expenditures is an accurate military pay comparison of civilian wage when (a) the object is to equalize discretionary income, and (b) the civilians have employer-paid health insurance, for which some out-of-pocket costs come out of untaxed income.

Civilians without employer-paid health insurance

If the civilian does not have employer paid health insurance, all health insurance and/or medical costs come out of post-taxed dollars.

Civilians who don't have employer-paid health insurance coverage must either buy health insurance and/or their own copayments or else their total medical care expenses. Further, they pay for these out of already taxed income, and thus receive no tax advantage as do those with employer coverage.

$$W_C - t_W - HC_{C2} = W_M - t_B \,. \tag{18}$$

Recall that, by equations (8) and (9), civilians pay taxes: *(19)*

$$t_W = r * W_C \,.$$

And military people pay taxes:

$$t_B = r * BP = r * (W_M - BAH - BAS) \,.$$

Putting equations (8) and (9) into equation (18), we get:

$$W_C - r * W_C - HC_{C2} = W_M - r * (W_M - BAH - BAS) \tag{20}$$

$$(1 - r) * W_C - HC_{C2} = (1 - r) * W_M + r * (BAH + BAS)$$

$$(1 - r) * (W_C - W_M) = r * (BAH + BAS) + HC_{C2}$$

$$(W_C - W_M) = r * (BAH - BAS + HC_{C2})/(1 - r)$$

$$W_C = W_M + (r * (BAH + BAS) + HC_{C2})/(1 - r) \,. \tag{21}$$

In other words, the comparison with civilian wages for those who are not covered by employers would be RMC plus the amount civilians pay for health care plus some tax advantage on the health care expenditures.

If the proportion of full-time civilian workers who have employer-paid health coverage is π, the correct comparison is:

$$W_C = W_M + \{\pi * [r/(1-r) * (BAH + BAS) + HC_{C1}] + (1-\pi) * [r/(1-r) * (BAH + BAS) + HC_{C2}/(1-r)]\ . \quad (22)$$

Equation (22) states that, under the conditions and assumptions outlined, civilian wages will be directly comparable to RMC plus the average civilian out-of-pocket expenditures for health care, including the average tax advantage that military personnel receive because some civilians pay health care out of pre-taxed dollars.

References

[1] Barack Obama. Memorandum for the Secretary of Defense, Subject: Eleventh Quadrennial Review of Military Compensation. Washington, DC: The White House, 11 Dec 2009

[2] Office of the Under Secretary of Defense for Personnel and Readiness. *Report of the Ninth Quadrennial Review of Military Compensation. Chapter II: Regular Military Compensation*, 2002

[3] Office of the Under Secretary of Defense for Personnel and Readiness. *Report of the Tenth Quadrennial Review of Military Compensation. Volume I: Cash Compensation*, Feb 2008

[4] U.S. Department of Defense, Office of the Secretary of Defense. *Military Compensation Background Papers*. 5th ed. Washington, DC: U.S. Government Printing Office, Sep 1996 (p. 21)

[5] U.S. Department of Defense, Office of the Secretary of Defense. *Military Compensation Background Papers*. 6th ed. Washington, DC: U.S. Government Printing Office, Apr 2005 (p. 14)

[6] Office of the Undersecretary of Defense for Personnel and Readiness. *Selected Military Compensation Tables*. Department of Defense, Jan 2011 (http://militarypay.defense.gov/Reports/ greenbooks.html; last visited June 2011)

[7] Congressional Budget Office. *Evaluating Military Compensation*. Jun 2007

[8] James E. Grefer. *Comparing Military and Civilian Compensation Packages*, Mar 2008 (CNA Research Memorandum D0016569)

[9] Robert A. Levy and James E. Grefer. *Estimating the Savings Associated With Civilianizing Navy Medical Personnel*, Sep 2004 (CNA Annotated Briefing D0010561)

[10] Bradley M. Gray and James E. Grefer. "Career Earnings and Retention of U.S. Military Physicians." *Defence and Peace Economics* (forthcoming)

[11] May Luong and Benoît-Paul Hébert. "Age and Earnings." *Perspectives on Labour and Income*, Vol. 10, No. 1, Jan 2009 (Statistics Canada Catalogue No. 75-001-XIE, found at http:// www.statcan.gc.ca/pub/75-001-x/2009101/article/10779eng.htm)

[12] Mark R. Rosenzweig. "Nonlinear Earnings Functions, Age, and Experience: A Nondogmatic Reply and Some Additional Evidence." *The Journal of Human Resources*, Vol. 11, No. 1, Winter, 1976: 23–27

[13] James Hosek. *A Recent History of Military Compensation Relative to Private Sector Compensation*, 2001 (RAND Corporation PM-1225-OSD)

[14] 106th Congress 1st Session Senate Report. "National Defense Authorization Act for Fiscal Year 2000," May 1999 (http:// www.fas.org/man/congress/1999/sr050.htm)

[15] U.S. Department of Defense. "A Primer on Basic Allowance for Housing for the Uniformed Services." Jul 2002 (http:// militarypay.defense.gov/pay/bah/bah_primer.pdf)

[16] J. Steven Landefeld et al. "GDP and Beyond: Measuring Economic Progress and Sustainability," Apr 2010 (Bureau of Economic Analysis; found at www.bea.gov/scb/pdf/2010/04%20April/0410_gpd-beyond.pdf)

[17] Donna J. Owens. "Tracking Down Discretionary Income." *Perspectives on Labour and Income*, Vol. 3, No. 1, Spring 1991

[18] Christian E. Weller. "Did Retirees Save Enough To Compensate for the Increase in Individual Risk Exposure?" Sep 2009 (Political Economy Research Institute)

[19] Thomas T. Semon. "Family Income and Spending Capacity." *The Journal of Marketing*, Vol. 26, No. 2, Apr 1962

[20] Fabian Linden, George W. Green, Jr., and John F. Coder. *A Marketer's Guide to Discretionary Income*. Washington, DC: U.S. Bureau of the Census, 1988

[21] Shayne Brannman and Cori Rattelman. *Comparison of Army and Air Force Physician Total Compensation*, Feb 2001 (CNA Information Memorandum D0003361)

[22] Michael Hansen and Michael Moskowitz. *The Effect of Compensation on Aviator Retention*, Nov 2006 (CNA Research Memorandum D0014925)

[23] Michael Mattock and Jeremy Arkes. *The Dynamic Retention Model for Air Force Officers New Estimates and Policy Simulations of the Aviator Continuation Pay Program*, 2007 (RAND Corporation TR-470-AF)

[24] Government Accountability Office. *Military Personnel: Military and Civilian Pay Comparisons Present Challenges and Are One of Many Tools in Assessing Compensation*, Apr 2010 (GAO-10-561R Military Compensation)

[25] Government Accountability Office. *Military Personnel: Comparisons Between Military and Civilian Compensation Can Be Useful, But Data Limitations Prevent Exact Comparisons*, Apr 2010 (GAO-10-666T, GAO Testimony Before the Subcommittee on Personnel, Committee on Armed Services, U.S. Senate)

[26] Robin A. Cohen, Michael E. Martinez, and Brian W. Ward. "Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey," 2009 (Division of Health Interview Statistics, National Center for Health Statistics; found at http://www.cdc.gov/nchs/data/nhis/early release/insur201006.htm#results)

[27] Richard Miller. "Estimating the Compensating Differential for Employer-Provided Health Insurance," *International Journal of Health Care Finance and Economics*, Vol. 4, No. 1, Mar 2004

[28] Kaiser Family Research Foundation and Health Research and Educational Trust. "Employer Health Benefits, 2009 Annual Survey"

[29] Robert Levy and Richard Miller. *Comparing TRICARE With Other Federal and Civilian Healthcare Plans*, Mar 2004 (CNA Research Memorandum D0009542)

[30] Orlo Nichols et al. *Internal Real Rates of Return Under the OASDI Program for Hypothetical Workers*, Apr 2009 (Actuarial Note Number 2008.5, Social Security Administration, Office of the Chief Actuary, Baltimore, MD)

[31] James Hosek, Jennifer Kavanagh, and Laura Miller. *How Deployments Affect Servicemembers*, 2006 (RAND Corporation MG-432-RC)

[32] Gary Lee and Aline Quester. *Marriage and the Marine Corps*, Jan 2000 (Memorandum for the Director, Manpower Plans and Policy Division, CNA Memorandum D0000025)

[33] Richard O. Helms, Col., USA. *Military Pay Comparability*, 1993 (National Defense University, Executive Research Project S101, Fort McNair, Washington, DC)

[34] Robert B. McBane (ed.). "Career Compensation for the Services: A Summary of the Hook Commission Report." *Army Information Digest*, Vol. 4, No. 2, Feb 1949

Chapter 2

The Effect of the Civilian Economy on Recruiting and Retention

John T. Warner

Staffing a volunteer military force of the size and geographic distribution of the volunteer U.S. military is a daunting challenge. The U.S. military currently maintains an active duty force of about 1.4 million personnel and a selected reserve force of 826,000. Successful recruitment and retention in these forces require attracting the requisite number and quality of individuals away from competing civilian alternatives. To do so, military service must offer sufficiently attractive remuneration in the form of (1) current and deferred cash compensation and (2) in-kind benefits such as health care, bearing in mind that factors such as conditions of service and the pride that personnel derive from military service affect the requisite remuneration. Much past research has been conducted on the subject of military recruiting and retention and how external market factors, cash and in-kind compensation, and other policies affect them. This section reviews the existing literature on military recruiting and retention, identifying the key factors that drive them and how they are affected by alternative policies relating to compensation, recruiting resources, and recruiting effort.[1] It begins with recruiting and then examines retention.

The review reaches the following conclusions:

- Military recruiting and retention are responsive to the level of military pay relative to civilian sector wage opportunities. Holding constant civilian sector wage opportunities, a 10 percent increase in overall current and future military compensation is estimated to increase the supply of high-quality enlisted recruits by between 6 and 11 percent. Such an increase is estimated to raise first-term enlisted retention (3–6 years of service) by 15–20 percent, second-term retention (7–10 years of service) by about

1. Three recent surveys of the literature on military recruiting and retention already exist. Warner and Asch (1995) survey the all-volunteer force (AVF) period literature up to 1994. Asch et al. (2007) focus on research contributions made over the 1995 2007 period. Bicksler and Nolan (2009) provide a detailed analysis of the market for enlisted recruits and implications of research findings for recruiting policy. This report draws heavily on these surveys.

The views expressed in this paper represent those of the author and are not necessarily those of the Department of Defense.

10–13 percent, and third-term retention (11–14 years of service) by about 5 percent.

- Recruiting and retention are responsive to enlistment and reenlistment bonuses that are targeted to specific groups of personnel. Enlistment and reenlistment bonuses are cost-effective tools for achieving manpower targets in hard-to-fill skills.
- Recruiting and retention are sensitive to the state of the economy. Studies indicate that a 10 percent decrease in the civilian unemployment rate will reduce high-quality enlisted recruiting by 2–4 percent. Retention also declines when unemployment decreases, but appears to be less sensitive to the state of the economy than recruiting. The recent economic downturn has improved recruiting and retention and has allowed the services to reduce use of enlistment and reenlistment bonuses. However, this improvement is expected to diminish as civilian economic conditions improve.
- Education benefit programs attract high-quality recruits, but may also induce them to leave to use those benefits. Because it represents a substantial increase in educational benefits over past programs, the Post 9/11 GI Bill program is expected to attract significantly more high-quality recruits into service, especially into the Army. However, this program has not been in effect long enough to discern its effects.
- Recruiting outcomes depend on the resources devoted to recruiting, including the stock of production recruiters and the amount of advertising. Recruiters appear to be the most cost-effective recruiting resource. Some evidence suggests that, in the short run, reductions in the recruiter force have a larger negative effect on recruiting than recruiter expansions have a positive effect; consequently large cyclical swings in the recruiter force should be avoided.

Recruiting

Overview and Trends

Since the downsizing of U.S. forces that occurred in the early 1990s, U.S. military services have had to recruit about 180,000 new enlisted personnel each year to maintain an enlisted force of 1.2 million.[2] The services not only want to

2. To put a recruiting goal of 180,000 in perspective, note that throughout the 1980s the services recruited about 280,000 youth per year for the enlisted ranks. The 2009 goal was reduced to 164,000 due to higher than normal retention and lower turnover.

meet quantity targets for enlisted recruiting, they also want to meet certain quality targets. The Department of Defense (DOD) has identified two primary quality measures for enlisted recruits—possession of a high school diploma and a score on the Armed Forces Qualification Test (AFQT) that exceeds the youth population average score of 50.[3] These quality measures are used because much past research has shown that recruits possessing these characteristics are more likely to complete an enlistment and are more productive in their jobs than recruits who do not have these characteristics.

Researchers have combined these two quality measures into a single indicator for high-quality (HQ). HQ recruits are thus defined to be recruits who possess both a high school diploma and score above 50 on the AFQT. HQ youth are the prime DOD recruiting target. Figure 1 shows the percentage of new enlistment contracts each year over the period 1990–2010 that were high quality. The figure also plots the civilian unemployment rate over time. Recruit quality jumped at the start of the 1990s; this jump reflects the end of the Cold War and the reduction in recruiting goals during the downsizing period. Recruit quality trended downward throughout

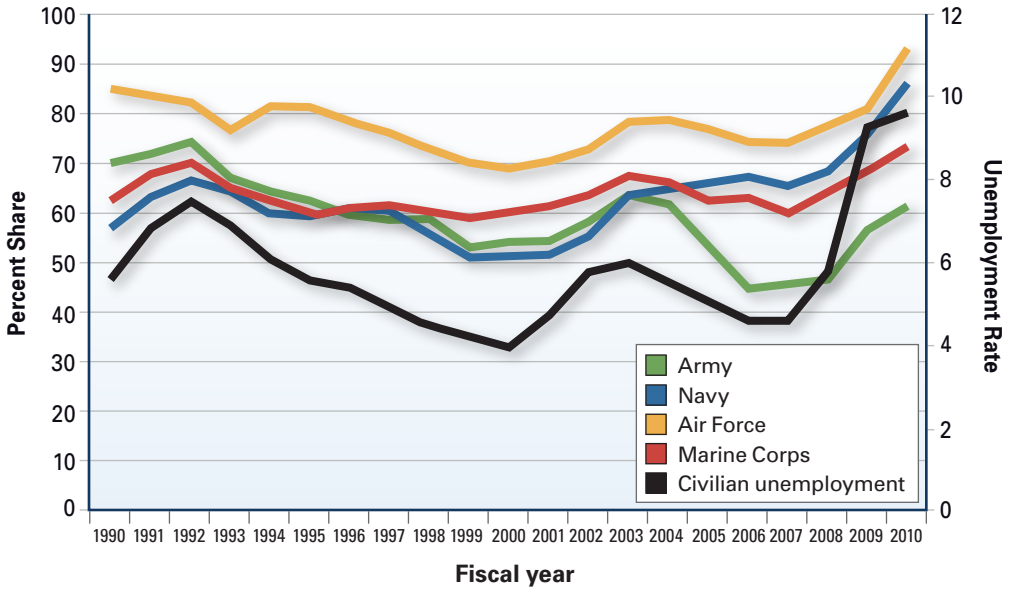


Figure 1. High-Quality Enlistments by Service and Unemployment, Fiscal Year 1990–2010

3. The AFQT test score is derived from subcomponents of the Armed Services Vocational Test Battery (ASVAB), a test battery administered to all applicants for enlisted service. The AFQT was normed in July 2004 to the 1997 youth population and has a median of 50. A score of 50 or above indicates that the applicant is above the average ability level in the youth population.

the 1990s and then jumped in the early 2000s before dropping again after 2003 in all services other than the Navy. The decline in the Army HQ share was especially precipitous after 2003.

Over the period of the all-volunteer force (AVF), even in periods of recruiting difficulty, the services have rarely failed to meet total recruiting targets. This is due to the fact that low-quality (LQ) recruits make up a small percentage of the military-eligible LQ population (around 2 percent) and can usually be found regardless of the state of the youth labor market. In periods of difficult recruiting, the services have avoided overall recruiting shortfalls by enlisting more LQ recruits. HQ recruits are sometimes said to be "supply-constrained" while LQ recruits are said to be "demand-constrained."

Research has identified key variables driving the HQ enlistment trends observed in Figure 1. Included among the factors explaining the observed cyclical swings are two key external market factors: the level of military pay relative to civilian wage opportunities for youth and the civilian unemployment rate. Figure 1 indicates a strong relationship between the percentage of recruits who are high quality and the civilian unemployment rate.

Although much cyclical variation in HQ enlistment is apparent in Figure 1, a longer term downward trend is apparent, especially in the Army. Research has identified several factors that may be related to this downward trend: (1) a rise in college attendance, (2) a decline in the population of veteran influencers of youth enlistment decisions, and (3) a decline in the percentage of the youth population that meets military enlistment standards.

Research has shown that enlistment outcomes are keenly influenced by DOD recruiting resource outlays and enlistment incentives. The key DOD recruiting resource inputs are military recruiters and advertising (both amount and type). The services also use individually-targeted enlistment incentives such as bonuses, college benefits, and college loan repayment to induce enlistment. We now review the evidence about the effects of various factors on recruiting.

Empirical Evidence

A number of studies of HQ enlistment have been conducted with post-drawdown data, the most recent of which is Asch et al. (2010). Table 1, Table 2, and Table 3 below summarize key estimates from the post-drawdown studies and means of estimates from the pre-drawdown studies. The numbers in the tables are elasticities of HQ enlistment with respect to the given factor—the percentage change in HQ

enlistment relative to a given percentage change in the factor. Thus, an elasticity of 1.0 implies that a 10 percent increase in the factor leads to a 10 percent increase in HQ enlistment; an elasticity of -0.5 means that a 10 percent increase in the factor leads to a 5 percent decrease in HQ enlistment.

Relative Military Pay and Unemployment

Table 1 shows elasticity estimates relating to the two principal external drivers of HQ enlistment—military pay and civilian unemployment. The most recent study of HQ enlistment is provided by Asch et al. (2010). This study analyzed Army and Navy HQ enlistment using fiscal year (FY) 2000–2008 data. For the Army, they estimate an elasticity of HQ enlistment with respect to relative military pay of 1.15. This means that if the level of military pay were to rise by 10 percent relative to civilian wage opportunities, enlistment of HQ youth would rise by 11.5 percent. They estimate a somewhat smaller elasticity, 0.73, for the Navy.

Table 1. External Market Factor Elasticities

Study	Service	Data Type and Time Period	Relative Pay	Unemployment
Asch et al. (2010)	Army	Quarterly by state, 2000–2008	1.15	0.11
	Navy	Quarterly by state, 2000–2008	0.73	0.12
Simon & Warner (2007)	Army	Quarterly by state, 1996–2005	0.70	0.42
Warner & Simon (2004)	Army	Quarterly by state, 1989–2003	0.71–0.81	0.25–0.31
	Navy	Quarterly by state, 1989–2003	0.62	0.29
	AF	Quarterly by state, 1989–2003	0.40	0.24
	MC	Quarterly by state, 1989–2003	0.64	0.15
Warner et al. (2003)	Army	Monthly by state, 1989–1997	0.78	0.22
	Navy	Monthly by state, 1989–1997	0.95	0.26
	AF	Monthly by state, 1989–1997	0.47	0.19
	MC	Monthly by state, 1989–1997	0.23	0.28
Hogan et al. (1996)	Navy		0.55	0.18
WSP Literature Review Mean[1]	Various	Various, Pre-Drawdown	0.75	0.62

1. From: Warner et al. (2001).

Many other past studies of HQ enlistment based on post-drawdown data have also estimated the effect of military pay on enlistment. Included among these are Simon and Warner (2007), Warner et al. (2003), and Hogan et al. (1996). Using Army data over the period 1996–2005, Simon and Warner (2007) obtain an Army HQ pay elasticity of 0.70. Using data spanning the period FY 1988–2003, Warner and Simon (2004) obtained Army HQ pay elasticity estimates in the range of 0.71–0.81 depending on model specification and estimation method. In the Warner et al. (2003) study, which used data over the FY 1988–1997 period, Army and Navy HQ enlistment elasticities were estimated to be 0.78 and 0.95, respectively. Importantly, over a time period that does not overlap the period used by Asch et al. (2010), the estimates of the effect of relative pay on HQ enlistment are broadly similar to one another.

Much research conducted with pre-drawdown data provides estimates that are consistent with those just described. The studies are too numerous and varied in method and data to list individually here. Table 1 simply shows the mean estimates of relative pay and unemployment elasticities from the Warner et al. (2001) survey of pre-drawdown research. That survey computed a mean pay elasticity estimate of 0.75 from these studies, a number in the general range of studies conducted since the drawdown.

Most studies find that HQ enlistment is strongly related to the civilian unemployment rate. Asch et al. (2010) estimated the elasticity of HQ enlistment with respect to the civilian unemployment rate to be about 0.1, implying that a doubling of the civilian unemployment rate (from 5 to 10 percent, say) would raise HQ enlistment by 10 percent. On a base of 50,000 HQ enlistments annually, that would mean about 5,000 more. According to the various estimates from other studies conducted with post-drawdown data, this estimate is likely to be the lower bound on the effect of unemployment.

Table 1 indicates that the average estimated unemployment elasticity in the pre-drawdown studies was 0.62, a generally larger value than the ones estimated with post-drawdown era data. The reason for this decline in the estimated sensitivity of HQ enlistment to unemployment is unclear. But despite the fact that more recent estimates of the sensitivity of HQ enlistment to unemployment are smaller, it should be kept in mind that the more recent estimates still imply a strong influence of the business cycle on military enlistment.

Recruiters and Advertising

Table 2 summarizes estimated effects of the sensitivity of HQ enlistment to changes in the number of recruiters and changes in the amount of advertising. Asch et al. (2010) estimate that a 10 percent increase in the stock of Army recruiters would

Table 2. Recruiting Resource Elasticities

Study	Service	Data Type and Time Period	Recruiters	Advertising
Asch et al. (2010)	Army	Quarterly by state, 2000–2008	0.57–0.63	
	Navy	Quarterly by state, 2000–2008	0.22–0.41	
Simon & Warner (2007)	Army	Quarterly by state, 1996–2005	0.47(+), 0.62(-)	
Warner & Simon (2004)	Army	Quarterly by state, 1989–2003	0.53	0.05
	Navy	Quarterly by state, 1989–2003	0.53	0.05
	AF	Quarterly by state, 1989–2003	0.57	0.01
	MC	Quarterly by state, 1989–2003	0.59	0.03
Warner et al. (2003)	Army	Monthly by state, 1989–1997	0.41	0.14
	Navy	Monthly by state, 1989–1997	0.64	0.08
	AF	Monthly by state, 1989–1997	0.48	0.01
	MC	Monthly by state, 1989–1997	0.47	-0.05
Hogan et al. (1996)	Navy	Monthly by NRD, 1990–1994	0.29	0.021 (Radio) 0.03 (TV)
WSP Literature Review Mean[1]	Various	Various, Pre-Drawdown	0.76	0.10

1. From: Warner et al. (2001).

expand Army enlistment by between 5.7 and 6.2 percent, depending upon model specification.[4] These estimates of Army recruiter elasticities are not much different from those obtained by Warner and Simon (2004, 2007) and Warner et al. (2003). Simon and Warner (2007) used a method that allowed them to permit the recruiter elasticity to differ depending upon whether the recruiter stock is increasing or decreasing. They estimate a 0.47 Army recruiter elasticity if recruiters are increasing but 0.62 if they are decreasing.[5]

Changes in the Army's recruiter stocks may explain some of the Army's HQ recruiting swings since FY 2000. The Army permitted its recruiter stock to decline from 6,500 in 2002 to 5,100 in 2004, a decline of roughly 30 percent. Other things

4. The larger estimate is from the model with time effects. See Table 4.1 of Asch et al. (2010).

5. This makes intuitive sense. The services increase their recruiter stocks by adding personnel who are inexperienced in recruiting and who require learning on-the-job before they become fully productive. When the services reduce their recruiter inventories, they typically do so by rotating off of recruiting duty the most experienced, and the most productive, recruiters.

the same, a recruiter elasticity of 0.6 predicts that Army HQ enlistments would decline by 18 percent. After 2004, the Army began dramatically increasing its recruiter stock; by FY 2009 it had grown to almost 7,700, an increase of roughly 50 percent over the FY 2004 level.

Asch et al. (2010) estimate that changes in the recruiter stock have smaller effects on Navy HQ enlistment than Army HQ enlistment. In a model that includes time effects, they estimate that a 10 percent increase in Navy recruiters increases Navy HQ enlistment by only 2.2 percent. This study uses the obtained estimates to calculate the cost of extra recruits brought about by additional recruiters. Despite the fact that their Navy recruiter elasticity estimates are much smaller than their Army estimates, the calculated marginal cost of the HQ enlistments induced by a larger recruiter stock is about $33,000 per additional HQ recruit in both services (see pp. 33–34 of the Asch et al. study).

Advertising is the other key input into the recruiting process. However, estimation of the effects of advertising has been plagued with lack of data, problems of measurement, conceptual problems related to model specification, and statistical problems relating to estimation. As a result, despite the fact that in FY 2009 the services spent over $600 million in advertising, its effects have not been well estimated.[6] The few post-drawdown studies that have attempted to do so include Warner and Simon (2004), Warner et al. (2003), Hogan et al. (1996), and Dertouzos and Garber (2003). Warner and Simon (2004) estimate an overall advertising elasticity of 0.05 for the Army and Navy using FY 1988–2003 data. Warner et al. (2001) obtained larger values (0.14 and 0.08, respectively) using FY 1988–1997 data. Hogan et al. (1996) estimate advertising elasticities by media type using data from the early-to-mid 1990s. They estimate an elasticity of 0.021 for radio advertising and 0.03 for TV advertising. The mean estimate of the advertising elasticity from pre-drawdown studies was 0.1. Needless to say, the estimated effects of advertising on HQ enlistment have been much more variable and imprecise than the estimated effects of recruiters.

Dertouzos and Garber (2003) argue that advertising was considerably different in type and content in the 1990s than it has been in the 2000s, and they call into question both past as well as recent studies of military advertising. They argue that

6. Data for most studies of the enlistment effects of military advertising were supplied by PEP, Incorporated, a New York-based advertising research firm. For many years, PEP collected advertising expenditure and impressions data for DOD from the advertising agencies handling the services advertising campaigns. Unfortunately for the analysis of service advertising programs, no advertising data have been collected since FY 2001. Warner and Simon (2004) estimate the effect of advertising on HQ enlistment using data over the period FY 1988 2003. To do so, they use actual PEP data by state and quarter over the FY 1988 2001 period. They estimate FY 2002–2003 advertising by state and quarter based on changes in the overall service advertising programs relative to FY 2001. Their approach assumes no geographic change in the allocation of advertising over the FY 2002–2003 period.

past estimates of advertising effectiveness are flawed because they are overly restrictive in key respects. First, researchers have assumed functional relationships that embed the assumption that the advertising elasticity is invariant to the baseline level of advertising. They argue that a small advertising campaign will be ineffective because insufficient advertising impressions are made to influence youths' attitudes about military service. Likewise, after some saturation point, advertising expenditures are ineffective because youth have received the same advertising message many times. Second, advertising is likely to have dynamic effects beyond the time period when an ad is first placed, but the effects are likely to diminish over time as the target audience forgets the initial advertising impression.

Dertouzos and Garber modify the basic enlistment supply model. They use a flexible functional form in the specification of the potential effects of advertising to allow the elasticity of different media to vary with the scale of advertising, permitting thresholds and saturation points that vary with media type and month. Their model permits an S-shaped (logistic) relationship between enlistments and advertising with effects that are spread out over the course of several months and depend on the combination of parameters estimated for the given media type. Dertouzos and Garber estimate their model using data from the mid-1980s and data over the 1993–1997 period and distinguish among television, radio, and magazine advertising. They find that when advertising budgets are small, magazine advertising is the most cost-effective medium. For larger budgets a mix of magazine and radio advertising is the best choice. Only for large budgets is TV advertising cost effective. They find that at the budget levels that prevailed in the 1980s, advertising was cost effective; but the budget levels in the period 1993 to 1997 were too low to be in the part of the S-curve where expenditures would have their maximum effect at the margin. The policy implication is that the services should not cut their advertising budgets too deeply during periods of low demand for recruits, lest they operate in the least efficient part of the S-curve.

Enlistment Incentives

Table 3 shows estimates of the effects of enlistment incentives that have been obtained in recent studies and compares them with estimates from pre-drawdown studies. Consider first the effects of enlistment bonuses. Asch et al. (2010) show that, in response to the recruiting challenges that arose after FY 2003, the Army substantially increased its enlistment bonuses. The percentage of HQ recruits receiving bonuses rose from about 40 percent to 70 percent in the FY 2003–2008 period, and the average bonus amount increased from $3,000 to $14,000. Asch et al. (2010) estimate that the bonus expansion did in fact improve HQ recruiting. Depending on model specification, they estimate an elasticity of HQ enlistment with respect to

Table 3. Enlistment Incentive Elasticities

Study	Service	Data Type and Time Period	Enlistment Bonus	Education Benefit
Asch et al. (2010)	Army	Quarterly by state, 2000–2008	0.06–0.17	0
	Navy	Quarterly by state, 2000–2008	-0.02–0.065	0
Warner & Simon (2004)	Army	Quarterly by state, 1989–2003		
	Navy	Quarterly by state, 1989–2003		
Warner et al. (2003)	Army	Monthly by state, 1989–1997	0.12	0.312
	Navy	Monthly by state, 1989–1997	0.02	0.202
WSP Literature Review Mean[1]	Various	Various, Pre-Drawdown	0.06	0.09

1. From: Warner et al. (2001).
Note: Estimates based on percentage of HQ recruits receiving educational benefits.

expected bonus amount of between 0.06 and 0.17. These estimates, in fact, seem to span the range of Army estimates obtained in past studies (Table 3). Estimates in this range are reasonably consistent with pay elasticity estimates.

Using the larger estimated elasticity, Asch et al. (2010) simulate how many HQ contracts the Army would have lost if the Army's enlistment bonus budget had not increased after FY 2003. They estimate that over the FY 2004–2008 period, the Army would have obtained 20 percent fewer HQ contacts had bonuses not been expanded. These extra contracts did not come cheaply, however. The estimated marginal cost of the HQ contracts brought about by the expanded bonus program is $44,000 (a per person-year marginal cost of roughly $11,000). If the simulation had been based on the smaller estimate of the bonus elasticity, the predicted HQ contract loss due to the bonus program expansion would have only been about 8 percent. The implied marginal cost of the HQ enlistments obtained with the larger program would have been almost $100,000 (with implied person-year marginal cost of $25,000). Recall that this study estimated the marginal cost of HQ enlistment via recruiters to be about $33,000.

Unlike their findings for the Army, Asch et al. (2010) do not find a market effect from Navy enlistment bonuses (a result similar to Warner et al. (2003)). The lack of market expansion for the Navy may be due to the fact that the Navy uses bonuses as an inducement to longer enlistment (and generally in high-tech skills) and does not give them to recruits who join for 3- or 4-year terms, as does the Army. But even

if they do not expand HQ enlistment, inducing a fixed number of HQ recruits to sign for longer terms can be cost effective. The Air Force, for example, attempts to induce longer enlistment by offering larger bonuses for 6-year contracts than for 4-year contracts. Simon and Warner (2009) studied the Air Force program and found it to be highly cost effective. A $5,000 spread between 4- and 6-year bonuses was estimated to increase 6-year contracts by 30 percentage points. Furthermore, the cost per additional person-year induced by a larger bonus for 6-year enlistments was estimated at about $11,000, making the marginal cost per person-year much lower than through other methods for expanding HQ person-years.

Educational benefits are the other main incentive for HQ enlistment. In fact, throughout the 1980s and 1990s, the Army used educational incentives more intensively than enlistment bonuses to attract HQ recruits. It did so by adding Army College Fund (ACF) "kickers" to the amounts to which all recruits were entitled if they participated in the Montgomery GI Bill program. Depending on year, military occupation, and term of enlistment, the kicker amounts could run as much as $50,000. The Navy introduced its own college fund program in 1990. The Marine Corps operated a very limited college fund program in the mid-to-late 1990s, but the Air Force has never had a college fund program.

In 1997, about 30 percent of Army HQ recruits were receiving ACF kickers and about 20 percent of Navy HQ recruits were receiving Navy College Fund (NCF) kickers. Estimates by Warner et al. (2003) indicated that elimination of these kicker programs would have reduced Army HQ enlistment by about 6 percent and Navy HQ enlistment by about 4 percent. That is, about one-third of Army ACF enlistments would not have enlisted in the absence of the program and about 20 percent of Navy NCF recipients would not have enlisted. Other studies have not estimated HQ enlistment to be as responsive to educational incentives as Warner et al. did. But even assuming HQ enlistment to be only half as responsive to educational benefits as they estimated, Warner et al. (2003) concluded that educational benefits are a reasonably cost-effective recruiting tool compared with other recruiting resources.

Due to the implementation of the Post 9/11 GI Bill program in August of 2009, educational benefits have been dramatically increased for all military recruits and not just college fund recipients. In fact, the Post 9/11 GI Bill program has roughly doubled real educational benefits in comparison to what they were under the Montgomery GI Bill program (Simon et al. (2010)). Since this program only recently went into effect, it will take some time for its effects to become apparent. Past research indicates that its effects will be non-negligible and could be sizeable.

Other Trend Effects in Recruiting

Despite the services' best efforts, other long-term trends are hampering HQ recruiting. Two trends identified by past research are the decline in the veteran population and the rise in college attendance. Bicksler and Nolan (2009) discuss the trends in veteran population and college attendance and provide a more detailed discussion of their estimated effects on HQ recruiting.

Asch et al. (2010) and Simon and Warner (2007) estimate that the conflicts in Iraq and Afghanistan have taken a sizable toll on Army recruiting. Because the variation in these factors is largely time related and therefore strongly correlated with other time-related factors, identification of their precise effects is difficult. But estimates in these studies imply that HQ enlistment could have fallen as much as 30–40 percent relative to peacetime enlistment. Deterioration in the external labor market (as evidenced by a much higher unemployment rate), more recruiting resources, and larger enlistment incentives have neutralized some of the war-related decline in HQ enlistment but not all of it.

Retention

This section discusses stylized facts regarding retention, briefly highlights economic models of retention decision-making, and reviews evidence about the retention effects of pay and other factors.

Stylized Facts

The important stylized facts about military retention can be illustrated with the aid of Figure 2, which shows aggregate Army enlisted continuation rates by year of service (YOS) for three fiscal years—FY 2001, FY 2005, and FY 2009.[7] The first stylized fact is that retention rates are lowest in the initial term of service, which typically includes personnel who have 3–6 years of service. The second stylized fact is that retention rates increase thereafter up to the 20-year point, where personnel become eligible for immediate military retirement benefits. The rise in retention between the initial enlistment period and the 20-year point reflects two factors: (1) a natural tendency for retention to rise as those who intend to make the military a career stay and those who do not leave and (2) the increased incentive to stay as personnel get

7. Due to data availability, Figure 2 uses continuation rates in lieu of voluntary retention rates. The total continuation rate at a given year of service is a weighted average of the retention rate of personnel in the last year of their current enlistment contract (and therefore eligible to leave) and the continuation rate of personnel who have more than 12 months left on their current contract (and are therefore not eligible to leave). Beyond the initial enlistment period, the continuation rate of those who are not eligible to leave is typically in excess of 95 percent. Except for level, the YOS pattern for voluntary retention is the same as the YOS pattern of overall continuation.

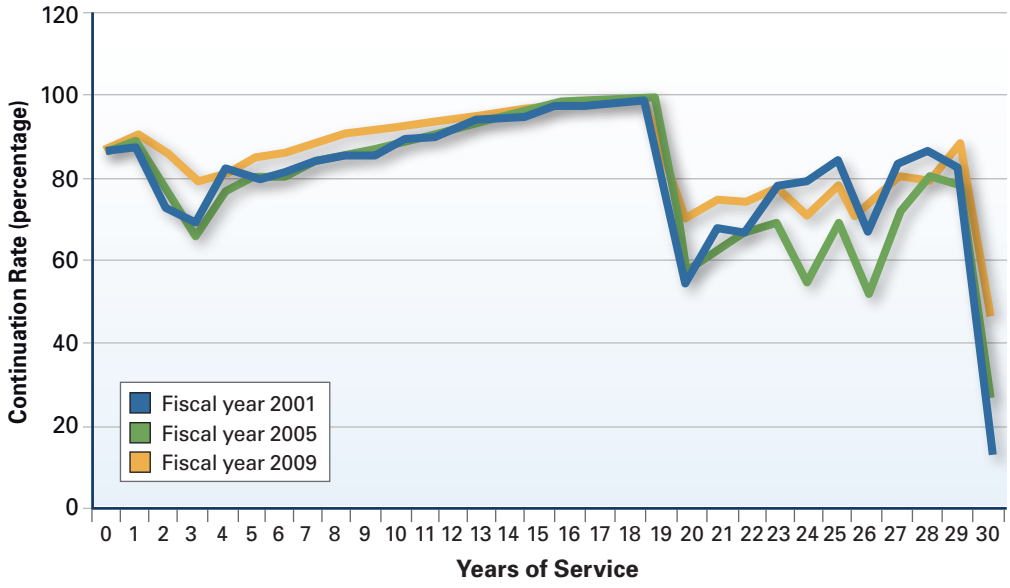


Figure 2. Army Overall Continuation Rates

closer to the retirement benefits available at the 20-year point. (Personnel in the YOS 10–20 range are sometimes said to be "in golden handcuffs" due to the increasing pull of the retirement system.)

The third stylized fact is that retention drops significantly once personnel become eligible for retirement benefits. While some of the decline may be attributed to the increased incentive because of the immediate availability of retirement benefits, at least part of the decline reflects the operation of High Year of Tenure (HYT) rules (also known as Up-or-Out rules), which force personnel to leave if they have not achieved a certain rank by a certain YOS. Though the rates vary, the same YOS pattern of continuation is evident across different occupations within the Army and across the different services. The same pattern is also evident for officers in different occupations and services.

Models and Retention Decisions

Economists have developed two general models of retention decision-making and used these models to guide empirical analysis of retention. It is clear from Figure 2 that the military retirement system, with its 20-year cliff vesting, has a powerful effect on retention decisions prior to the 20-year point. The models therefore attempt to account for the fact that individuals do not make retention decisions based just on current pay, but on the whole sequence of expected future military pays including retirement pay.

The models can be placed into two broad categories—models that are based on a dominant time horizon (e.g., one that typically includes the 20-year point) and models that are based on a weighted average of future time horizons. The first class of models is illustrated by the Annualized Cost of Leaving (ACOL) model. The ACOL model is discussed at some length in Warner and Asch (1995). In the ACOL model, individuals evaluate the financial returns to staying and leaving over all possible future periods of service and choose to stay or leave based on the period with highest annualized return (maximum value of ACOL). The choice is determined in part by an unobserved, non-pecuniary taste-for-service factor. In the simplest version of the ACOL model, the retention rate is the fraction of decision-makers for whom the sum of the pecuniary incentive (ACOL) and the non-pecuniary taste factor is a positive number. Simply put, individuals prefer to remain in service if the maximum net payoff is positive.

The simple version of the ACOL model implies that after the initial decision point, retention rates would jump to 100 percent as long as ACOL is increasing from one term to the next. Since retention rates do not do this (Figure 2), the simple ACOL model needed to be generalized in order to be applicable to panel data (data incorporating more than one decision point). The ACOL-2 model did so by assuming that random, transitory shocks as well as permanent tastes influence retention decisions at each decision point. Introduction of random shocks at each decision point allows low-taste individuals to remain in service if they draw a "good" shock and high-taste individuals to leave if they draw a "bad" shock. But high-taste individuals are more likely to remain in service than low-taste individuals; the ACOL-2 model accounts for this self-selection process without the unfortunate implication that retention beyond the initial decision point will be 100 percent as long as ACOL is increasing in YOS.

The ACOL and ACOL-2 models are dominant horizon models. The alternative approach is a model with multiple horizons that are derived within the model (i.e., endogenous). Gotz and McCall (1984) first developed this approach, which they called the Dynamic Retention Model (DRM). In the DRM, an individual with a given (permanent) taste for service evaluates the payoff to all possible future stay-leave sequences and makes a retention decision based on a weighted average of these payoffs compared to the payoff from immediate separation. The weights are based on the individual's taste-for-service factor as well as on (the distribution of) random shocks which individuals anticipate may induce them to separate at each future decision point. Individuals with a low taste for military service will anticipate that they are not likely to stay for a long career and will therefore not place a high weight on long-term payoffs compared to the weight they place on short-term payoffs. High-taste individuals, on the other hand, anticipate long careers and therefore place

more weight on long-term pays compared to short-term pays. Due to the fact that high-taste individuals are more likely to stay at each retention decision point (the sorting effect), more experienced groups of personnel have a higher average taste for service, and higher retention, than less experienced groups. Retention rates rise with experience and independently of compensation due to this sorting effect.

The theoretical advantage of the DRM is that it avoids an unfortunate implication of the ACOL (or ACOL-2) model, namely that pay changes that occur beyond the dominant time horizon do not change ACOL and, therefore, have no effect on retention. In the DRM, any future pay change has some effect on retention, with the magnitude determined by individuals' perceived likelihoods of remaining in service long enough to be influenced by the pay change (which in turn depends on tastes). The DRM is especially useful when applied to significant structural changes to military compensation, for example military retirement system reform.

The ACOL and ACOL-2 models have been frequently used in empirical studies of retention for two reasons: (1) the models are relatively easy to estimate with commonly available software and (2) they can accommodate a large number of explanatory variables including the unemployment rate and controls for other factors such as pay grade, occupational specialty, AFQT, education level, race, ethnicity, gender, and marital status.

Despite its theoretical advantages, the DRM is mathematically more complicated and more difficult to estimate. This added complexity has limited its empirical application to a handful of studies including Gotz and McCall (1984), Daula and Moffitt (1995), Asch and Warner (2001), Asch et al. (2008), and Mattock at al. (2010). The last two studies are noteworthy for the use of recently developed econometric techniques for estimation of non-linear models.[8]

Empirical Evidence

Empirical studies of enlisted retention have focused on first-term reenlistment, and second-term reenlistment, and those of officers have focused on retention at the initial service obligation (6 to 10 years of service). Some of these studies have applied one of the structural models of retention described in the previous section. Structural

8. These models have been used for compensation policy analysis. Asch and Warner (2001) calibrated the DRM to Army enlisted data (by manually adjusting three key parameters in the model) and used the calibrated model to simulate the effects of various structural changes to the enlisted basic pay table. Asch et al. (2008) used the Method of Simulated Likelihood (MSL) to estimate the model with data on both officers and enlisted personnel. They then used the estimated models to predict the effects of changes to the retirement system being considered by the 10th Quadrennial Review of Military Compensation (QRMC). Mattock et al. (2010) re-estimated the model by MSL using data on officers and used it to predict the effects of changes to various special and incentive (S&I) pays for officers.

models aggregate the various elements of military compensation received in a given time period into a single measure of compensation. But the focus of some studies has been the retention effect of a specific element of compensation such as the Selective Reenlistment Bonus (SRB). These studies tend to adopt a "reduced form" approach and include the specific pay measure as a separate variable along with controls for as many other observable factors as possible to isolate the effect of the specific pay measure being studied. With these comments as background, the estimated effects of compensation and other factors are now summarized.

General Pay Elasticities

By general pay elasticities, we mean the percentage effect of an overall increase in military pay. Warner and Asch (1995) and Goldberg (2001) summarize overall pay elasticity estimates from 10 studies of enlisted retention and two studies of officer retention that used pre-drawdown data. They found overall pay elasticities for enlisted personnel ranging from 1.0 to 3.0 at the initial reenlistment decision point, with a central tendency of around 2.0. Simply interpreted, if all elements of future military compensation were to rise by 10 percent, and civilian compensation remained unchanged, first-term retention would be predicted to rise by about 20 percent. Hence, if the first-term retention rate were 40 percent and real military compensation rose by 10 percent, the first-term retention rate would be predicted to rise by 8 percentage points (20 percent of the base retention rate). The predicted rise in the second-term retention rate due to a 10 percent overall pay increase is also around 8 percentage points, though such an increase implies a smaller elasticity.[9] Retention changes beyond the second term are much smaller (as would be expected due to the relatively high base retention rate beyond that point).[10]

Some studies conducted with post-drawdown data on enlisted personnel have estimated lower pay elasticities at the initial decision point than those based on pre-drawdown data, in the range of 0.5 to 1.5. Hansen and Wenger (2005) addressed the question of whether the pay elasticity has in fact declined in recent years. Ultimately, they found no evidence in support of a decrease, and they discovered that the apparent differences in pre- and post-drawdown estimates could be laid to differences in methodology. Hansen and Wenger estimate a baseline model which yielded a pay elasticity of 1.6, which is in the middle of the range of previous estimates.

9. An 8 percentage point retention increase on a base retention rate of 60 percent, for example, is an increase of 13.3 percent, implying an overall pay elasticity at the second reenlistment point of 1.33.

10. The estimates discussed in the text were all obtained with econometric estimation using the ACOL model. Asch and Warner (2001) use their calibrated DRM to simulate the effect of a 10 percent increase in overall compensation on Army enlisted retention. Their model predicts that a 10 percent real pay increase would raise retention by 21 percent at the first-term point, 13 percent at the second-term point, and 5 percent at the third-term point. These predictions are consistent with econometric evidence from other studies.

Studies of the effects of compensation on officer retention are fewer in number. The Warner and Asch (1995) survey of such studies found estimates of officer elasticities at the end of initial obligation in the range of 0.8 to 1.5, implying that a 10 percent increase in military pay would raise officer retention by between 8 percent and 15 percent. The two recent studies of officer retention that apply the DRM (Asch et al. (2008) and Mattock et al. (2010)) suggest that officer retention is in fact more sensitive to changes in compensation than the estimates from earlier studies of officer retention might indicate.

Reenlistment Bonuses

A number of past studies have used the reduced form approach to directly estimate the effects of SRBs on enlisted retention.[11] The most recent to do so is Asch et al. (2010). Chapter 7 of that study examines first- and second-term retention in selected Army enlisted occupations in the FY 2003–2007 period. In both terms of service, a one-level increase in the SRB multiplier (which represents one month of basic pay per year of reenlistment) was estimated to increase the reenlistment rate by about 3–4 percentage points (Table 7.6 in Asch et al.). Chapter 8 of that study provides alternative estimates using different data. Estimates available in that chapter suggest that a one multiple SRB increase will raise Army reenlistment by 2.5 percentage points (Table 8.1 in Asch et al.). Chapter 8 also provides estimates of SRB effects for the other services. Similarly to the Army, Navy first-term reenlistment was also estimated to rise by 2.5 percentage points per unit increase in the SRB multiplier; Marine Corps reenlistments were predicted to rise by 3.5 percentage points.

The Asch et al. (2010) estimates of the reenlistment effects of SRBs are consistent with a number of past studies of SRB effects on enlisted retention cited in the review articles by Warner and Asch (1995) and Goldberg (2001). Collectively, these studies indicate that SRBs have strong effects on enlisted retention and they furthermore suggest that SRBs are a very cost-effective tool in force management.

Incentive Effects of Sea Pay

In addition to SRBs, the services provide military members with a variety of special and incentive pays for various purposes. One of these is Career Sea Pay. Golding and Gregory (2002) analyzed the relationship between Career Sea Pay and the willingness of sailors to remain on or extend sea duty. They showed that sea pay had a positive effect on completing a year of an obligated sea tour and on encouraging extensions on sea duty. An increase of $50 per month in sea pay

11. Reenlistment bonuses are paid in selected military specialties, and the amount of the bonus equals the individual s basic pay times the number of years of reenlistment times a bonus multiplier (integer values from one to six).

increased the predicted completion rate of a 48-month sea tour by 3.3 percentage points, or 11 percent, and increased extensions of 48-month tours by 2.9 percentage points, or 5.8 percent. Career Sea Pay was found to be a cost-effective way to increase ship manning.

Educational Benefits

Educational benefits are a powerful recruiting incentive, as discussed above. But when educational benefits are used to increase enlistment, they also create an incentive to leave military service in order to use the benefit. Studies conducted with data from the 1980s found that Army personnel who received the ACF reenlisted at a lower rate than non-ACF recipients (Smith, Sylwester, and Villa (1991) and Hogan, Smith, and Sylwester (1991)). More recently, Simon et al. (2010) study the effects of educational incentives on reenlistment in the FY 1993–2003 period. Consistent with the earlier studies, Simon et al. (2010) estimate the higher educational benefits will reduce Army first-term retention. However, this study did not find an adverse impact of educational benefits on retention in the other services. Thus, while increased generosity of the Post 9/11 GI Bill program has raised concern within DOD about its effects on enlisted retention, past studies do not offer clear-cut evidence about what its retention effects will be. Adverse retention effects of the program may be mitigated by a feature that permits service members who have served 10 or more years in the Post 9/11 period to transfer benefits to dependents.

Business Cycle Influences on Retention

The state of the economy has a strong influence on recruiting. Evidence that retention may also depend on the state of the economy is indicated in Figure 2. Army enlisted continuation prior to the 20-year point was generally higher in FY 2009, when the civilian unemployment rate averaged 8.5 percent, than either FY 2001 or FY 2005, with unemployment rates of 4.3 and 5.2 percent, respectively.

Civilian unemployment roughly doubled between FY 2001 and FY 2009. How much do studies predict retention to have increased as a result? Unfortunately, Simon et al. (2010) provide the only estimates of the retention effects of civilian unemployment based on post-drawdown data. The unemployment rate measure in this study is the unemployment rate in an individual's home state at the time of reenlistment. This study estimates that a 1 percentage point rise in the civilian unemployment rate increases Army first-term retention by 0.5 percentage points, Navy retention by 0.8 percentage points, Air Force retention by 0.9 percentage points, and Marine Corps retention by 0.7 percentage points. These estimates imply that the approximate doubling of civilian unemployment between FY 2001 and

FY 2009 would increase first-term retention by somewhere between 2 percentage points (Army) and 3.6 percentage points (Air Force). These effects are modest and may be due to the fact that the study included year effects along with the unemployment rate in the individual's home state to control for other time-related effects on retention. These time effects no doubt capture in part effects of economy-wide movements in unemployment.

Goldberg and Warner (1982) provide a study of the retention effects of civilian unemployment based on Navy data from the FY 1974–1980 period. They estimate larger unemployment effects that are roughly double those estimated by Simon et al. (2010).[12] Based on these estimates, the observed rise in civilian unemployment between FY 2001 and FY 2009 would raise first- and second-term retention rates by about 8 percentage points. The larger estimates of unemployment effects obtained in this study may be due to the fact that it did not include time effects in the estimated models.

Summary

The evidence found in numerous empirical studies suggests that both recruiting and retention are significantly influenced by the state of the civilian economy. The civilian economy affects recruiting and retention in at least two ways: through the availability of civilian employment, as measured by the civilian unemployment rate; and by the potential earnings offered by the civilian sector, as measured by average civilian earnings. As the U.S. economy improves we can expect that the declining civilian unemployment rate and rising civilian real earnings will pose challenges for recruiting and for retention.

The 9th Quadrennial Review of Military Compensation found that military compensation hovered around the 60th percentile of civilian earnings based on comparisons with comparable groups of civilian workers, and it recommended that military pay be raised over time to the 70th percentile of earnings. Over the course of the last decade, a series of annual pay increases following from this recommendation, as well as the severe economic downturn that began in 2007, have transpired to raise military compensation above the 70th percentile, as work reported elsewhere for the 11th Quadrennial Review of Military Compensation indicates. Military compensation has risen to the point, in comparison with civilian compensation, that generalized pay hikes are a costly means of inducing desired retention changes in specific communities that may be experiencing recruiting and retention difficulty

12. They estimate models by occupation group. The weighted average estimate of their first-term estimates is a 2 percentage point rise in retention per percentage point rise in unemployment; the second-term weighted average effect is almost the same, 1.8 percentage points.

and a time when overall recruiting and retention are healthy. The research reviewed here indicates that changes in bonuses and other special and incentive pays have sizeable impacts on recruiting and retention, and furthermore, are cost effective in comparison with other policy alternatives.

References

Asch, B., P. Heaton, J. Hosek, F. Martorell, C. Simon, and J. Warner. 2010. *Cash incentives, and military enlistment, attrition, and reenlistment*. MG-950-OSD. Santa Monica, Calif.: RAND Corporation.

Asch, B., J. Hosek, M. Mattock, and C. Panis. 2008. *Assessing compensation reform: research in support of the 10th Quadrennial Review of Military Compensation*. Santa Monica, Calif.: RAND Corporation.

Asch, B., J. Hosek, and J. Warner. 2007. The new economics of manpower in the post-Cold War era. In: *Handbook of defense economics* Volume 2. Edited by T. Sandler and K. Hartley, 1075–1138. Amsterdam: Elsevier.

Asch, B. and J. Warner. 2001. A theory of compensation and personnel policy in hierarchical organizations with application to the U.S. military. *Journal of Labor Economics* 19: 523–562.

Bicksler, B. and L. Nolan. 2009. *Recruiting an all-volunteer force: The need for sustained investment in recruiting resources—an update*. Arlington, Va.: Strategic Analysis.

Daula, T. and R. Moffit. 1995. Estimating dynamic models of quit behavior: The case of military reenlistment. *Journal of Labor Economics* 13: 449–523.

Dertouzos, J. and S. Garber. 2003. *Is military advertising effective? An estimation methodology and applications to recruiting in the 1980s and 1990s*. MR-1591-OSD. Santa Monica, Calif.: RAND Corporation.

Goldberg, M. 2001. *A survey of enlisted retention: Models and findings*. CRM D0004085.A2/Final. Alexandria, Va.: Center for Naval Analyses.

Goldberg, M. and J. Warner. 1982. *Determinants of Navy reenlistment and extension rates*. CRC 476. Alexandria, Va.: Center for Naval Analyses.

Golding, H. and D. Gregory. 2002. *Sailors' willingness to complete sea tours: Does money matter?* CRM D0006886.A2/Final. Alexandria, Va.: Center for Naval Analyses.

Gotz, G. and J. McCall. 1984. *A dynamic model retention model of Air Force officer retention: theory and estimation*. R-03028-AF. Santa Monica, Calif.: RAND Corporation.

Hansen, M. and J. Wenger. 2005. Is the pay responsiveness of enlisted personnel decreasing? *Defense and Peace Economics*. 16: 29–43.

Hogan, P., D. Smith, and S. Sylwester. 1991. The Army College Fund: Effects on attrition, reenlistment and cost. In: *Military compensation and personnel retention*. Edited by C. Gilroy, D. Horne, and D. Smith, 317–354. Alexandria, Va.: U.S. Army Research Institute.

Hogan, P., T. Dall, P. Mackin, and C. Mackie. 1996. *An econometric analysis of Navy television advertising effectiveness*. Falls Church, Va.: Systems Analytic Group.

Mattock, M., B. Asch, J. Hosek, C. Whaley, and C. Panis. 2010. *Towards improved management of officer retention: A new capability for assessing officer retention*. DRR-5184-OSD. Santa Monica, Calif.: RAND Corporation.

Simon, C. and J. Warner. 2007. Managing the all-volunteer force in a time of war. *Economics of Peace and Security Journal* 2(1), 20–29.

Simon, C. and J. Warner. 2009. The supply price of commitment: Evidence from the Air Force bonus program, *Defence and Peace Economics* 20(4): 269–286.

Simon, C., S. Negrusa, and J. Warner. 2010. Educational benefits and military service: An analysis of enlistment, reenlistment, and veterans' benefit usage 1991 2005. *Economic Inquiry* 48(4): 1008–1031.

Smith, D., S. Sylwester, and C. Villa. 1991. Army reenlistment models. In: *Military compensation and personnel retention*. Edited by C. Gilroy, D. Horne, and D. Smith, 317–354. Alexandria, Va.: U.S. Army Research Institute.

Warner, J. and B. Asch. 1995. The economics of military manpower. In: *Handbook of defense economics* Volume 1. Edited by K. Hartley and T. Sandler, 347–398. Amsterdam: Elsevier.

Warner, J. and C. Simon. 2004. *Updated estimates of enlistment supply: A report prepared for Office of the Undersecretary of Defense for Personnel and Readiness*. Accession Policy Directorate. Clemson University: Department of Economics.

Warner, J., C. Simon, and D. Payne. 2001. *Enlistment supply in the 1990s: A study of the Navy College Fund and other enlistment incentive programs*. DMDC Report No. 2000-015. Arlington, Va.: Defense Manpower Data Center.

Warner, J., C. Simon, and D. Payne. 2003. The military recruiting productivity slowdown: The roles of resources, opportunity cost, and tastes of youth. *Defense and Peace Economics* 14: 329–342.

Part II

Special and Incentive Pays

Chapter 3

The Officer and Enlisted Special and Incentive Pay Analysis Model

Kim Darling
Patrick Mackin
Joseph Mundy

Model Overview

The Special and Incentive Pays Analysis Model, developed for the Eleventh Quadrennial Review of Military Compensation, is an all-force inventory aging model that allows users to analyze the effects of changing special and incentive (S&I) pay amounts and/or timing on inventory distribution. The model allows users to adjust parameters that include:

- Economic factors
- Gains adjustment methods
- Selective Reenlistment Bonus (SRB) adjustments
- Timing and amounts of other special and incentive pays.

The model shapes inventory distribution through adjustments to baseline continuation rates. These adjustments are based on changes to special and incentive payout amounts as well as the prevailing unemployment rates. Payouts are discounted in an Annualized Cost of Leaving (ACOL)-like fashion and, along with the unemployment rate, are entered into a logit formula. The adjusted continuation rate formula is provided below.[1]

$$Adj\ CR = (Not\ at\ ETS\ CR) * (Perc\ Not\ at\ ETS) + (Adj\ at\ ETS\ CR) * (Perc\ at\ ETS)$$

1. Adj CR = adjusted continuation rate
   Not at ETS CR = not at expiration term of service (ETS) continuation rate
   Adj at ETS CR = adjusted at ETS continuation rate
   Perc not at ETS = percent not at ETS
   Perc at ETS = percent at ETS

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

Where:

$$Adj\ at\ ETS\ CR = \frac{1}{1 + e^{-\left(\ln\left(At\ ETS\ {}^{CR}/_{Not\ at\ ETS\ CR}\right) + \beta_{ACOL} * \Delta ACOL + \beta_{Urate} * \Delta Urate\right)}}$$

The adjusted continuation rate is applied to inventory counts to determine the projected number of individuals remaining from earlier that year. Gains, in the form of accessions and lateral transfers, are then added to the model to complete the inventory projection. Inventory gains are predicted according to the user's choice of three methods and distributed according to historical gains distributions. The model's output, which is broken down by years of service (YOS), includes:

- Baseline and projected continuation rates
- 2010 inventory end strength and projected remaining individuals for each fiscal year (FY)
- Projected inventory counts after adjustments for gains
- Inventory requirements as specified by previous military instruction

The model guides the user sequentially through three input pages before presenting the final output. The *Parameters* page (Figure 2) allows you to select the job code, adjust the gains method, and set general economic assumptions for each projection year. The *SRB Adjustments* page (enlisted personnel only, Figure 3) allows the user to view historical SRB data and adjust those figures if desired. The *Special and Incentive Pays* page (Figure 4) allows the user to view historical payout structures and create custom pays that can conform to almost any annual structure. Upon completion of these pages, the user is presented with the predicted output, after which point one can alter parameters through page navigation shortcuts. All pages contain a link that enables users to view a summary of payouts via a *Payout Summary* page (Figure 6).

Calculating Marginal Costs

In addition to predicting the effects of changes in pay on retention behavior and force manning, policy analysts are concerned with the relative efficiency of proposed changes. That is, what is the additional total cost of a change in incentive pays for each additional member who is retained? The S&I Pay Analysis model provides the information necessary to calculate these costs.

In virtually all cases, increases in S&I pays will increase total cost in two ways. First, total costs increase because a greater number of members will accept the pays

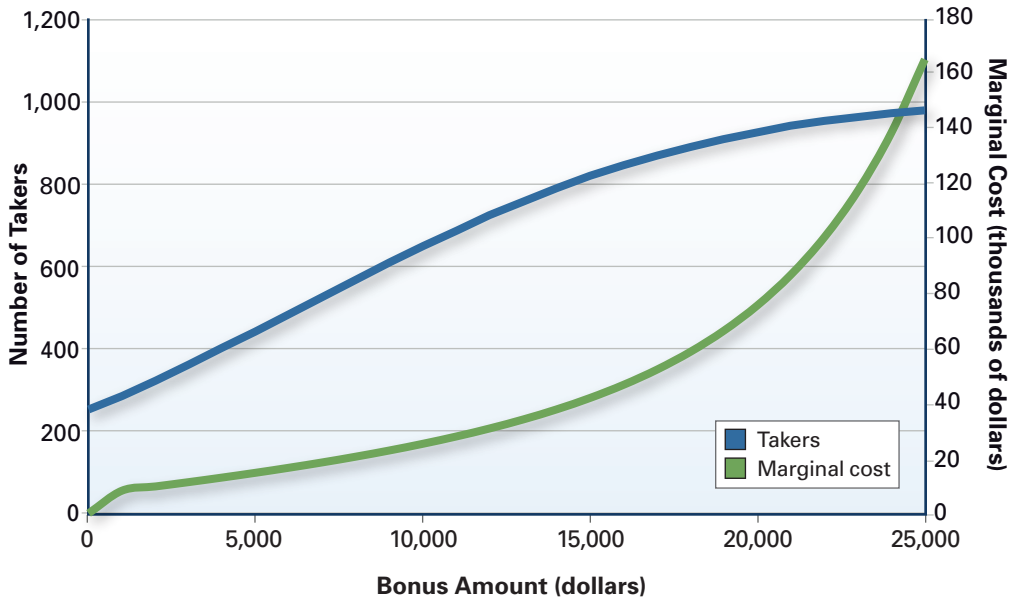


Figure 1. Marginal Cost Example

and agree to stay, accept a particular assignment or type of duty, or join the military. Second, all of the members who would have stayed, accepted the assignment, or joined without the higher level of pay will also receive the higher amount. At higher and higher levels of the pay, the marginal yield in terms of additional takers will decline relative to the change in the total cost.

The concept is illustrated in Figure 1, a hypothetical example of a bonus paid to retain members. In this example, 1,000 members are facing a stay/leave decision; in the absence of a bonus, 25 percent (250) will stay. As the bonus increases, the take rate increases, albeit at a decreasing rate. As the bonus increases above $15,000, the red line denoting the number of takers becomes very flat (i.e., the change in the take rate is very small). Conversely, the marginal cost curve (defined as the change in total cost divided by the change in takers) becomes very steep.

For example, increasing the bonus from $3,000 to $4,000 increases the number of takers from 360 to 400 (40 additional takers). The total cost of the change is $4,000 * 40 + $1,000 * 360 = $519,000. The marginal cost per additional member retained is about $13,000. Increasing the bonus from $14,000 to $15,000 changes the number of takers from 787 to 816 (29 additional takers). The marginal cost per additional taker is about $42,000.

User Guide

Adjusting Model Parameters

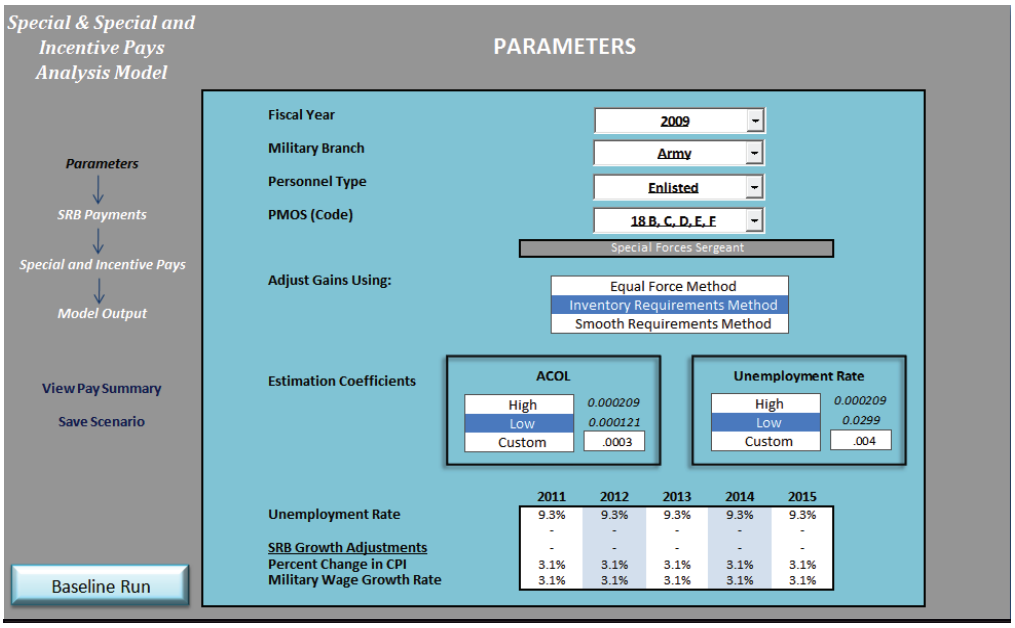


Figure 2. Parameters Page

The Parameters page (Figure 2) shows inputs to the model.

Fiscal Year

Select the fiscal year on which you wish to base continuation rates. Presently, 2009 is the only fiscal year available.

Military Branch

Select Army, Air Force, Marines, or Navy.

Personnel Type

Select Enlisted, Warrant, or Officer.

Primary Military Occupational Specialty (PMOS Code)

Select the unique job classifier. Note that despite use of "PMOS," this identifier may represent a different naming convention. For example, enlisted Navy sailors will show EMC (NEC).

Gains Adjustment

Choose between Equal Force, Inventory Requirements, and Smooth Requirements methods. The Equal Force Method will determine the number of gains by keeping the 2010 end inventory constant. The Inventory Requirements Method determines the number of gains by taking the difference between pre-established inventory requirements and projected inventory. The Smooth Requirements Method adjusts the inventory to incrementally reach pre-established FY 2015 inventory levels. Gains are computed by taking the difference between these required inventory levels (calculated in previous step) and projected inventory levels. One should view the available inventory requirements information (available on the "Output" sheet) for each PMOS to determine which method is most appropriate.

Estimation Coefficients

Choose to use high- or low-end estimates relating to unemployment rate and ACOL coefficients. If not satisfied with either of these options, select "Custom" and type in the coefficient you wish to use.

General Assumptions

The model requires you to input unemployment rates, percentage change in CPI, and military wage growth rates for all fiscal years. Please note that the latter two inputs are used exclusively for the estimation of Air Force and Navy SRB payments whose payout amounts are dependent upon the basic pay of the eligible members.

Alterations to SRB Payouts

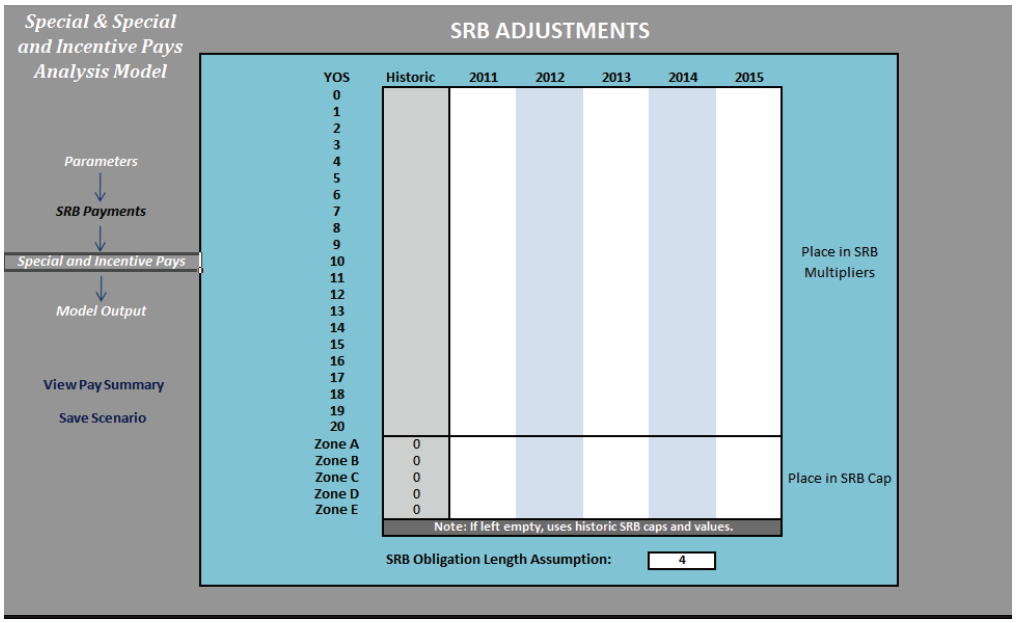


Figure 3. SRB Page

In Figure 3, the gray, left-most column shows historic SRB amounts and caps. For the Army and Marine Corps, the fields will show actual SRB amounts, whereas the Navy and Air Force will show SRB multipliers. All forces will show a dollar value for the SRB caps. To alter the SRB caps or amounts (dollar values or multipliers), enter values into the white space. *If you leave the white space unaltered, the SRB amounts and caps will remain unchanged for all fiscal years.* To alter the duration of the assumed obligation for the SRB (denoted in years), enter a value in the field provided.

Adjustments to Special and Incentive Pays

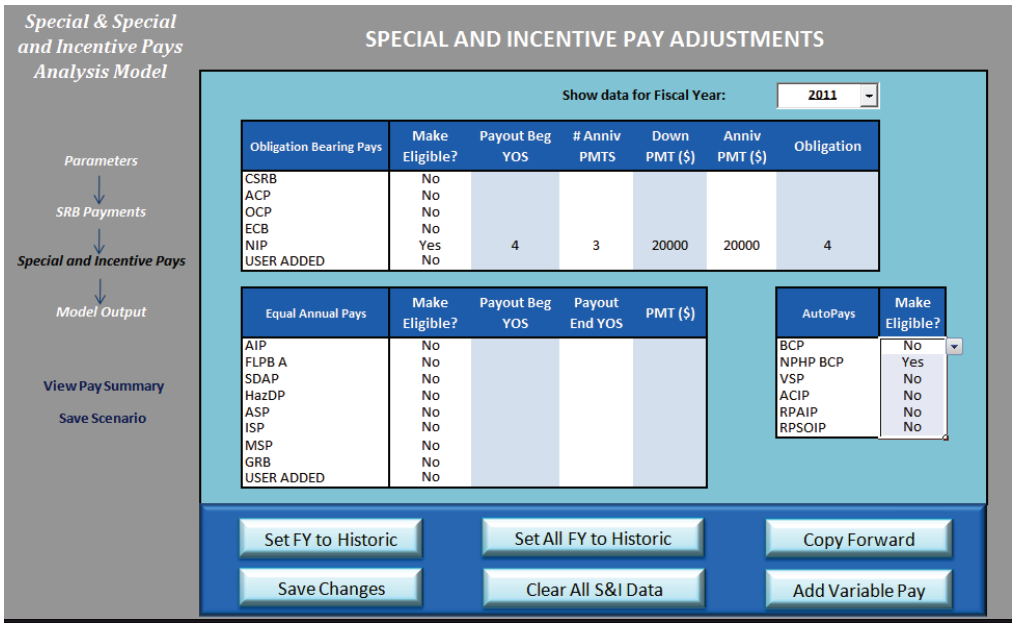


Figure 4. Special and Incentive Pays Page

The Special and Incentive Pays page (Figure 4) contains three distinct input tables, each of which relate to different types of payout structures: Obligation Bearing Pays, Equal Annual Payouts, and AutoPays. Obligation Bearing Pays carry an obligation for which the member must agree to a contract. Payouts are discounted back to the first YOS they receive the initial payment. Equal Annual Pays are designed to account for pays that carry equal (assumed annual) payments between given years of service. Autopays have variable payouts for each YOS and are predetermined. The page also contains a link to a Variable Pay input table, which allows you to create a custom variable payout schedule. Each input table is designed to account for these differences and provide instruction for filling in vital information.

Obligation Bearing Pays

The Obligation Bearing Pay input table requires you to specify eligibility, the first year in which an individual receives payment, the number of anniversary payments, the down payment amount, anniversary payment amount, and obligation duration (in years). For modeling purposes, pays conforming to this schedule are discounted back to the year of service for which they receive their first payment.

Equal Annual Payouts

The Equal Annual Payouts input table assumes individuals in a PMOS receive equal annual payouts over a specified period in a career cycle. This table requires the user to specify eligibility, the first and last years in which individuals receive the pay, and the annual payment amount.

Autopays Input Table

The Autopays input table requires the user to specify eligibility. The pays in this table have predefined and variable payout schedules that are programmed into the model. In many cases, special or incentive pays can vary among PMOSs; it is impractical to automatically assign values to a PMOS that has never received that pay. *Therefore, if a PMOS is not historically eligible for a specific pay, changing the eligibility to "Yes" will not yield a payout. If you wish to add an autopay, enter the payout schedule using the Variable Pay input table.*

Variable Pay

To access the Variable Pay input table, click the "Add Variable Pay" near the bottom right of the window. You will be directed to a table dimensioned by YOS and fiscal year. Amounts placed in this table will be added to the existing payout amounts that are defined in other tables and will assign the values to the individuals in the PMOS for the years you define. When you are finished, click "Back" to return to the Special and Incentive Pays page.

Built-in Functions

At the bottom of the Special and Incentive Pays page, built-in function buttons have been provided to expedite the process of setting payout conditions for each year.

Showing Data for Selected Year

The model allows you to have different payout schedules for each fiscal year from 2011 to 2015. Changing the value in the drop-down box will retrieve pay information for the selected fiscal year. If you made changes to the payout schedule in a fiscal year, be sure to click the "Save Changes" button before switching fiscal years or those changes will not be saved.

Set FY to Historic

This function allows the user to set the payout schedule (for the selected fiscal year) equal to historic conditions. Using this function alone will result in no change between 2010 payouts and the fiscal year selected. This tool is designed for setting up baseline runs or making minor tweaks to payout schedules.

Set all FY to Historic

This function is identical to *Set FY to Historic*, except it will complete the task for all fiscal years. This functionality was designed to allow users to quickly and with minimal effort complete baseline runs.

Copy Forward

This function allows you to copy and save the pay conditions in the selected fiscal year to all future years through 2015. This functionality was designed to allow users to adopt a pay change beginning in a fiscal year and copy that change forward without having to enter the information by hand for each fiscal year. Please note that this function will not affect the values of the Variable Pay input table; you must make changes to this table by hand.

Save Changes

Use this feature to save changes to pays listed on the Special and Incentive Pay page *prior to altering the selected fiscal year.*

Clear All S&I Data

This function allows you to clear all special and incentive pay data (other than SRB) for all fiscal years. Please note that historical pay information will be preserved by the model and the *Set FY to Historic* and *Set All FY to Historic* features will still work.

Add Variable Pay

This function will guide you to the Variable Pay input table (Figure 5).

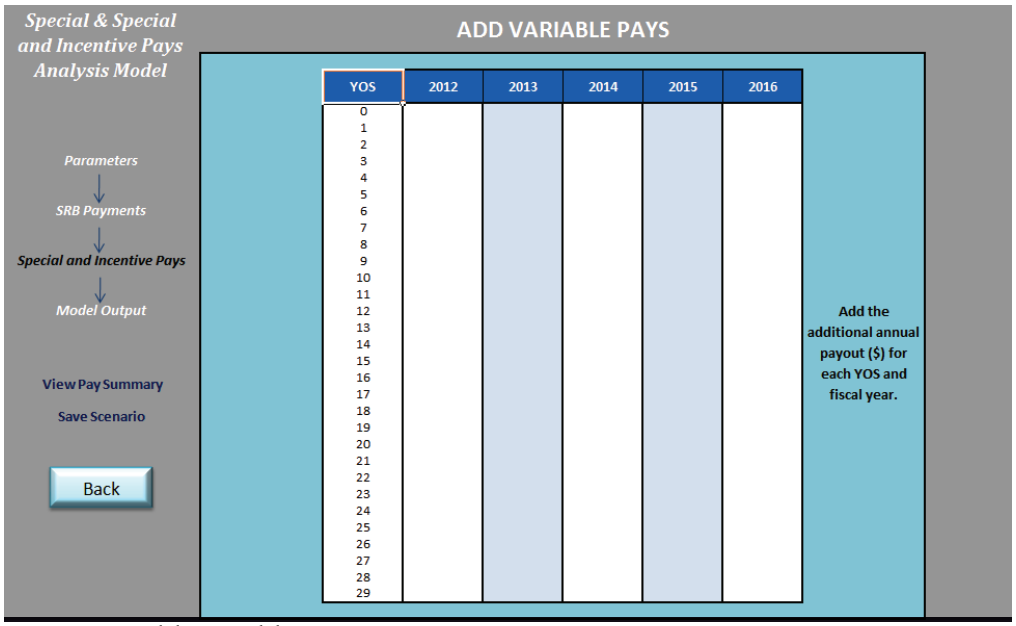


Figure 5. Add Variable Pays Page

Payout Summary

Each page contains a link to a summary of pay information page (Figure 6). This summary page allows one to view the sum of all special and incentive pays (including the SRB) for each "taker" of the pay. The page also displays the number of individuals receiving the pay. All fields are dimensioned by YOS and fiscal year.

Model Output: Inventory Profiles and Continuation Rate Adjustments

The model's output is displayed on two pages (Figures 7 and 8) and shows baseline and projected continuation rates, those projected to stay from the previous year, ending inventory when gains are added to the model, and end inventory requirements for each fiscal year. When finished, you can use the *Save Scenario* feature, which summarizes vital input and output data in a new worksheet.

Special & Special and Incentive Pays Analysis Model

Parameters
↓
SRB Payments
↓
Special and Incentive Pays
↓
Model Output

View Pay Summary

Save Scenario

SUMMARY OF COSTS

YOS	PV of Total Costs (S&I + SRB) Per Taker						NUMBER OF S&I PAY TAKERS				
	Historic	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
0	2,530	2,530	2,530	2,530	2,530	2,530	-	-	-	-	-
1	51,135	51,135	51,135	51,135	51,135	51,135	0	0	0	0	0
2	57,633	57,633	57,633	57,633	57,633	57,633	0	0	0	0	0
3	63,772	63,772	63,772	63,772	63,772	63,772	0	0	0	0	0
4	66,832	66,832	66,832	66,832	66,832	66,832	0	0	0	0	0
5	71,373	71,373	71,373	71,373	71,373	71,373	9	12	13	16	14
6	83,566	83,566	83,566	83,566	83,566	83,566	17	16	21	22	27
7	83,566	83,566	83,566	83,566	83,566	83,566	30	30	29	36	38
8	83,566	83,566	83,566	83,566	83,566	83,566	28	32	32	30	38
9	83,566	83,566	83,566	83,566	83,566	83,566	12	15	17	17	16
10	83,566	83,566	83,566	83,566	83,566	83,566	9	10	13	14	14
11	86,688	86,688	86,688	86,688	86,688	86,688	9	9	11	13	15
12	86,089	86,089	86,089	86,089	86,089	86,089	14	12	13	15	19
13	85,383	85,383	85,383	85,383	85,383	85,383	7	9	8	9	10
14	9,286	9,286	9,286	9,286	9,286	9,286	5	5	7	6	7
15	8,303	8,303	8,303	8,303	8,303	8,303	12	12	12	16	15
16	7,142	7,142	7,142	7,142	7,142	7,142	15	15	16	16	20
17	5,773	5,773	5,773	5,773	5,773	5,773	7	8	8	8	8
18	4,157	4,157	4,157	4,157	4,157	4,157	43	31	37	35	37
19	4,157	4,157	4,157	4,157	4,157	4,157	5	4	3	4	3
20	8,303	8,303	8,303	8,303	8,303	8,303	0	0	0	0	0
21	144,987	144,987	144,987	144,987	144,987	144,987	0	0	0	0	0
22	174,232	174,232	174,232	174,232	174,232	174,232	0	0	0	0	0
23	208,741	208,741	208,741	208,741	208,741	208,741	0	0	0	0	0
24	249,462	249,462	249,462	249,462	249,462	249,462	9	16	14	20	15
25	297,513	297,513	297,513	297,513	297,513	297,513	5	7	12	11	15
26	35,711	35,711	35,711	35,711	35,711	35,711	6	9	10	18	16
27	28,863	28,863	28,863	28,863	28,863	28,863	2	2	2	3	5
28	20,784	20,784	20,784	20,784	20,784	20,784	0	0	0	0	0
29	11,250	11,250	11,250	11,250	11,250	11,250	0	0	0	0	0

Figure 6. Pay Summary Page

Special & Special and Incentive Pays Analysis Model

Parameters
↓
SRB Payments
↓
Special and Incentive Pays
↓
Model Output

View Pay Summary

Save Scenario

This simulation projects future Air Force 46YXP force using FY 2009 aggregate continuation rates.

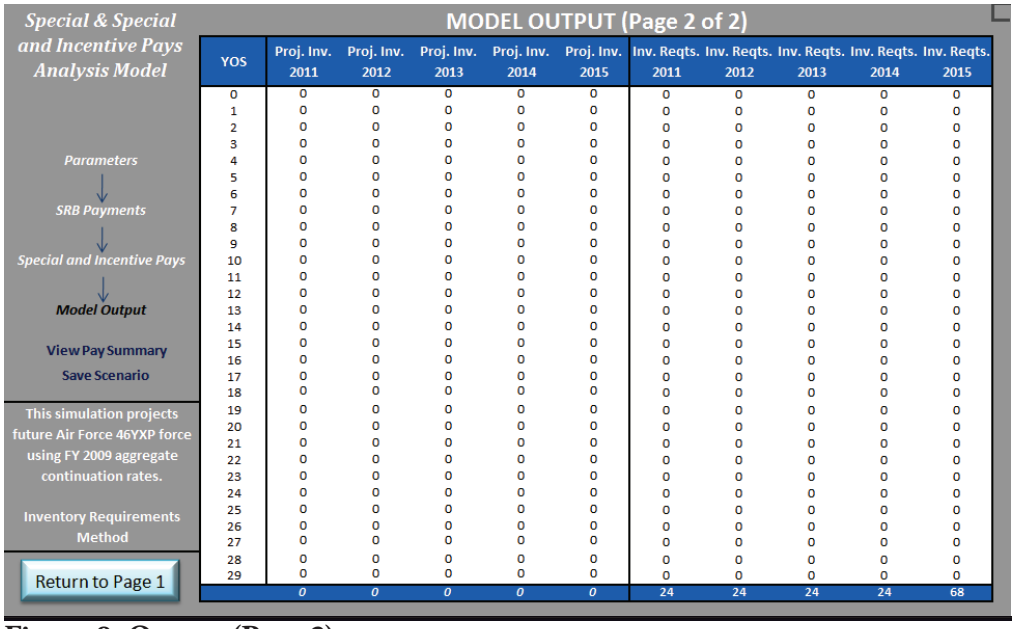
Inventory Requirements Method

Go to Page 2

MODEL OUTPUT (Page 1 of 2)

YOS	Baseline CR	Proj. CR 2011	Proj. CR 2012	Proj. CR 2013	Proj. CR 2014	Proj. CR 2015	End Strength	Proj. Stayers	Proj. Stayers	Proj. Stayers	Proj. Stayers	Proj. Stayers
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
10	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
11	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
13	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
17	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
18	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
19	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
21	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
23	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
25	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
26	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
27	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
28	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
29	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0	0	0	0	0
					Total		0	0	0	0	0	0
						ADD GAINS =>		24	24	24	24	68

Figure 7. Output (Page 1)



YOS	Proj. Inv. 2011	Proj. Inv. 2012	Proj. Inv. 2013	Proj. Inv. 2014	Proj. Inv. 2015	Inv. Reqts. 2011	Inv. Reqts. 2012	Inv. Reqts. 2013	Inv. Reqts. 2014	Inv. Reqts. 2015
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	24	24	24	24	68

Figure 8. Output (Page 2)

General Navigation Tools

Each page contains navigation links on the left of the screen as well as options to view a summary of the scenario pay data and save the scenario.

Chapter 4

Analysis of Staffing and Special and Incentive Pays in Selected Communities

Paul F. Hogan
Kim Darling
Patrick Mackin
Joseph Mundy
Meredith Swartz
John T. Warner

Overview of Method and Approach

The review of compensation for selected critical career fields includes an analysis of recruiting and retention experience across recent years; analysis of civilian labor market alternatives for the community; documentation of incentives used to attract and retain personnel; and recommendations for changes in pay incentives to improve recruiting and retention.

Our approach to this analysis includes the following steps:

1. collect historical personnel data and historical, current, and future staffing requirements
2. collect current and historical information on recruiting and retention pay incentives
3. review staffing issues with service personnel
4. evaluate civilian market supply and demand, and compensation
5. obtain any empirical evidence demonstrating responsiveness of behavior to pay incentives and economic conditions
6. analyze current staffing and potential for improvements using the Officer and Enlisted Special and Incentive Pays Analysis Model developed for this purpose
7. determine opportunities for improvement and model-projected force effects
8. provide recommendations

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

We apply this general analysis plan to each of four career fields we address. The following sections will describe any particular issues relating to each of those fields.

Our approach is guided by the following considerations regarding the use of Special and incentive (S&I) pays. Historically, S&I pays have been about 5 percent of total cash military compensation, yet they provide significant leverage to help the services manage the force. They do this by targeting specific problems and issues without the constraint of paying all members the same amount regardless of staffing conditions, or other factors that are relevant to only a subset of members or occupations. S&I pays tend to be "high powered" or efficient in that most of the compensation dollars go directly toward the identified staffing or related problem.

Criteria for application of S&I pays include the following:

- **Extraordinary civilian earnings opportunities.** If the particular community faces extraordinary civilian earnings opportunities that would attract military members into the civilian sector, resulting in poor retention, S&I pays offer a way to increase military earnings for that community, making it more competitive. Health professionals, such as physicians, are examples.
- **High training/replacement costs.** It may be cost effective to improve the retention rates of communities for which training costs are especially high, and therefore replacing losses are particularly costly. Adding S&I pays in such occupations to improve retention may actually reduce the total costs associated with the community. Examples where this may be the case include pilots and nuclear trained officers.
- **Rapid demand growth.** When demand for an occupation increases, it may be efficient to increase retention, reducing losses, so that, along with increased accessions, staffing and readiness goals can be achieved earlier, and perhaps at lower cost than relying solely on training new entrants. It should be recognized that the additional retention incentives are likely to be temporary, and that once staffing in the community has stabilized they may be reduced.
- **Onerous or dangerous conditions of service.** Not all members face the same working conditions or the same dangers. Special and incentive pays can be used to compensate members who face harsh or unpleasant working conditions or circumstances, or a greater risk of injury or death. The ability to attract and retain members under these circumstances remains a key criterion for assessing the case for S&I pays on this account. Examples of

such conditions of service may include service in a combat zone, sea duty, or working with hazardous materials.

- **Special skills and proficiency.** Special and incentive pays can be used to encourage the acquisition of a skill, or to provide an incentive for improved proficiency in the skill. Use of the Foreign Language Proficiency Bonus to encourage proficiency in select foreign languages is one example of the application of S&I pays for this purpose.
- **Performance or productivity.** S&I pays can be structured to provide incentives for increased performance or productivity. By rewarding performance or productivity, this application of S&I pays could motivate effort, increasing overall performance and productivity, and also provide a retention incentive to those who have high performance. In general, however, examples of this application of S&I pays are rare, perhaps because of the difficulties in measuring productivity in many military areas.

These reasons for using S&I pays are not mutually exclusive. For example, occupations with high training costs may also have extraordinary civilian earnings opportunities. A key point, however, is that the use of S&I pays should, with few exceptions, result in an "allocative" effect or impact: because of the pay, individuals are induced to enter or remain in military service at higher rates, or to acquire skills and achieve proficiency at higher rates, etc. The pays should induce changes in member behavior that result, ultimately, in improved staffing, readiness, or proficiency.

Prudent use of S&I pay resources means that the case for applying a pay should be evaluated carefully, based on its intended effect on retention and staffing, readiness, or proficiency; the evidence that it will achieve the desired outcome; and the cost. Most importantly, existing applications of S&I pays should be periodically and systematically evaluated to insure that they are producing the force staffing benefits intended, that these benefits are still needed, and that the S&I pay remains the cost-effective way to achieve the desired outcome.

In the analysis of four selected communities below, we apply the basic principles and methods discussed in this section, and use the model described in Chapter 3 of this volume to evaluate overall staffing in these communities and the application of S&I pays to these communities. In addition, Appendix 1 at the end of this chapter contains tables that forecast the marginal costs of increased retention through the use of S&I pays for the communities examined below. (The occupational specialty codes for those communities are included in Appendix 2.)

Special Operations Forces

In the wake of September 11, 2001 and subsequent operations abroad in Afghanistan and Iraq, requirements for Special Operations Force (SOF) personnel have grown significantly. Though much of the requirements growth has already occurred, requirements will continue to grow in the foreseeable future. Operations abroad have lead to higher operating tempo, lower dwell time and increased family separation, and more exposure to danger. Furthermore, civilian job opportunities for trained SOFs have expanded. These are all factors that make recruiting and retention more difficult and therefore increase the challenge of meeting the growing demand for SOF personnel.

In light of the growing requirements and increased challenges in meeting them, existing S&I pays for SOF personnel have been increased and new ones have been implemented, including the Critical Skills Accession Bonus (CSAB), the Critical Skills Retention Bonus (CSRB), Assignment Incentive Pay (AIP), and Special Duty Assignment Pay (SDAP). These pays have been important factors in attracting and retaining SOF personnel. Indeed, an analysis in Chapter 5 of this volume suggests that the CSRB has played a key role in retention of highly experienced SOF personnel.

It is useful to comment on a current Special Operations Command (SOC) proposal to overhaul the current S&I pays for SOF personnel. The current pays have been criticized on two grounds. One is a lack of parity among the services. SOF personnel working side by side may be receiving different S&I pays depending upon their parent service. The other is that the pays are not very predictable over the course of a career. SOC has therefore developed a proposal to replace AIP and SDAP with monthly career SOF pay. Monthly amounts would depend on SOF occupational classification (operating forces, combat support, and combat service support) and experience level. Billets designated as "critical" would receive an additional supplement.

SOF-Civilian Pay Comparisons

One of the problems in setting compensation for SOF personnel is establishing what their civilian opportunities are and how those opportunities compare with their military compensation. Civilian comparisons are difficult because there is no direct civilian counterpart to most SOF occupations other than a special operations pilot.[1] While there are no direct counterparts to most SOF occupations, the military-civilian occupation cross-walk tool available at careerinfonet.org states that "leadership ability and management skills of this occupation are sought after by many organizations in the public and private sectors." In the case of officer personnel, various civilian

1. A cross-walk tool available at http://www.careerinfonet.org/MOC shows the direct civilian counterparts to each military occupation.

managerial occupations could be used to obtain civilian earnings alternatives. One plausible managerial occupation is engineering managers. Figure 1 shows the median 2009 earnings of engineering managers as well as their 75th percentile of earnings.[2] The military pays shown in the figure are for fiscal year (FY) 2009.

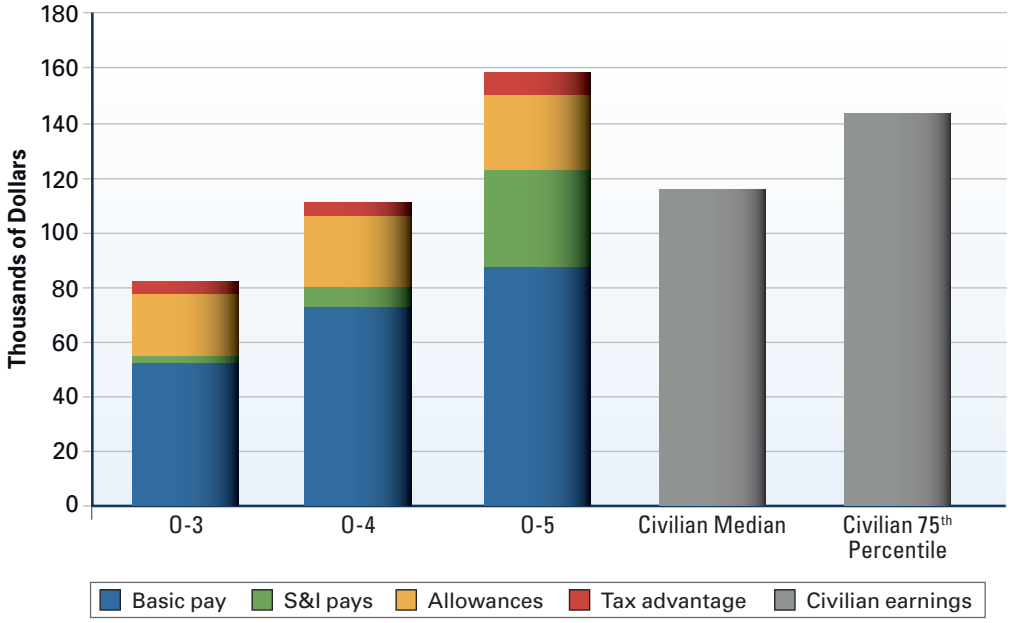


Figure 1. SOF Personnel: Officer Pay Comparison[3]

The data in this figure indicate that the current military compensation of midlevel SOF officers—consisting of the sum of basic pay, housing and food allowances, the tax advantage arising from the non-taxability of the allowances, and the average S&I pays they receive—is at or below the median earnings of engineering managers. O-3 officers in fact are paid below the median earnings of engineering managers while O-4 officers are at roughly the median for civilian earnings. For O-5 officers, current pay is above the 75th percentile of civilian earnings. Of course, the comparison does not consider the value of in-kind benefits (e.g., health care) or retirement.

As in the case of SOF officers, there are no direct civilian counterparts to any of the SOF enlisted occupations. For every SOF enlisted occupation, Careerinfonet's cross-walk tool says that "The military occupation you selected has no direct equivalent to a civilian occupation; however the close teamwork, discipline, and leadership

2. The source for these data is the U.S. Bureau of Labor Statistics, Occupational Employment Statistics (http://www.bls.gov/oes/oes_dl.htm). Engineering managers have the OES code 11-904.
3. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

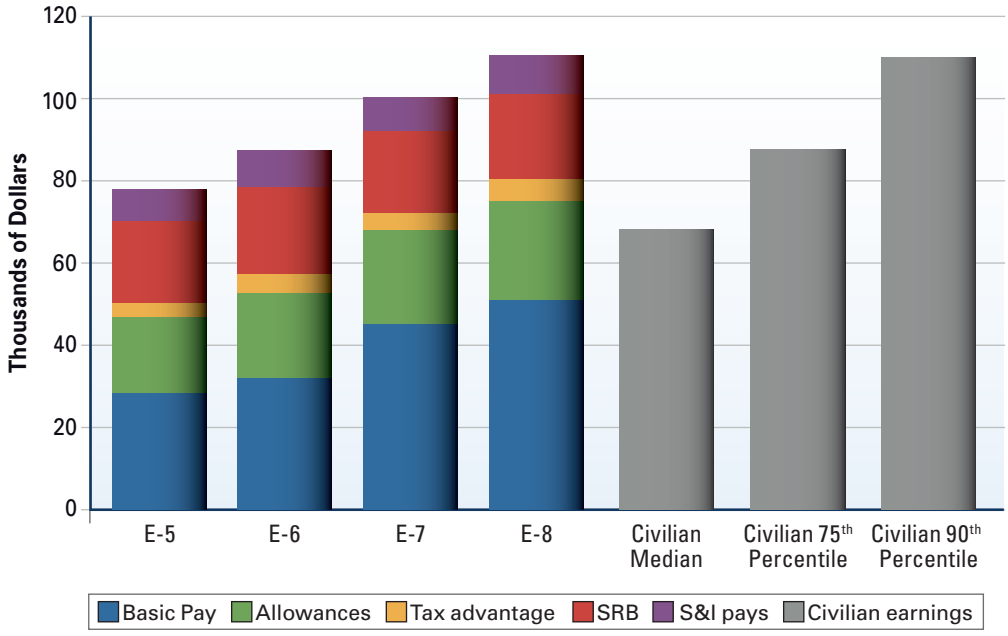


Figure 2. SOF Personnel: Enlisted Pay Comparison[4]

experiences it provides are helpful in many civilian occupations." A civilian occupation emphasizing teamwork, discipline, and leadership experience is First-Line Supervisors/Managers of Firefighting (OES 33-1021). The median earnings and 75th percentile of earnings for civilians in this occupation are displayed in Figure 2 along with the FY 2009 military pay of enlisted SOFs in ranks E-5 to E-8.

The data in this figure indicates that the military earnings of SOFs—including their basic pay, allowances, tax advantage, and bonuses—are generally between the 50th and 90th percentile of civilian earnings. Again, these comparisons do not consider the value of in-kind benefits (e.g., health care) or retirement.

Current Staffing and Requirements

The U. S. Special Operations Command (SOCOM) has personnel serving in many Military Occupation Specialties (MOS). This section reviews current (FY 2010) staffing and how staffing compares to the services' stated requirements for personnel by SOF MOS.

Table 1 displays the FY 2010 and FY 2015 requirements for various Army SOF MOS categories, requirements growth over the period, the Army's inventory of SOF personnel in the MOS category at the start of FY 2010, and the ratio of 2010 inventory

4. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

Table 1. Army SOF Force Manning and Requirements

Military Occupation Specialty	FY 2010 Requirement	FY 2015 Requirement	Growth	FY 2010 Inventory	Ratio
Special Forces Officer	1,070	1,123	5%	1,362	1.27
SOF Technical Warrant Officer	566	647	14	458	0.81
Special Forces Sergeant	4,656	5,206	12	4,877	1.05
Special Forces Senior Sergeant	1,199	1,303	9	1,164	0.97

to 2010 requirements. Beginning with inventories, in FY 2010, the Army SOF force consisted of 1,362 commissioned officers, 458 warrant officers, and 6,041 enlisted personnel. The Army's current inventories of Special Forces sergeants and senior sergeants were roughly in balance with its stated requirements (as measured by authorizations) for these personnel. The Army's Special Forces officer inventory exceeded its stated requirements by 27 percent. The overall surplus was due to an imbalance between its senior officer force and its junior (O-3) force, where manning is below requirements. The Army was manned at 81 percent of its requirement for warrant officers.

The Army's demand for SOF personnel is scheduled to grow modestly between FY 2010 and FY 2015. Over this period, SOF commissioned officer demand will grow by 5 percent, warrant officer demand will grow by 14 percent, and enlisted demand will grow by about 10 percent.

Table 2 presents requirements and manning in various Navy SOF specialties. In FY 2010, the Navy SOF force consisted of 723 commissioned and warrant officers and 4,435 enlisted personnel. The Navy SOF is currently staffed at between 87 percent and 98 percent of requirements depending upon MOS. Officer manning ranges between 90 percent for SEAL officers and 94 percent for Explosive Ordnance Disposal (EOD) officers, and enlisted manning ranges between 87 percent for EOD personnel and 98 percent for Special Warfare Combatant-craft Crew (SWCC).

Navy requirements for some SOF categories are scheduled to grow substantially over the next five years. The demand for enlisted EOD personnel is scheduled to increase by 50 percent, from 1,035 to 1,553. Other categories are scheduled to grow by between 7 percent (SWCC) and 39 percent (SEAL).

Table 3 presents requirements and manning in various Marine Corps SOF specialties. In FY 2010, staffing ranged from 65 percent to 100 percent. CI/HUMINT Operations Officer manning is lowest relative to requirements.

Table 4 presents requirements and manning in various Air Force SOF specialties. In FY 2010, Air Force SOF officer specialties were staffed at 85 percent to 88 percent

Table 2. Navy SOF Force Manning and Requirements

Military Occupation Specialty	FY 2010 Requirement	FY 2015 Requirement	Growth	FY 2010 Inventory	Ratio
Special Operations Officer (EOD)	543	679	25%	509	0.94
Special Warfare Officer (SEAL)	237	329	39	214	0.90
Special Operations Enlisted (EOD)	1,035	1,553	50	905	0.87
Navy Diver (First Class)	1,231	1,383	12	1,193	0.97
Special Warfare Combatant Craft Crew (SWCC)	770	822	7	757	0.98
Special Operator (SEAL)	1,699	2,173	28	1,580	0.93

Table 3. Marine Corps SOF Force Manning and Requirements

Military Occupation Specialty	FY 2010 Requirement	FY 2015 Requirement	Growth	FY 2010 Inventory	Ratio
CI/HUMINT Operations Officer	108	104	-4%	70	0.65
CI/HUMINT Specialist	695	701	1	507	0.73
Intelligence Chief	26	26	0	25	0.96
Reconnaissance Man	1,424	1,602	13	1,420	1.00
EOD Technician	605	773	28	540	0.89

Table 4. Air Force SOF Force Manning and Requirements

Military Occupation Specialty	FY 2010 Requirement	FY 2015 Requirement	Growth	FY 2010 Inventory	Ratio
Special Operations Pilot	1,117	1,281	15%	951	0.85
Special Operations Combat System Officer	633	648	2	558	0.88
Control and Recovery Officer	209	221	6	182	0.87
Combat Control	521	553	6	508	0.98
Pararescue	517	532	3	463	0.90
Special Operations Weather	112	124	11	81	0.72

of requirements; enlisted specialties were staffed at 90 percent and 98 percent, respectively, in the two largest enlisted SOF specialties, Pararescue and Combat Patrol. A smaller specialty, Special Operations Weather, was staffed at only 72 percent of requirements. Overall, Air Force SOF manning ratios are similar to manning ratios in the Navy and Marine Corps.

Air Force SOF requirements are scheduled to grow modestly over the FY 2010–2015 period. Four specialties are scheduled to grow by 6 percent or less over the period; Special Ops Pilots exhibit the largest requirements growth (15 percent).

Staffing Analysis

Our analysis of SOF staffing seeks to answer the following questions. First, how does SOF retention compare with service-wide retention? Second, will the services be able to meet their requirements for SOF personnel by FY 2015 under various scenarios about the path of the economy? Third, if they cannot meet requirements with current compensation, what would be the most cost-effective means of achieving them?

The answer to the first question will help establish whether shortfalls in manning are more attributable to insufficient retention or to insufficient gains into the SOF community (training pipeline through-put). To begin to answer the question of how SOF retention compares to service-wide retention, Table 5 shows the overall annual continuation rate by service for SOF officers and enlisted personnel in FY 2009, along with service-wide overall annual continuation.[5] The table indicates that, despite the extraordinary demands placed on them, most SOF personnel have higher-than-average continuation. For example, in FY 2009, the overall, service-wide Army officer continuation rate was 92.9 percent while the Army SOF officer continuation rate was 94.2 percent. Among Army enlisted personnel, the overall SOF continuation rate of 91.4 percent exceeded the Army-wide average by four percentage points. The Air Force is the exception—both SOF officers and SOF enlisted personnel had lower-than-average continuation in FY 2009 compared to service-wide Air Force continuation.

SOF retention rates were compared with respective service-wide retention at comparable experience levels. The data indicate that SOF retention compares favorably with service averages for the same experience level. Figure 3 illustrates this general conclusion by comparing FY 2009 Army SOF continuation by year of service (YOS) with overall Army enlisted continuation. Army SOF retention exceeds overall Army enlisted retention up to the 10-year mark, dips somewhat below overall enlisted retention up to the point where personnel enter the zone of retirement eligibility (YOS 19),

Table 5. Overall Annual Continuation Rate, FY 2009

		Army	Navy	Air Force	Marine Corps
Officers	All	92.9%	93.3%	93.8%	93.2%
	SOF	94.2	95.1	91.0	*
Enlisted	All	87.4	83.6	88.5	86.3
	SOF	91.4	93.6	80.2	88.6

* There were only 70 officers in this category, which is too small to compute reliable rates.

5. The continuation rate is the percentage of personnel who began the fiscal year who were still in service at the end of the fiscal year. The continuation rates in the table were constructed from data supplied by the Defense Manpower Data Center (DMDC).

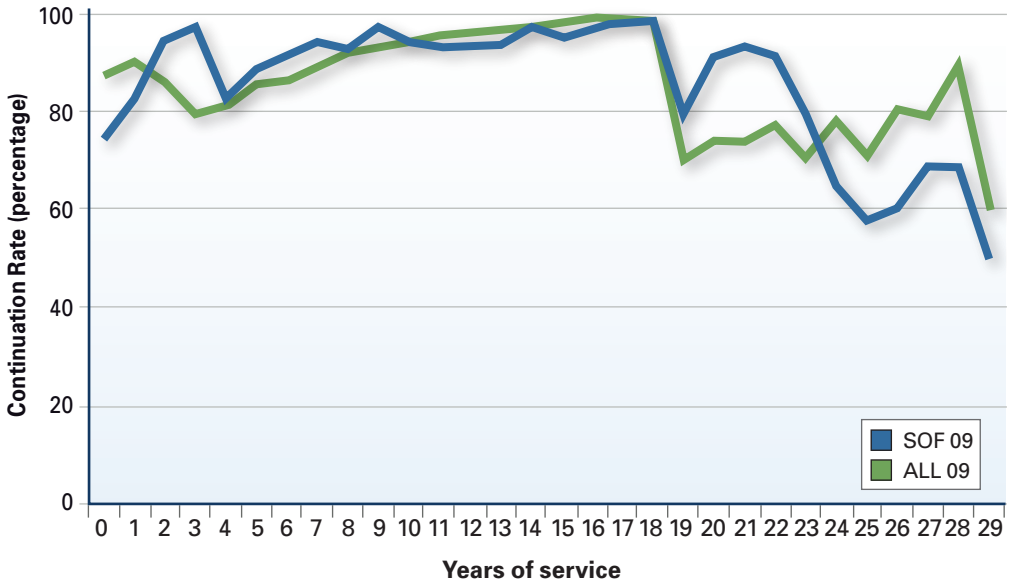


Figure 3. Army Enlisted SOF/Overall Continuation Rates, FY 2009

and then significantly exceeds overall Army enlisted retention in the YOS 19–24 range. This suggests that other, positive factors have more than offset the negative retention factors cited earlier. In addition to the compensation differential enjoyed by SOF personnel, their high esprit de corps and commitment to mission have no doubt played a part in their relatively high retention.

The inventory projection model starts with the FY 2010 actual force at the beginning of the year and forecasts the inventory at the end of each fiscal year from FY 2010 to FY 2015 under alternative assumptions about compensation policy and the path of the civilian economy. The model starts with FY 2009 continuation and retention rates, and adjusts those rates based on changes in unemployment and compensation policy. The total continuation rate at a given YOS is a weighted average of the retention of personnel who are in the final year of an enlistment contract (i.e., at expiration of term of service, or ETS) and the continuation of personnel not at ETS, with the weight being the fraction at ETS. Beyond the first term of enlistment, non-ETS continuation is around 98 percent. Adjustments are made to the ETS retention rate based on changes in unemployment or in compensation. The magnitudes of the adjustments are based on estimates from available econometric studies. The predicted effects of compensation changes are made using the Annualized Cost of Leaving (ACOL) model.[6]

The inventory projection model forecasts the annual continuation rate by YOS, computes the total number of personnel continuing, and then computes the number

6. See Chapter 2 of this volume for a discussion of econometric evidence about the responsiveness of retention to various elements of compensation and for an overview of the ACOL model.

of gains into the force necessary to meet a strength objective. Gains may come from lateral entrants or from new accessions, and they are distributed by YOS based on the YOS distribution of gains observed in the FY 2007–2009 period. Gains can be computed under the assumption that stated requirements are met each and every fiscal year or that they are met at the end of FY 2015, in which case gains are smoothed over the FY 2011–2015 period. Based on continuation behavior, the gains indicate the new personnel that must be brought into the skill to either meet each year's requirements or meet requirements by the end of the projection period.

Figure 4 shows projections for the Army enlisted SOF force under a base case scenario of declining unemployment but unchanged compensation from that in effect in FY 2010.[7] The figure shows the FY 2010 actual force, the force projected for the end of FY 2011 and the force projected for the end of FY 2015. The projections are made assuming that there are sufficient gains into the SOF community for the Army to meet annual requirements throughout the period. The FY 2010 force has 6,041 personnel (the combined number of Special Forces sergeants and Special Forces senior sergeants in Table 1 above); the FY 2015 force has the stated requirement of 6,509.

Under the base case scenario shown in Figure 4, the Army's SOF force not only increases in number between FY 2010 and FY 2015, it increases in experience as well. Experience growth is a result of the higher-than-average continuation of SOF personnel (Figure 3). SOF continuation is so high, in fact, that the experience growth

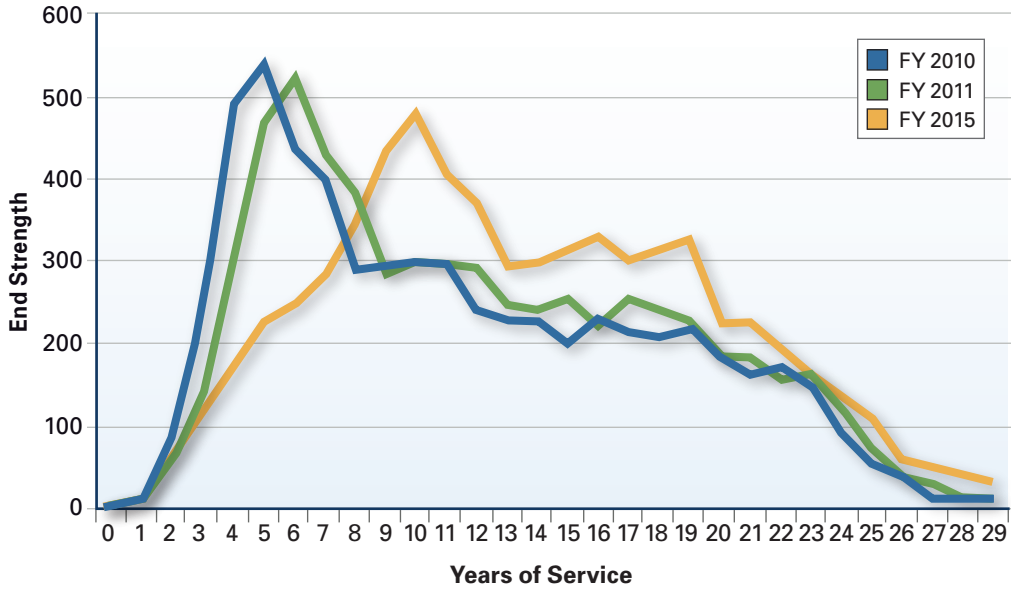


Figure 4. Army Enlisted SOF Strength by Years of Service (Base Case Scenario)

7. The projections in Figure 4 and Figure 5 assume that the civilian unemployment rate declines by 0.8 percent annually, reaching 6 percent in FY 2015.

occurs despite the fact that future continuation has been adjusted downward to reflect improvements in the civilian economy.

A caveat, of course, is that the adjustments for an improving economy are too small. But the adjustments have been made based on available econometric estimates of the effect of unemployment on retention. As discussed in Chapter 2, estimates indicate that the effect of unemployment is modest at best, and there is always the possibility that improvements in the economy will have a larger impact on SOF retention than those assumed for the forecasts. Should retention be more impacted than the forecasts assume, the Army's response would naturally be what it has been in the past when faced with retention shortfalls—increase S&I pays, in particular the Selective Reenlistment Bonus (SRB). Figure 5 illustrates the impact of doubling the amount of SOF SRBs in all three reenlistment zones. If SRBs were doubled beginning in FY 2011, by FY 2015 the SOF first-term force would decline and the number of SOFs in YOS 5–14 would grow.[8]

Figure 5 also indicates the effect of halving SOF SRBs throughout the projection period. SOF experience would decline, and gains would have to increase in order to meet requirements. The main point of these scenarios is that SRBs have a clear and significant impact on the force, and can be deployed quickly if needed. In the SRB increase scenario, the cost of each extra reenlistment is calculated to be $72,000, indicating a marginal cost per person-year of $18,000, assuming a four-year reenlistment. The SRB reduction scenario implies a marginal saving of $54,000 per reenlistment avoided when SRBs are reduced ($13,500 per person-year). These scenarios illustrate the principle of rising marginal cost as bonuses are increased.[9]

The pattern of findings for other parts of the Special Operations Force was qualitatively similar to those shown here for the Army enlisted force and therefore do not need repeating. Retention is sufficiently high in all parts of the Special Operations Force that experience levels are likely to grow absent unforeseen improvements to the economy or retention responses that are larger than seen in the past. If shortfalls occur in meeting future requirements, they will be due to lack of sufficient gains into the SOF community through either direct accessions or lateral entry from other skills.[10]

8. One constraint imposed in the model excursions was that end strength would be fixed across all alternatives, and accessions would be allowed to fluctuate to meet o verall end strength targets each year. Therefore, alternatives which increased retention will generally lead to fewer accessions and lower first-term strength numbers.

9. These marginal cost calculations are similar to those estimated by Asch et al. (2010).

10. SOF community managers agreed with this assessment. They noted that their communities had increased gains in recent years and will continue to do so in the future. They also agreed that retention was strong and would be strong in the foreseeable future.

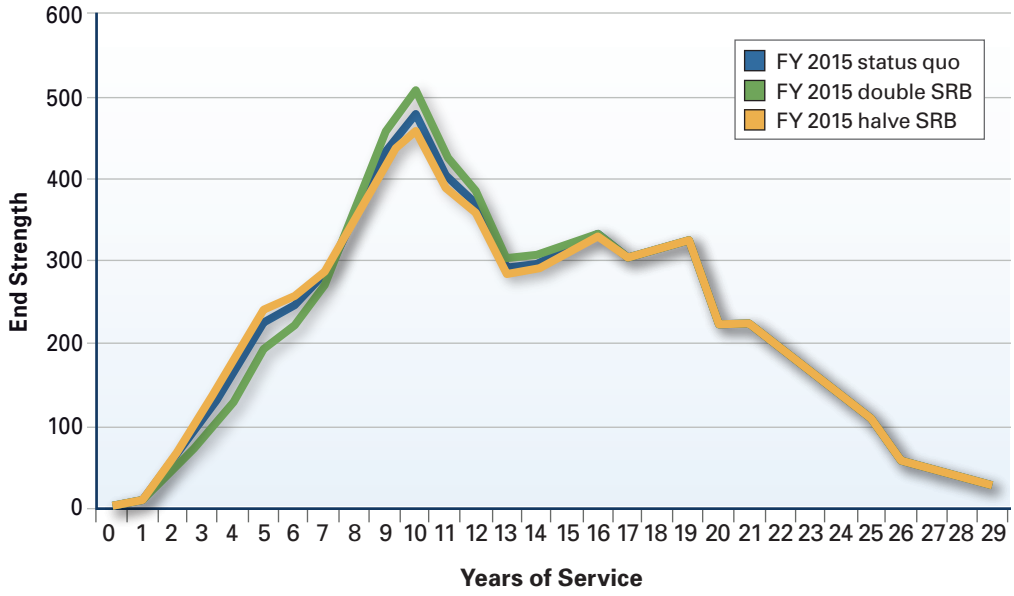


Figure 5. Army Enlisted SOF Strength by Years of Service: Scenarios Illustrating SRB Effects

SOF Career Pay Proposal

In addition to SRB and CSRB, SOF personnel are eligible for two other S&I pays: AIP and SDAP. Each service has established its own eligibility criteria for these pays and the dollar amounts also vary by service.[11] Eligibility criteria vary by rank, years of service, and skill. Personnel assigned to Special Missions Unit (SMU) operator billets receive AIP equal to $750 per month at any rank.[12] SOF personnel in non-SMU billets are typically eligible for AIP only if they have 25 or more years of service. SDAP is paid for assignments considered extremely difficult or involving an unusual degree of responsibility. Billets eligible for SDAP are paid on a scale ranging from SD-1 ($75 per month) to SD-5 ($375 per month).

The U.S. Special Operations Command has developed a proposal to combine AIP and SDAP into a single SOF Career Pay (SCP) that would be common to all SOF personnel in similar circumstances.[13] SOF billets would be categorized into five functional groups (OF-A, OF-B, OF-C, OF-D, and OF-E) and four skill levels based on rank/time in unit. The OF-A group consists of SMU operators, the OF-B group

11. These pays are described in Volume 7A of DOD Financial Management Regulation (Chapter 15), November 2010. (http://comptroller.defense.gov/fmr/07a/07a_15.pdf). There are many categories of AIP applying to non-SOF personnel as well as SOFs.
12. The $750 monthly amount applies if the individual has less than 36 months in the billet; after 36 months the amount increases to $1,000 per month.
13. SOF Career Pay Proposal Update, USSOCOM J1, January 5, 2011.

consists of other SOFs in non-operator billets, the OF-C group consists of Army Rangers in V-coded billets, OF-D consists of certain Army and Air Force air crews, and the OF-E group consists of psychological operations personnel.[14] The plan also calls for a Critical Billet Supplement, paid at three rates, to E-9s who are in Senior Enlisted Advisor (SEA) billets.

The SCP amounts available to OF-A personnel would range from $750 per month at skill level 1 to $1,300 per month for skill level 4. For OF-B personnel, the amounts would range from $375 per month to $600 per month.

We were asked to evaluate the retention effects of this proposal. Evaluation is somewhat difficult due to the fact that we do not know the mix of SMU and non-SMU billets in the critical SOF MOSs. We therefore evaluated retention effects for Army personnel assuming that all SOF personnel are in the OF-B category. The results of our analysis are shown in Figure 6. Projections indicate that the proposal would have a modest impact on Army SOF retention and career force. The modest estimated changes result from the fact that the monthly SCP amounts for OF-B personnel are very similar to the combined AIP and SDAP amounts received today. The same holds true for OF-A personnel, indicating that if the analysis had been

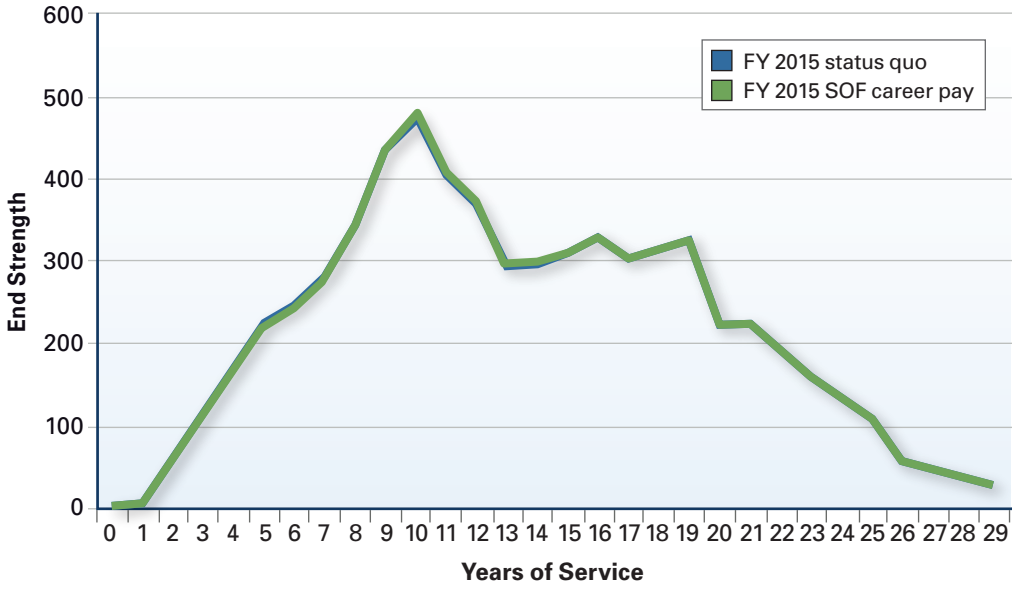


Figure 6. Estimated Effect of SOF Career Pay Proposal Compared with Current Combination of AIP and SDAP

14. Other personnel assigned to SOCOM would be placed into Combat Support (CS) or Combat Service Support (CSS) categories and may be eligible for SCP depending upon their category. The plan calls for CS-A (SMU Direct Support) and CSS-A (SMU Support) to be eligible for SCP but not personnel in other CS or CSS categories.

conducted assuming that everyone fell into the OF-A category rather than the OF-B category, the simulated effects would not have been much different.

Legislative Authority for Consolidation in Career Pay

Implementation of the SOF Career Pay proposal under the new consolidated authority for S&I pays would require some revisions to the existing statutes. The existing authority, under 37 USC Sec. 353, provides for a skill incentive pay or proficiency bonus. This statute allows the services to pay a monthly skill incentive pay to members who serve in "a career field or skill designated as critical" by the service secretary.

However, there are some limitations on skill incentive pay that would have to be relaxed to accommodate the SOF proposed pay. First, members may not receive both skill incentive pay and a proficiency bonus in the same month; some SOF members are currently receiving the Foreign Language Proficiency Bonus (FLPB), which also, presumably, falls under Sec. 353. Second, members may not receive the skill incentive pay in the same month that they receive Hazardous Duty Pay under Sec. 351. Finally, the skill incentive pay is limited to $1,000 per month, while the SOF proposal has a maximum monthly rate of $1,300.

The solution would require either modification of Sec. 353 to eliminate the three limitations or the establishment of a separate pay authority for career pay. Either alternative would accomplish the immediate objective of accommodating this pay proposal. Modifying the existing statute has the advantage of maintaining a fairly small number of broad authorities, although Sec. 353 is not expressly intended as a career pay. If a new authority is established, it should be a broad authority for career pay, not an authority specific to the SOF Career Pay.

Conclusions and Recommendations

The Army has the best staffed SOF force, with all critical skills other than SOF warrant officers in excess of 90 percent of requirements. With the exception of one Marine Corps critical skill group and one Air Force group, other SOF categories are staffed at 80 percent or more of requirements.

Most of the future SOF requirements growth is in the Navy, where the requirement for EOD technicians is projected to grow by 50 percent and the requirement for SEAL officers is scheduled to grow by 39 percent. EOD technician requirement growth is also high in the Marine Corps (28 percent). Requirements growth for other groups is modest. But even with requirements growth, retention is sufficiently high in all parts of the Special Operations Force such that experience levels are likely to grow absent unforeseen improvements to the economy or in retention responses to the

economy that are larger than seen in the past. Furthermore, high retention means that retention-induced improvements in manning via higher careerist compensation would be expensive. Indeed, without end strength growth, the SOF average experience level is likely to grow. Maintaining a force that is balanced in its experience mix, while at the same time growing, will necessitate more gains through new accessions and lateral transfers of junior personnel. That is, meeting future requirements for SOF personnel will be more about increased training pipeline capacity and trainee throughput than about retention improvements effected via compensation or other incentives. SOF community managers agreed with this assessment, and they indicated that training throughput had already increased markedly in recent years. They also were confident that, absent negative retention shocks arising from a suddenly improved economy, they would be able to meet future requirements with the compensation in place.

We evaluated a SOCOM proposal to replace two current S&I pays—AIP and SDAP—with a SOF career pay. The proposal was estimated to have a modest effect on retention, but may well have other positive effects, such as on skill development. The proposal is consistent with recent DOD efforts to consolidate and simplify S&I pays. If there is a drawback to this proposal, it is that a SOCOM-wide SCP restricts service-level management flexibility.[15]

Based on this analysis, we offer the following recommendations:

1. The services should consider greater use of retention bonuses for late-career (retirement-eligible) personnel when needed, based on the effectiveness of the CSRB in SOF communities. (See Chapter 5 for an analysis of the CSRB.)
2. The services should adopt the SOF Career Pay proposal, but allow for service-specific flexibility in setting pay rates.
3. The Department should pursue legislative changes to modify Sec. 353 of 37 USC to (a) raise the monthly ceiling, (b) eliminate the prohibition against receiving both skill incentive pay and proficiency bonuses simultaneously, and (c) eliminate the prohibition against receiving skill incentive pay and Hazardous Duty Pay simultaneously.

15. Desire for some service-specific flexibility in the implementation of S&I pays is evident in the CSRB program. The Army offers CSRB to retirement-eligible personnel for commitments of up to six years (maximum bonus amount of $150,000). Though it could also adopt this structure, the Marine Corps wants to avoid the potential for excess seniority growth in its SOF force and, therefore, does not allow CSRB contracts of more than four years (maximum bonus amount of $50,000). The Navy s current CSRB for SOF personnel is the same as the Army s. But the Navy wants to restructure its SOF CSRB, breaking it into three phases (YOS 19 24, YOS 25 26, and YOS 26–30). Its purpose in doing so is to better match CSRB contract lengths with its up-or-out points. Up-or-out rules are relaxed for personnel who receive CSRB, and the Navy feels that too many personnel are remaining beyond its desired mandatory separation points, particularly E-7 personnel. (See Navy CSRB Info Brief rev 4, Bupers 3, undated.)

Remotely Piloted Vehicle Operators

The use of Remotely Piloted Vehicles (RPVs) by the military services has grown dramatically in the last 10 years; moreover, the services are likely to expand the scope of RPV operations in the future. As a relatively new career field, its manpower requirements are still developing. Likewise, there is little evidence regarding the impact of civilian sector demand for RPV operators.

RPV operators cover a wide range of vehicles operating in a variety of environments. The smallest may be launched from the bed of a truck and provide over-the-horizon surveillance, while the largest have the wingspan of a 737, operate in commercial air space, deliver ordnance on targets, and are operated remotely via satellite. Early applications of RPVs have focused primarily on surveillance and reconnaissance, although some RPVs are weaponized. According to some sources, future generations of these aircraft could expand the mission area to include airlift, aerial refueling, resupply of deployed units, and other functions.[16]

Overview of the Career Field

RPV manning varies by service. The Navy and Air Force rely on commissioned officers, mostly pilots and navigators. However, the Air Force has also instituted a separate career field for officers who only pilot RPVs (18X). The new career field was added because of a lack of training capacity in the normal pilot/navigator pipeline. Instead of the training that pilots and navigators receive, those officers who enter the 18X pipeline receive about six months of training, including becoming qualified to fly a Cessna propeller driven aircraft. Navy officers are pilots and naval flight officers (NFOs) who rotate into the RPV jobs then back to cockpit assignments. Air Force officers may be pilots, navigators or non-rated officers, but they have remained in the RPV career field.[17]

In contrast, the Army and Marine Corps use enlisted operators. The Air Force also has enlisted sensor operators, but these personnel do not operate the aircraft. These differences may reflect differences in the types of vehicles employed, navigation method (line of sight vs. satellite), and operational mode (rudder & stick vs. computer) as well.

Compensation schemes also vary across services. Army and Marine Corps operators are eligible for Selective Reenlistment Bonuses, but not flight pay. Navy

16. See, for example, Magnuson (2010).

17. Air Force officers voluntarily or involuntary reassigned from manned cockpit communities will have an opportunity this year (RPA Crossflow Board) to decide whether to permanently categorize in community or return to manned cockpits.

officers, because they are pilots and NFOs, are eligible for the same S&I pays (Aviation Career Continuation Pay, ACP, and Aviation Career Incentive Pay, ACIP) that they receive when in cockpit or other assignments. The Air Force pays rated officers Aviation Career Pay and ACIP, and the officers receive gate credit for ACIP for RPV assignments. Non-rated Air Force officers and enlisted sensor operators do not receive a bonus equivalent to ACP, but they do receive remotely piloted aircraft (RPA) Incentive Pay (RPAIP). This pay is authorized under the Assignment Incentive Pay authority, and is structured to look just like ACIP for officers and Career Enlisted Flyer Incentive Pay (CEFIP) for enlisted sensor operators.

Current and Future Manning Requirements

A common theme across all four services is a significant growth in requirements, as measured by authorized positions. It may be too early to tell whether retention will be a long-term problem in these communities. For example, because the program is at a nascent stage, none of the non-rated officers in the Air Force has completed their initial service obligations. However, the Army cites first-term reenlistment problems, and first-term retention in the Marine Corps also appears low.

Table 6 summarizes RPV operator requirements for each of the services. Navy requirements are not included because Navy officers are managed as part of larger pilot/NFO communities without separate requirements for RPV. The Navy believes that the current supply of officers on shore duty is sufficient to meet all funded requirements, but not all authorizations are funded. If Navy requirements grow in the future, sources for staffing have not yet been identified to meet that demand.

Table 6. RPV Operator Manning and Requirements

Requirements	FY 2010	FY 2015	Change	FY 2010 Inventory	Inv/Req Ratio
Air Force Officers					
Pilots	861	987	14.6%	475	0.56
Navigators	24	31	29.2	23	0.96
RPA Pilot	14	14	0.0	20	1.43
Total Air Force Officer	899	1,032	14.8	518	0.58
Army Enlisted					
UAV Operator	1,059	1,485	40.2	1,158	1.09
Air Force Enlisted					
UAS Sensor Operator	579	582	0.5	304[18]	0.52
Marine Corps Enlisted					
UAV Operator	135	226	48. 9	107	0.79

Source: DMDC, Services

18. Inventory as of September 30, 2010; inventory as of September 30, 2009 was 1.

Air Force inventory levels overall only meet half of current requirements. The Air Force addresses these manning shortfalls by reducing the crew ratio on Combat Air Patrols (CAPs). The desired ratio is 10 per CAP; the Air Force is currently operating at 6 per CAP, which it considers to be an unsustainable tempo. Also the Air Force intends to increase the size of the new community for non-rated officers (18X) to replace some of the pilot requirements, though these plans are not yet reflected in requirements for the 18X community.

The inventory of Army enlisted operators is sufficient to meet current demand, but requirements are projected to grow by 40 percent in the next five years. Marine Corps demand is growing as well, and is expected to level out at 226 in FY 2012. Zone A retention is about 25 percent, which is where the Marine Corps has targeted to allow selection, but this relatively low retention rate may make it difficult to meet future requirements.

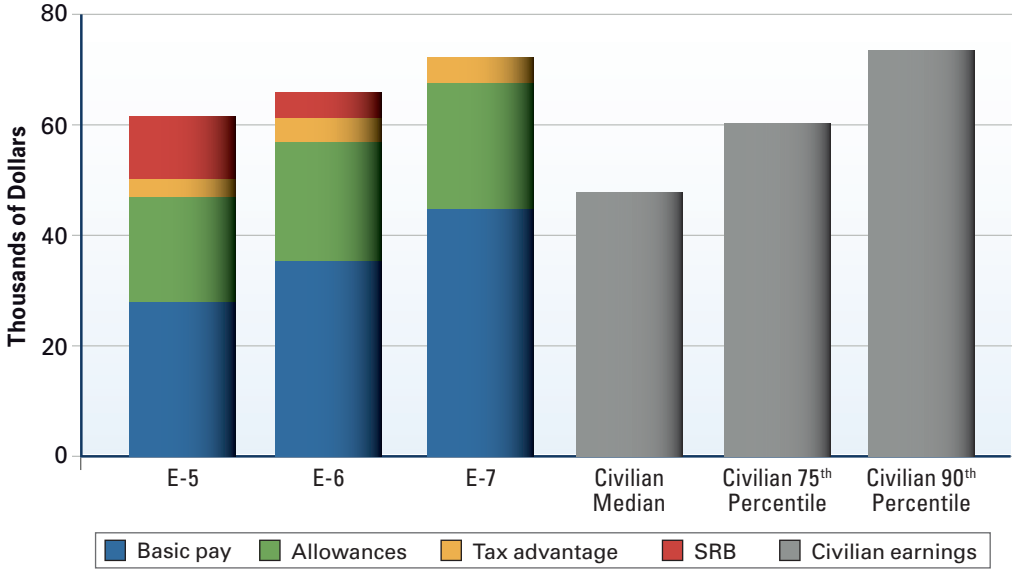
Comparisons to Civilian Market

Currently, civilian sector demand for RPV operators is largely derived from military requirements. That is, civilian employers seeking trained RPV operators are typically engaged in training of military personnel or are designing and building equipment for the services. However, many service representatives believe that there is a potential for substantial growth in civilian demand, including such agencies as the U.S. Border Patrol, U.S. Forest Service, and the Drug Enforcement Agency.[19]

Earnings comparisons are somewhat problematic because of a lack of direct civilian counterparts. Even for commercially rated aviators, commercial pilot jobs may not be a good comparison; potentially, service in RPV operations might reduce cockpit time, making officers less attractive to civilian carriers.

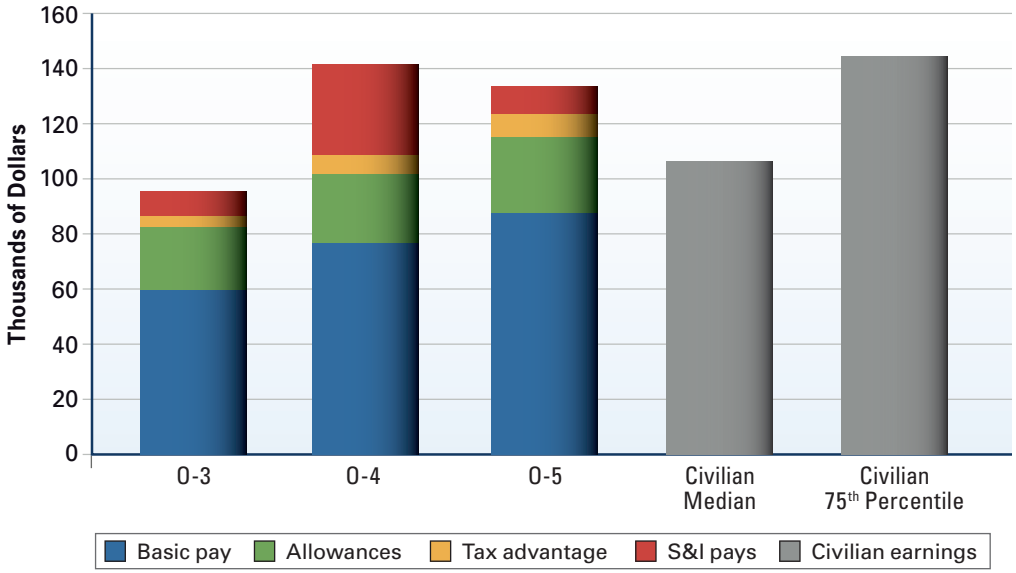
A closely related civilian occupation to the enlisted RPV operator is electro-mechanical technician. Figure 7 compares typical FY 2009 earnings profiles for military personnel with civilian data from Occupational Employment Statistics for May 2009. Military pay, allowances, and bonuses are generally between the 75th and 90th percentile of civilian earnings, although the comparison does not consider the value of benefits (e.g., health care) or retirement. Marine Corps RPV operators are receiving a large SRB now ($43,500 in Zone A; $18,250 in Zone B; and $14,750 in Zone C). Army operators currently receive bonuses ranging from about $8,000 to $14,000.

19. Current usage of unmanned aerial vehicles by other agencies is either in its nascent stages or non-existent, so there is little information on pay and competition from these sources. According to Haddal and Gertler (2010), for example, U.S. Customs and Border Protection had six vehicles in use and, as of June 2010, had received limited authorization from the Federal Aviation Administration to use RPVs along the Texas border and the Gulf of Mexico only.



Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 7. Pay Comparisons for Enlisted RPV Operators[20]



Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 8. Pay Comparisons for Officer RPV Operators[21]

20. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.
21. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

A similar comparison for RPV officer operators is based on airline pilots, copilots, and flight engineers from the Occupational Employment Statistics maintained by the Bureau of Labor Statistics. Many of the officers who perform this job in the military are commercially rated pilots (Figure 8). Earnings for O-4 and O-5 officers compare favorably with civilian earnings at the 75th percentile (without considering the value of benefits and retirement). Civilian earnings at the 90th percentile earnings are top-coded in the data and are not reported.

Analysis of Enlisted Retention

The staffing analysis revealed that improved retention could potentially benefit the enlisted communities in the Army and Marine Corps. While current Army retention appears adequate, requirements for operators are growing rapidly. Likewise, the Marine Corps is currently undermanned, even before substantial increases in requirements are considered.

The same issues may face the Air Force for the enlisted and officer (18X) communities. However, each of these occupations is new enough that we were not able to obtain any historical data on continuation behavior. Instead, we focused on evaluating alternative pay schemes for the Army and Marine Corps operators.

Shortages of operators may be viewed primarily as a problem of initial supply or training capacity, but incentives to boost retention of trained personnel might reduce accession requirements somewhat. We explored two options to improve retention:

- increase SRB levels by 25 percent
- pay enlisted operators CEFIP or equivalent pay[22]

The Army was paying bonuses ranging from about $8,000 to $14,000 (depending on pay grade, term of service, and zone) at the time we conducted this analysis; a 25 percent increase would be worth a total of about $2,000 to $3,500 per soldier. Figure 9 shows that this alternative yields relatively modest increases in retention. The Army would be able to reduce accession (and training) requirements by about 0.5 percent to meet manning objectives. The marginal cost per additional soldier retained would be about $19,100.

A CEFIP-like pay—RPAIP—would have a larger effect, reducing accession requirements by 1.8 percent; however, this pay would be more expensive, increasing annual compensation by over $4,000 for most of the career. The marginal cost per additional soldier retained is correspondingly larger ($21,650).

22. Air Force enlisted sensor operators are already eligible for a CEFIP equivalent pay.

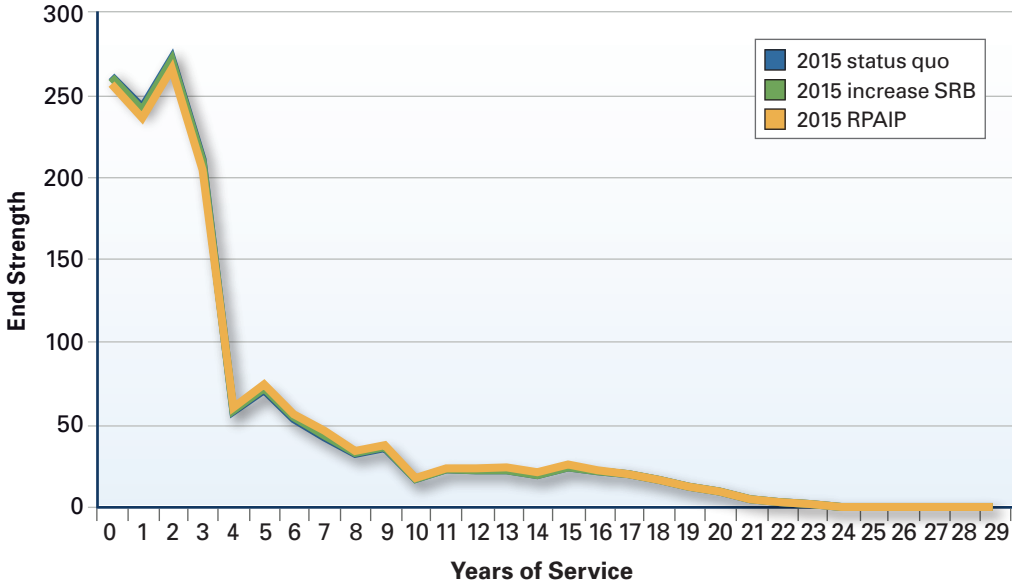


Figure 9. Army Enlisted RPV Operators Incentive Options

The results of a similar excursion for Marine Corps UAV (unmanned aerial vehicle) operators were comparable, although the effects of both of the alternatives were larger than they were for the Army analysis. Marine Corps staffing is currently about 50 percent of requirements. A 25 percent increase in SRB reduces accession requirements by about 1.8 percent, while the RPAIP option has a larger effect on retention, reducing accession requirements to meet overall staffing goals by 2.8 percent. The predicted retention effects of these alternatives are larger than they were for the Army, but the marginal costs per Marine are larger as well. The marginal cost of the SRB increase is $22,100 per additional Marine retained; the comparable cost for the RPAIP increase is $22,800. The forecasted impact of each alternative on FY 2015 inventory compared to the baseline is shown in Figure 10.

The larger effects for the Marine Corps (relative to the Army) are because (a) Marine Corps SRBs are larger, meaning that a 25 percent increase is more valuable, and (b) baseline retention rates for the Marine Corps are lower, which can increase predicted responsiveness. It is interesting to note the substantial impact of the RPAIP option, since the Air Force has decided to implement this pay for its new enlisted and officer communities, although it has not yet determined whether retention might be an issue.

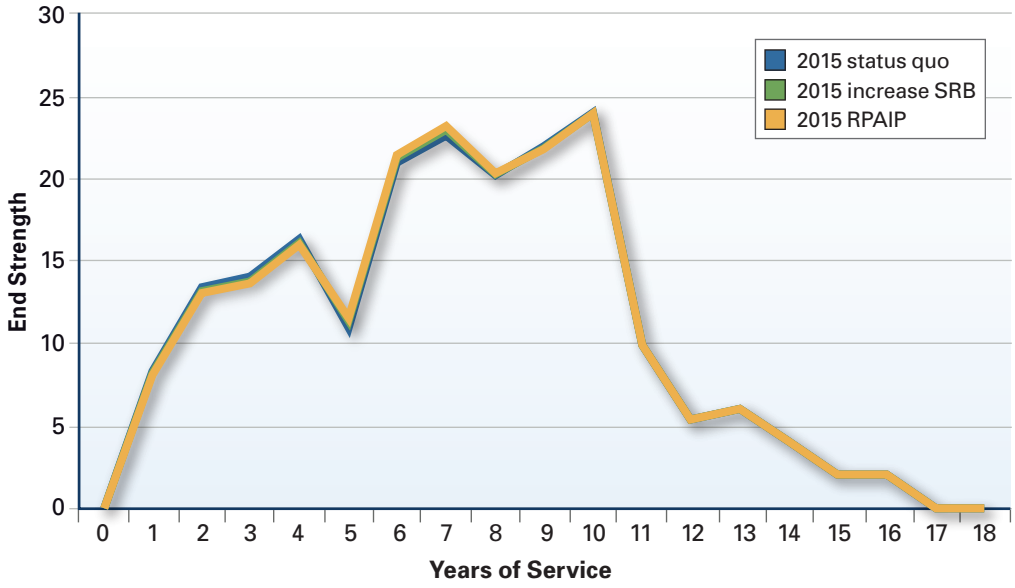


Figure 10. Marine Corps Enlisted RPV Operators Incentive Options

Designing Compensation for New Occupations

With the establishment of two new communities in the Air Force, the question arises regarding the best way to design a set of pays for a new occupation in the absence of any evidence on retention patterns.

Ideally, the first step in designing a compensation plan for such a new community is to conduct a market survey to get a sense of civilian sector opportunities and earnings. If there is evidence of earnings in the civilian sector that are substantially higher than base military compensation, an initial set of special and incentive pays may be warranted.

In some cases, including RPV operators, there is no clear civilian market for the new occupation and an initial survey is not possible. Other *a priori* conditions that might justify initial establishment of pays include high training costs or rapid requirements growth. However, when the compensation is based on this sort of evidence, a flexible, adjustable bonus is preferred over a career pay that is more difficult to adjust once evidence regarding retention and recruiting behavior is available. In this situation, the service is forced to accept some risk regardless of its pay strategy. If the service establishes a pay, it faces the risk of having "overpaid" for personnel. The alternative strategy is to not establish any special and incentive pays, thereby assuming the risk of insufficient retention.

The Air Force chose to establish RPA Incentive Pay for both officers and enlisted personnel despite a lack of evidence that the pay is necessary to retain sufficient numbers of trained personnel. Recalling the basic framework and criteria for applying special and incentive pays presented earlier, the Air Force RPV career field appears to satisfy the criteria of "rapid demand growth" and perhaps "high training costs."[23] Given current staffing ratios and increasing future requirements, the option of not establishing any special and incentive pay appears to be riskier.

However, the choice of a career pay rather than a more flexible set of bonuses may increase the long-run cost and reduce the likelihood that pays will be adjusted downward if recruiting and retention do not become a problem. While the application of special and incentive pays in the absence of solid evidence regarding recruiting and retention issues is understandable, the application of the pay should be evaluated as soon as the data can support an empirical assessment of the case for the special pay.

Conclusions and Recommendations

Service demand for trained RPV operators is growing rapidly and, in most cases, appears to be outstripping the capacity of the training pipeline. Currently, there is no evidence of significant competing demand for these individuals from the civilian sector. If non-military applications grow, the military is probably the only short-term source of trained operators.

The Navy is unique among the services, in that it has not created a separate officer (or enlisted) community exclusively for RPV operators, so it was impossible to track either requirements or personnel supply. The Air Force pays its pilots and navigators in the RPA community the same set of pays available to those working in manned cockpits—ACIP and ACP. Air Force operators specifically trained for RPA operations only (the 18X community) receive a pay equivalent to ACIP, but not ACP. Enlisted sensor operators receive a CEFIP equivalent. Neither the Army nor the Marine Corps provide an equivalent for enlisted operators, but both offer SRB.

Based on the preceding analysis, we offer the following recommendations:

1. Expand the use of RPA pilots (18X) to meet Air Force demand. These officers, though they have significant training costs, are a less

23. The Air Force was not able to provide precise estimates of the training costs for either pilots or 18X officers. Certainly, the training pipeline is shorter for 18X officers than it is for manned cockpit rated officers. However, the level of training is certainly greater than it is for other non-rated officers, like infantry and surface warfare officers. The case for high training costs would have to be established with a more careful analysis of training costs (including the salary of the trainee) relative to other sources of gains to the community (e.g., conversion of officers from specialties that are reducing in size) and relative to the costs of retention incentives.

expensive option than converting trained pilots and navigators, although conversions may continue to make sense if other Air Force requirements for rated officers were to decline and result in surpluses of rated officers.

2. Consider an ACP-like bonus for RPA pilots, targeted to critical career points, if retention becomes a problem, or the higher retention can further reduce the need to use rated officers for these jobs.
3. Assess the effectiveness of RPA Incentive Pay once current cohorts complete their initial obligations. The rationale for a pay structured like ACIP is unclear; ACIP, or flight pay, was established to compensate for a career that is more hazardous than others and involves a considerable amount of training. Certainly, the hazardous nature does not exist and the level of training, while significant, may not approach levels necessary for other flight crew. Even if such a pay differential proves necessary, it is not clear that structuring the pay to be like ACIP would make sense.
4. Increases in SRB for Army and Marine Corps UAV operators would ameliorate growing accession and training requirements. SRB is a slightly more efficient option than ACIP, which cannot be targeted. While the projected effects of large increases in SRB are modest, the marginal cost of retaining personnel using bonuses are lower than the costs of using a career pay for the same purpose.
5. Closely monitor the civilian market for signs of increased demand.
6. When establishing a new occupation, the services should take a systematic approach to determining whether or not to design additional pays for the community:
    a. When possible, the services should conduct a market survey of comparable civilian employmen1t and earnings. If civilian earnings appear to be substantially higher than base military pay, the services may consider immediate establishment of S&I pays. Otherwise, they should establish no additional pays unless and until there is evidence of retention or recruiting problems.
    b. The service should also consider whether there is a preliminary, *a priori*, case that can be made for the additional pay based on the criteria discussed earlier, such as a significant growth in demand, high training costs, onerous working conditions, or skill acquisition. This preliminary case, however, does not substitute for a more detailed analysis based on the evidence, once data on recruiting, retention, and other key outcomes become available.

c. The services may consider an initial "conversion" bonus if appropriate, but this should be preceded by a well-constructed survey to determine whether sufficient personnel will voluntarily convert without an incentive.

d. In the case of an occupation without a close civilian alternative and no reliable evidence on recruiting and retention, the services should avoid establishment of inflexible pays until there is evidence of a problem. A schedule of bonuses could potentially be announced, but subject to adjustment based on market conditions.

e. The service should undertake a more detailed evaluation and analysis as soon as sufficient data becomes available.

Linguists/Translators

The services employ language professionals to provide linguistic and translation capabilities for critical foreign languages. In addition, other personnel (e.g., Special Operations) may need basic foreign language skills (situational proficiency) in order to perform missions effectively. Demand for particular language skills depends to a large extent on current and (anticipated) future mission requirements. Currently, the most critical languages are Arabic, Persian, and Chinese. Language criticality may depend as well on supply considerations. These three languages are also among the most difficult for non-native speakers to acquire.

Competing demand in the civilian sector can be intense and may also fluctuate with the business cycle. This competing demand may also be, at least partly, derived from service requirements as well, as the services contract with private companies for some translation tasks. Both private employers and other federal agencies (including the Department of State, National Security Agency, Defense Intelligence Agency, and Central Intelligence Agency) employ language professionals and may compete for trained military personnel.

Overview of the Career Field

Language professionals may receive both Selective Reenlistment Bonuses and a proficiency bonus. The Foreign Language Proficiency Bonus (FLPB) is based on degree of proficiency, and criticality of the language requirement. FLPB rates do not vary across services, but services can set their own Strategic Language Lists (SLL).

Members are eligible to receive FLPB if they:[24]

24. DOD Instruction 7280.03, August 2007.

1. are proficient in at least two of three modalities (reading, listening, and speaking) of any foreign language on a DOD approved list
2. meet at least one of the following conditions
   a. are qualified in a military specialty requiring language proficiency
   b. have received training designed to achieve foreign language proficiency
   c. are assigned to duties requiring foreign language proficiency
   d. are proficient in a foreign language identified as a critical need

Certification of proficiency is typically through the Defense Language Proficiency Test (DLPT), although alternative certification is used if no test exists for a particular language. Monthly payments range from $25 to $500 depending on proficiency and degree of criticality, as shown in Table 7.

There are two relatively new programs that were designed, in part, to help meet demand for foreign language speakers in the uniformed services: the Military Accessions Vital to the National Interest (MAVNI) program and the 09L program.

The MAVNI program has been used to recruit legal aliens for both health care professionals and individuals with foreign language skills. For enlisted individuals with special language and culture backgrounds, the applicants must have language skills and cultural expertise in a critical language area. They must also demonstrate language proficiency, meet all other criteria for enlistment eligibility, and must enlist for at least four years of active duty.[25] The Army, which has been

Table 7. DOD Bonus Rates for Foreign Language Proficiency

Proficiency in any combination of the reading, listening, and speaking modality	Payment A For foreign languages on the SLL (Immediate Investment)	Payment B For foreign languages on the SLL (Strategic Stronghold)	Payment C For other DOD-approved foreign languages not on the SLL
Skill Levels	Monthly Pay	Monthly Pay	Monthly Pay
1/1	$100	$ 50	$ 25
2/2	200	150	125
2/2+	250	175	150
2+/2+ or 2/3	300	200	175
2+/3	350	250	200
3/3	400	300	275
3/3/3 or 4/4	500	400	300

Source: DOD Instruction 7280.03, August 2007

25. *MAVNI Fact Sheet*, http://www.defense.gov/news/mavni-fact-sheet.pdf.

the primary user of the MAVNI program, has accessed about 900 individuals for language skills. However, MAVNI recruits' alien status means that they are only eligible for a small number of military occupations that do not require security clearances. These recruits have been sought to provide "bench strength" in some languages (i.e., personnel who could be called upon in the future to provide interpreter services). The program is currently on hold because of concerns with security screening issues.

The 09L program is also managed by the Army; it focuses on recruiting native speakers of critical languages. Thus far, the focus has been on Arabic, Dari, Pashtu, Kurdish, and Farsi speakers. The program, established in 2003, was initially focused on recruiting individuals into the Individual Ready Reserve for service on active duty, but has since expanded to include recruiting individuals to serve in the active component. The native speakers in this community are used as interpreters, but not as translators; they are used most intensively by Special Forces units. These linguists are eligible for both FLPB and enlistment bonuses, although they qualify for FLPB based on an oral proficiency exam, rather than the DLPT.[26]

Current and Future Manning and Requirements

Foreign language requirements are expected to remain fairly stable in the near future, at least at the aggregate level. As mission requirements change, the specific languages required may change as well.

Table 8 summarizes current and future requirements for the four services compared to FY 2010 inventory. Both the Army and the Air Force appear to be fully manned; in neither case, however, do the data provide visibility into the inventory of individual language skills. In contrast, both the Navy and Marine Corps face manning shortages. The Navy is undermanned in Arabic, Chinese, Korean, and Spanish; Navy managers are further concerned that a shortage of Persian specialists is imminent. Recent changes in the DLPT for Persian have increased the non-graduation rate to almost 50 percent. Marine Corps requirements, overall, will remain flat in the near future, although there may be some shift among Primary Military Occupation Specialties (PMOSs). The Marine Corps is using SRBs to attempt to close current manning gaps.

26. *Overview of Army's 09L Interpreter/Translator Program* (https://secureweb2.hqda.pentagon.mil/vdas_armyposturestatement/2010/information_papers/Interpreter_or_Translator_Program.asp).

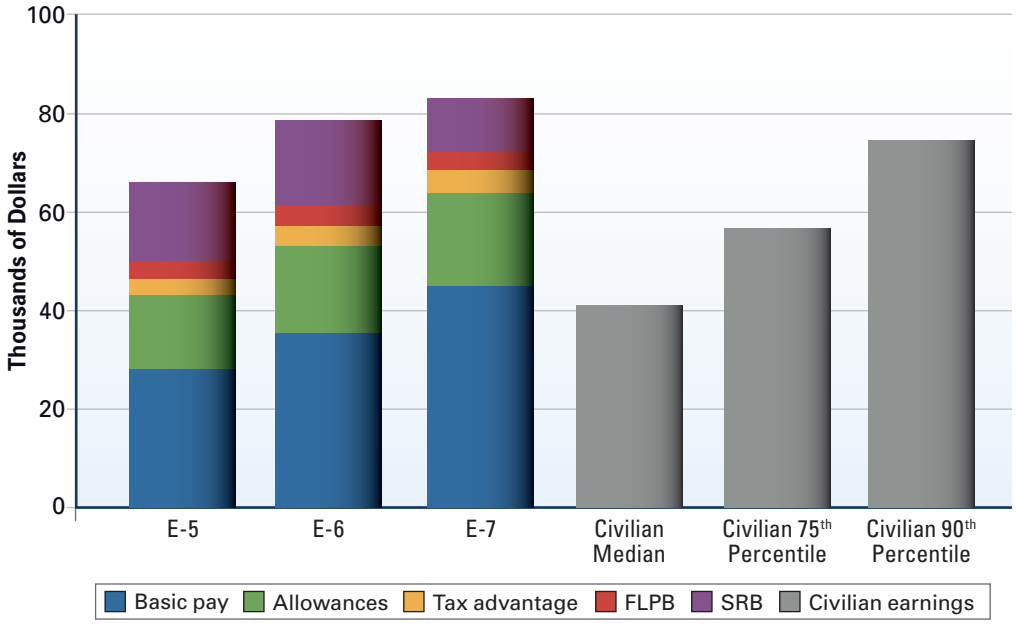
Table 8. Linguist/Translator Manning and Requirements

	Requirements			Inventory	Ratio
	FY 2010	FY 2015	Change	FY 2010	FY 2010
Army Enlisted					
09L Interpreter/Translator	298	309	3.69%	264	88.59
35P Cryptologic Linguist	2,274	2,271	-0.13	2,243	98.64
Total Army Enlisted	2,572	2,580	0.31	2,507	97.47
Navy Enlisted					
CTI Non Lang Spec	306	459	50.00	14	4.58
CTI Arabic	556	598	7.55	290	52.16
CTI Persian	118	122	3.39	143	121.19
CTI Chinese	339	359	5.90	243	71.68
CTI Korean	368	386	4.89	116	31.52
CTI Spanish	286	293	2.45	129	45.10
CTI Russian	188	200	6.38	151	80.32
Total Navy CTI Enlisted	2,161	2,417	11.85	1,086	50.25
Air Force Enlisted					
1A8X1 Airborne Cryptologic Analyst	1,089	1,088	-1	1,527	140.22
1N3X1 Cryptologic Language Analyst	2,388	2,397	9	2,952	123.62
9L000 Interpreter/Translator	73	73	0	37	50.68
Total Air Force Enlisted	3,550	3,558	8	4,516	127.21
Marine Corps Enlisted					
2671 Cryptologic Linguist, Middle East	282	286	1.42	219	77.66
2673 Cryptologic Linguist, Asia-Pacific	170	170	0.00	128	75.29
2674 Cryptologic Linguist, Western Europe	133	131	-1.50	112	84.21
2676 Cryptologic Linguist, Eastern Europe	129	122	-5.43	86	66.67
2691 Sig Intel/Electronic Warfare Chief	61	65	6.56	69	113.11
Total Marine Corps Enlisted	775	774	-0.13	614	79.23

Source: DMDC, Services

Comparisons to Civilian Market

Unlike many military occupations, military language professionals have a nearly direct counterpart in the civilian sector. Other agencies and private employers hire linguists and translators to perform the same sorts of duties required of them in the military. The ongoing recession in the civilian economy appears to have improved retention of language professionals, but first-term retention rates average around 50 percent across the services. This suggests that there is room to improve retention, particularly given the high training costs for these positions.



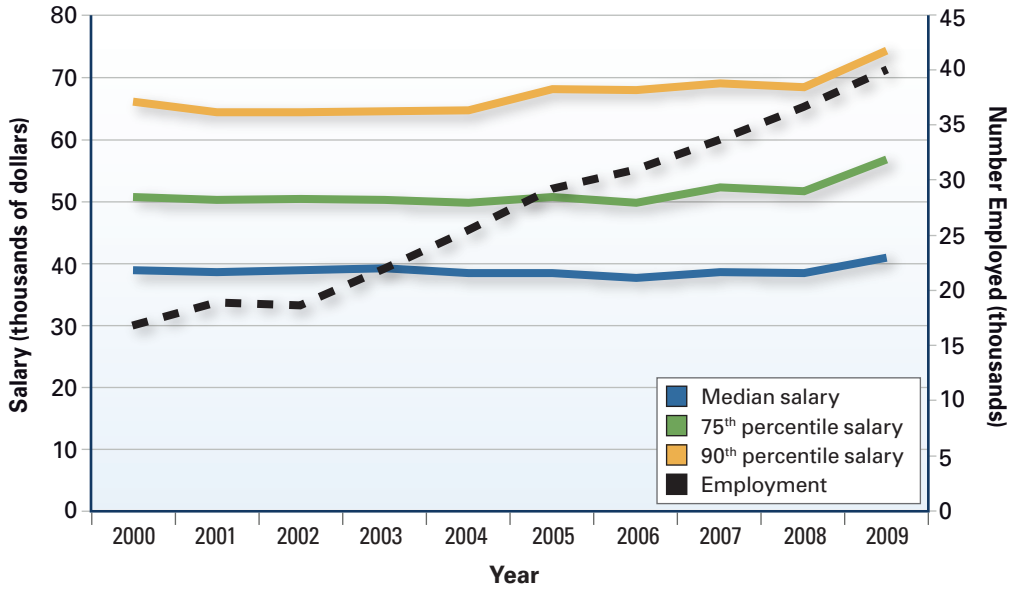
Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf

Figure 11. Pay Comparisons for Language Professionals[27]

Figure 11 compares military pay to civilian salaries for linguists and translators. Pay for midcareer linguists and translators compares favorably with civilian compensation, although civilian numbers do not reflect, potentially, the same mix of critical language skills. For example, the SRB amounts shown here are for the most critical languages (Arabic, Persian, and Chinese). Also, a fairly high proportion (about 26 percent) of civilian workers is self-employed, which may make comparisons difficult. Many civilians may work less than full time as well. Military pay, allowances, and bonuses are generally between the 75th and 90th percentile of civilian earnings, although the comparison does not consider the value of benefits (e.g., health care) or retirement.

It is interesting to note that employment levels in the civilian sector have risen dramatically in the last decade, but there has not been a corresponding increase in real wages. Figure 12 shows employment levels from 2000 through 2009 along with real salaries at the 50th, 75th, and 90th percentiles. With the exception of a slight increase in 2008 and 2009, salaries have remained nearly flat. Again, the employment numbers may mask a higher proportion of workers who work less

27. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.



Source: Occupational Employment Statistics (various years) (http://www.bls.gov/oes/oes_dl.htm)

Figure 12. Civilian Salary and Employment for Linguists and Translators

than full time, and the increase may be largely in languages with large numbers of native speakers (e.g., Spanish).

There are at least three ways in which the civilian market could dramatically increase demand for military language professionals. First, competing demand from government contractors and other federal agencies will probably remain strong in the near future. Military personnel have the training and security clearances required for many of these jobs. Second, a rebounding civilian economy may increase private sector demand. For example, firms involved in manufacturing may step up operations in China, creating a larger demand for Chinese translators.

The third area of concern is the value of the new G.I. Bill benefit. Personnel recruited into language fields have high aptitude scores and may be predisposed to pursue a college education. Because the new benefit is more lucrative than its predecessor, linguists/translators may increasingly choose to leave the military after an initial enlistment. Pairing an undergraduate college degree with language skills will make them even more attractive to civilian employers.

Analysis of Alternatives

Both the Navy and the Marine Corps face current shortages of language professionals. We examined the effectiveness of increasing SRB levels to help address the shortages. Because the services cannot individually target the FLPB payment amount, the SRB seemed to be a more appropriate tool.

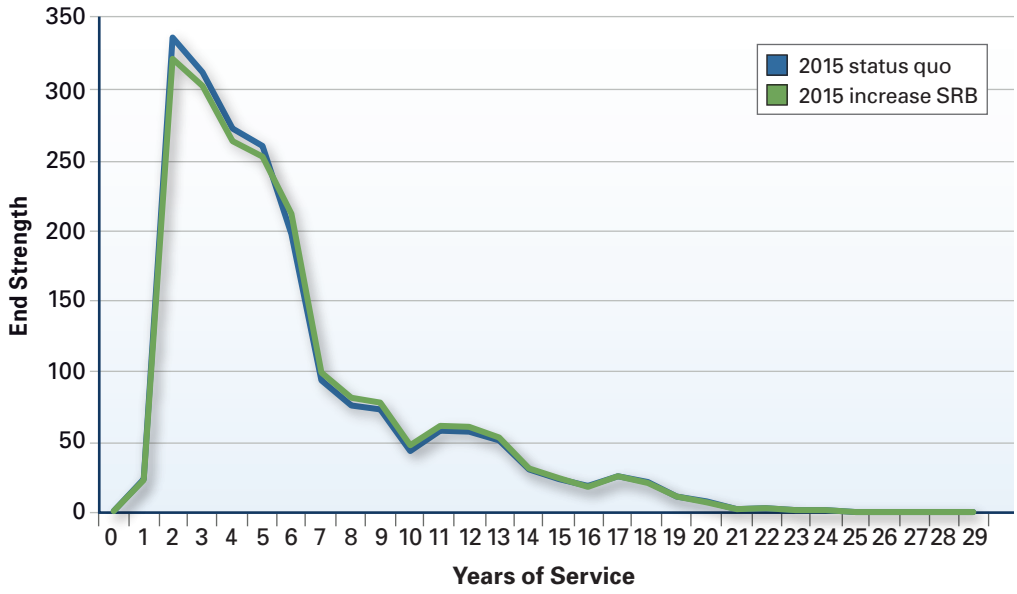


Figure 13. Inventory of Navy Language Professionals, FY 2015

The Navy's primary shortages are in Arabic, Chinese, Korean, and Spanish. We simulated the effect of increasing the SRB multiplier by 2.0 for each group. The effects on FY 2015 inventory are shown in Figure 13.[28]

The larger bonuses are predicted to increase retention, but the impact is fairly modest. By 2015, this higher bonus would reduce accession demand (to meet the same manning level) by about 16 sailors, compared to the status quo alternative. The marginal cost of the increased bonus for each additional sailor retained would be about $20,600.

We performed a similar excursion for the Marine Corps. The Marine Corps faces shortages in Middle East and Asia-Pacific languages. For these two PMOS, we simulated the effects of a 25 percent increase in SRB.[29] Marine Corps SRBs for these two communities are already substantial. For PMOS 2671 (Middle East) and PMOS 2673 (Asia-Pacific), the bonuses range from about $59,000 to $83,000. Bonuses under the CSRB authority are also available for Marines in Zone D (YOS 15–19). A 25 percent increase is worth about $15,000 to $20,000. The effect on FY 2015 inventory is shown in Figure 14. In relative terms, the effect is larger than the effect predicted for the Navy alternative. Total accessions to meet the same

28. The value of the SRB is equal to the multiplier * monthly basic pay * length of reenlistment (in years). For an E-5 earning about $2,300 per month, a level-2 increase in the multiplier for a four-year reenlistment will be worth about $18,000. The Navy pays the bonus in a lump sum worth 50 percent of the total bonus and the remainder in equal annual installments across the life of the enlistment contract.

29. Unlike the Navy, the Marine Corps does not use a multiplier system to calculate bonuses. Also, Marine Corps SRBs are paid in a single lump sum.

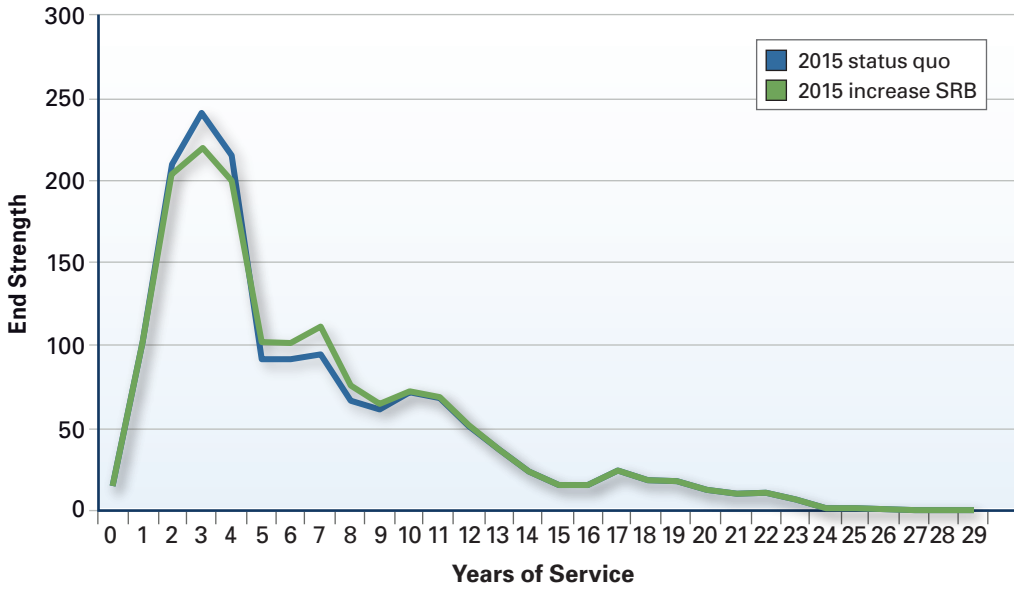


Figure 14. Inventory of Marine Corps Language Professionals, FY 2015

end strength are about 18 lower in 2015 than they would be under the status quo. In absolute terms, this is about the same reduction as predicted for the Navy, but Marine Corps inventory is about one third that of the Navy. The marginal cost per additional Marine retained is also much higher than was the case for the Navy example ($58,300 compared to $20,600).

Compensation Implications of DOD Initiatives to Promote Regional Expertise and Cultural Awareness

The Department of Defense (DOD) has placed increased emphasis on the need to develop and maintain regional expertise and cultural awareness. The *Strategic Plan for Language Skills, Regional Expertise, and Cultural Capabilities: 2011–2016* states:

> While much has been done to establish foundational language skills, regional expertise, and cultural capabilities, further growth and advancement are needed to support our national security efforts. The Department of Defense efforts must also complement and provide a model for national efforts to build a globally competent workforce by educating a larger pool of language and internationally competent high-school and college graduates from which the Department, other federal agencies and the private sector can recruit.

Incentive pay has focused on language skills and does not vary with any measure of regional expertise or cultural awareness.

There are two issues to consider when thinking about compensation incentives for promoting regional expertise and cultural awareness:

1. What are DOD/service requirements?
2. How will regional expertise and cultural awareness be measured?

The first issue has at least two aspects. The services may need language professionals (linguist/translators and foreign affairs officers) with these capabilities as well as other personnel who remain "in reserve" should requirements arise. Also, there may be a demand for these capabilities separate from language skills. There may be cases in which different levels of proficiency are needed for each aspect (language skill, cultural awareness, regional expertise). One might conceive of a three-part rating system that applies to particular assignments or career fields.

Conversely, it may make sense, based on requirements, to tie these capabilities to language proficiency. As in the case of language skill, it may be true that "more is always better." That is, the services would always want to encourage higher levels of proficiency, regardless of assignment or career field.

The second issue is critical. Language proficiency is measured using the Defense Language Proficiency Test, which yields both a reading and a listening proficiency score. While there may be some debate about the accuracy of the tests, they are at least at some level an objective measure of proficiency.

Moreover, there is some empirical evidence that FLPB is an effective tool for encouraging members to achieve and maintain proficiency in language skills. Mackin, et al. (2007) estimated an econometric model of language proficiency and demonstrated that proficiency bonuses have a significant, positive effect on proficiency levels as measured by DLPT scores. Another way to state this is that incentives tied to DLPT scores effectively motivated personnel to improve language proficiency.

No such test exists for measuring regional expertise or cultural awareness. DOD Instruction 5160.70 (Management of DOD Language and Regional Proficiency Capabilities) does describe a grading system for regional proficiency skill levels:

- 0+ – Pre-Novice
- 1 – Novice
- 2 – Associate
- 3 – Professional
- 4 – Senior Professional
- 5 – Expert

These levels include descriptions of the level of understanding that individuals have about relevant subject areas, but also include combinations of education, training, and experience as indicators of proficiency. Regional proficiency is also tied to language skill proficiency in these definitions, suggesting that DOD intends to link the two.

Implications for Compensation Design

Should the Department consider new incentives to encourage the acquisition and retention of regional expertise and cultural awareness? The obvious first step is to determine whether there is a supply problem. If so, is the problem primarily related to acquisition, retention, or maintaining proficiency?

The Foreign Language Proficiency Bonus targets "pure" proficiency and it recognizes that, to maintain proficiency in language skills, individuals must undertake some private effort to maintain their skill levels. Because an objective test for language proficiency is possible, FLPB can be directly tied to performance on the DLPT, rather than to indirect measures such as rank, experience, or education. In the absence of an accurate, objective test for regional expertise and cultural awareness, a bonus-based system similar to FLPB would not appear to be feasible. That is to say, if *measured* proficiency in regional expertise and cultural awareness can only be based on indirect proficiency measures such as rank, experience, and education, a bonus-based system such as FLPB will not be a good model for incentivizing regional expertise and cultural awareness. When direct, objective measures of regional expertise and cultural awareness do not exist, a better model will be a career incentive pay that encourages members to undertake the assignments, training, and education necessary to qualify at higher levels of proficiency.

Receiving the career incentive pay might be based upon a series of "gates" which consist of cumulative months of assignment in the region, completed training or education, and language proficiency. Levels of career pay could be graduated across the career to reflect both increasing proficiency levels and force-shaping goals. Levels could also vary depending on the criticality of region, although it might be difficult in practice to adjust career pay levels as conditions and requirements change.[30]

A career incentive pay presents some disadvantages, however. First it would not be ideal for incentivizing proficiency among non-language professionals. Second, it would incentivize members to achieve a particular level of proficiency but, perhaps,

30. There is nothing in the structure of career pay that would prohibit frequent adjustments, but one of the rationales for this type of pay is to establish a fairly stable level of compensation that encourages members to invest in training and to take assignments. If levels fluctuate frequently, the pay s effectiveness might diminish.

would not be able to contain graduated amounts for higher levels of proficiency. Finally, gates based on experience and education criteria would make it difficult for members with cultural awareness acquired by other means (e.g., natives of the region) to qualify.

To summarize, a bonus modeled on the FLPB is advisable if an objective test to measure regional expertise and cultural awareness is developed. Pay levels may vary by level of proficiency and criticality of the region/culture. The bonus may be available to both language professionals and to others who remain in reserve for surge capability. Conversely, a career incentive pay may be more appropriate if proficiency is measured primarily by experience and education, and distinctions in performance within groups defined by experience and education are difficult or costly to measure.

Conclusions and Recommendations

Compensation for foreign language professionals in the military services compares favorably with civilian alternatives, although the Navy and the Marine Corps are experiencing shortages in critical languages. While pay may appear to be adequate, there may be substantial unmeasured differences in working conditions and the mix of language skills required between civilian and military jobs.

Competing demand for language professionals in the private sector is likely to increase with economic recovery. Moreover, language professionals are expensive to train. Both of these facts argue strongly for a program of incentives that is substantial and can be adjusted quickly to react to changes in requirements and market conditions.

FLPB is an effective tool for maintaining proficiency levels, but is not well suited to targeting of specific manning requirements. SRB and, for later career points, CSRB are preferred tools for managing changing supply and demand conditions.

The services and DOD have identified a requirement to promote and sustain cultural awareness and regional expertise, in addition to foreign language proficiency. Structuring compensation incentives to foster this objective will be difficult, and will depend in large part on the method used to certify proficiency levels.

Based on our analysis, we offer the following recommendations for compensation of foreign language professionals:

1. Consider more aggressive use of SRB/CSRB to retain a higher proportion of trained professionals. The replacement cost for these individuals is high and, in many cases, the most serious constraint is training capacity. Higher bonuses will at least partially reduce accession requirements.

2. Continue to employ FLPB to encourage proficiency and maintain some comparability with civilian employers competing for talent. The Department should also consider allowing the services to vary the bonus levels based on their specific requirements and conditions.
3. Explore compensation alternatives for encouraging cultural awareness and regional expertise only after further study to determine whether the services are having difficulty encouraging a sufficient level of proficiency without additional incentives. Also, any compensation system designed must await the formulation of reliable procedures for certifying proficiency.
4. Increased use of alternative accession sources, including the MAVNI and 09L programs, may further reduce manning costs, but further study of the effectiveness and retention behavior of these recruits is warranted.

Mental Health Professionals

Overview of the Career Field

The Army, Air Force, and Navy employ clinical mental health professionals to meet the mental health needs of active duty members and their families from all the services.[31] These professionals include officers who are psychiatrists, clinical psychologists, clinical social workers, and mental health nurse practitioners, as well as enlisted personnel who are mental health specialists.

The demand for mental health professionals has increased significantly. Almost a decade of war, and its concomitant deployments and family separation, has taken its toll on military members, families, and veterans. Frequent deployment of military members, often to combat zones, has put stress on the member directly and on the member and family through increased family separation. The increase in post-traumatic stress disorder and traumatic brain injury and, most vividly and tragically, the increase in the rate at which military members take their own lives, are illustrative of the need for increased mental health services in the military.

Congress has expressed its concern. In the FY 2006 National Defense Authorization Act (NDAA), Congress required the establishment of a Department of Defense Task Force on Mental Health.[32] This task force made specific recommendations to "Ensure an adequate supply of uniformed providers [of mental health services]."[33] Most recently,

31. The Navy's mental health specialists also care for the Marine Corps.
32. National Defense Authorization Act for FY 2006, PL 109-163 January 6, 2006, Section 723.
33. See Department of Defense Task Force on Mental Health (2007), recommendation 5.3.3, p. 45.

in the FY 2010 National Defense Authorization Act, Section 714, mental health staffing is addressed. It states that, within 180 days of enactment, the secretary of each military department will increase the number of active duty mental health personnel authorized by the greater of the amount required but not authorized to fill or 25 percent of the number authorized. It included a provision to require a report, within a year, on the number of mental health personnel required to meet mental health needs of members, retirees, and dependents. Finally, it requires the secretary to develop and implement a plan to increase, significantly, the number of health care professionals in the Department of Defense by September 30, 2013. The plan will include both accession and retention incentives, and new ways to train mental health professionals for the military.[34]

In February, 2011, the Assistant Secretary for Health Affairs, in response to the requirements of Section 714 of the National Defense Authorization Act for FY 2010, released the report to Congress entitled *Mental Health Personnel Required to Meet the Needs of Service Members, Retired Members, and Dependents*.[35] The following table, showing the status of staffing across the services at the end of FY 2009, is reproduced from this report.[36]

Table 9 indicates that, in FY 2009, the services were able to recruit and retain sufficient mental health professionals to staff the positions they had funded.[37] However, all of the services report significant growth initiatives to meet the mental health needs of service members and dependents and to comply with the Congressional requirement for increasing staffing in the mental health professions. Table 10 though Table 12, from the report, show the growth in military mental health positions planned by each of the services.

Table 9. Numbers of Mental Health Personnel Reported at End of FY 2009

	#Personnel	#Billets	Percentile Filled
Psychiatry	322	326	99%
Mental Health Nurse Practitioner	65	52	125%
Psychology	528	537	98%
Social Worker	401	384	102%
Mental Health Nurse	165	131	126%

Source: Health Manpower Personnel System

34. National Defense Authorization Act for FY 2010, PL 111-84 October 28, 2009, Section 714.

35. Assistant Secretary of Defense for Health Affairs (2011).

36. Assistant Secretary of Defense for Health Affairs (2011), p. 7.

37. The billets in this table are, presumably, funded authorizations. For some of the mental health specialty areas, including psychiatry and clinical psychology, the inventory data may include staff in training positions (residents and interns).

Table 10. Army MEDCOM Increases (Effective FY 2011)

Occupation	Growth
Psychiatrists	+12
Psychiatric/Behavioral Health Nurses	+5
Psychiatric/Behavioral Health Nurse Practitioners	+10
Social Workers	+8
Clinical Psychologists	+10
Enlisted Behavioral Health Specialist	+34

Table 11. Navy Specialties Net Growth from FY 2009–FY 2012

Occupation	Growth
Psychiatrists	+ 28
Clinical Psychologists	+ 28
Social Workers	+ 62
Psychiatric Nurse Practitioners	+ 14
Mental Health Nurses	+ 10
Psychiatric Technicians	+ 57

Table 12. Air Force Specialties Net Growth from FY 2009–FY 2012

Occupation	Growth
Psychiatrists	+18
Psychologists	+31
Social Workers	+79
Psychiatric Nurse Practitioners	+27
Psychiatric Nurses	+15
Enlisted Mental Health Technicians	+169

All of the services are increasing the number of authorized positions for mental health. It is interesting to note that both the Navy and the Air Force are planning a substantial increase in social worker positions. Social workers are somewhat easier to attract and retain than some other mental health professionals, such as clinical psychologists and, in many areas, are good substitutes for these other mental health professionals. Indeed, the services are catching up to what has already occurred in the civilian market.[38]

38. See, for example, McFall (2006), p. 26:

> Today, this picture is changing once again: Social workers and mental health workers from other disciplines now are displacing psychologists as the primary providers of mental health services doing to psychologists what psychologists did to psychiatrists earlier. The pace of this shift has been dramatic. In 1991, for example, social workers were providing only about 5 percent of all mental health services in the United States; by 1997 they were providing 56 percent of these services…"

Supply of Mental Health Professionals in the Civilian Sector

In general, there is an excess demand for mental health professionals in the civilian sector based on the mental health needs or epidemiology of the population. This demand increased during the recession. However, the effective demand—the demand based on ability and willingness to pay for services—has not been as great. This is the case for two reasons. First, mental health services are often not covered, or are subject to inadequate coverage, by many private sector insurance policies. The Mental Health Parity Act of 1996 and the Mental Health Parity and Addiction Equity Act of 2008 reduced the differences between medical benefit coverage, limits, co-pays, and deductibles and those of mental health benefits, for those plans that offer both types of benefits. However, while it did increase insurance coverage for mental health services, it did not eliminate differences. In the aggregate, coverage for mental health services remains below that for physical health services. This suppresses the "effective" demand for mental health services—the ability to pay for them—compared to medical services.

A second factor affecting the effective demand for mental health services is the effect that the recession has had on state budgets. Mental health services, particularly community mental health centers and services in the areas of alcohol and substance abuse, are subsidized by state programs. These programs have been cut significantly by many states over the course of the recession, reducing services provided and reducing the effective demand for mental health professionals.[39]

This has resulted in the perverse outlook where, though the underlying epidemiology of the population would imply that more mental health professionals are needed, the ability to finance services and the willingness to pay for services has resulted in an effective decrease in demand. The implication for the Department of Defense is that, in the case of mental health professionals, it should be able to compete effectively with the civilian sector for additional mental health professionals.

Psychiatrists

The investment necessary to produce a fully trained psychiatrist is substantial. Psychiatrists must be medical school graduates and complete a four-year residency, often followed by a one-year postdoctoral fellowship. One implication of this is that, to recruit a psychiatrist by financing their education, as would be the case with the Health Professions Scholarship Program (HPSP), may require a lead time of up to eight years.

39. See, for example, State Budgets Decimate Mental Health Services, Washington Times. March 9, 2011.

Because, in part, of the factors mentioned in the previous section, the earnings of psychiatrists are generally at the lower end of physician specialties.[40] They are similar to those of primary care physicians, rather than the specialist, though their training investment is more similar to the latter. Partly because of this, the numbers of psychiatrists are projected to decline over the next 10 years.

Figure 15 presents our projection of the number of adult psychiatrists, over the period 2010 through 2020.[41] The total numbers are projected to decline from about 34,000 in 2010, to fewer than 28,000 by 2020. This decline is due to an aging psychiatrist workforce entering retirement age and, concomitantly, fewer medical school graduates choosing to pursue graduate medical education in psychiatry. If the trend in the latter were to change, the decline would be somewhat smaller, or even reversed.

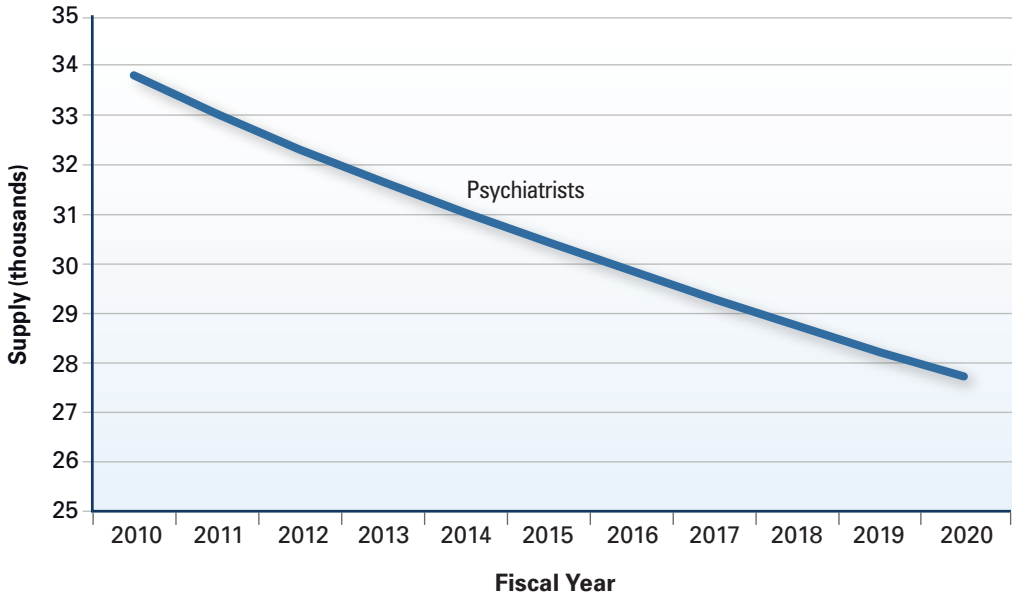


Figure 15. Adult Psychiatrists: Supply Projection

Clinical Psychologists and Social Workers

Prior to World War II, clinical psychologists were focused on testing. During the war, the military began using them to meet its needs for mental health professionals. After the war, despite the efforts by competing mental health providers to restrict

40. We discuss the earnings of civilian mental health professions, compared to those mental health professionals serving on active duty, below.

41. These projections are based on The Lewin Group's Physician Supply model.

their mental health practice, clinical psychologists became increasingly prominent substitutes for psychiatrists in many areas of mental health.[42]

The training necessary to become a doctoral level clinical psychologist today is almost as intensive as that for a psychiatrist. After completion of an undergraduate degree, the candidate must complete a doctoral program, including a practicum component that generally requires about five to seven years. This is followed by a one-year internship, and by a one-year postdoctoral fellowship. Despite this investment in training, the earnings of clinical psychologists in the civilian sector are relatively modest. Again, this is in part due to the factors affecting the effective demand for mental health professionals discussed above.

Social Workers

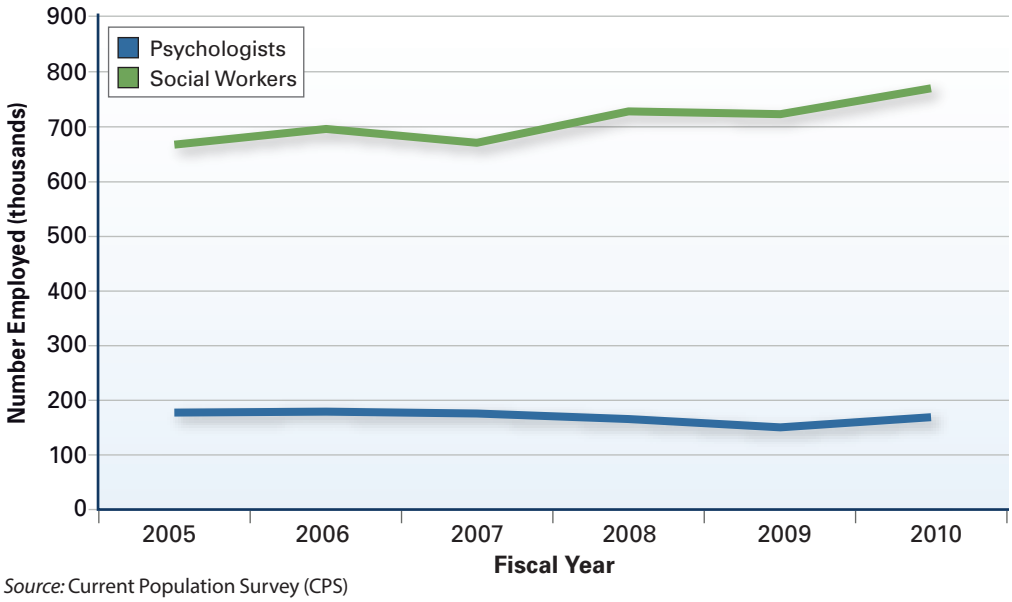
Social workers are one of the four recognized mental health professions that also include psychiatrists, psychologists, and psychiatric nurses. Generally, there are two types of degrees for social workers. A bachelor of science in social work (BSW) is an undergraduate degree typically requiring four years to complete. It may include a practicum component. A master of science in social work (MSW) is a more advanced degree, typically requiring two years to complete, and typically including an internship. It does not require an undergraduate degree in social work as a prerequisite. Clinical social workers are, typically, those who are likely to be substitutes for clinical psychologists and psychiatrists for some tasks. They generally hold an MSW and specialize in counseling.

The demand for social workers has been increasing over time, and they have been increasingly viewed as substitutes for clinical psychologists and psychiatrists in certain functions. McFall argues that social workers are seen increasingly as a lower cost substitute for clinical psychologists, in much the same way that clinical psychologists began to substitute for psychiatrists after World War II.[43] For those tasks for which clinical social workers are substitutable for clinical psychologists or psychiatrists, social workers are quite cost effective.

Figure 16 shows the number of psychologists and the number of social workers that were employed, by year, over the period 2005 to 2010. The Current Population Survey numbers represent self-reported psychologists and social workers. These represented sampled respondents who (a) indicated that their occupation was social worker or psychologist; and (b) indicated that they were employed in that occupation. Employment includes "self-employed." The numbers include all who report being employed as psychologists or social workers, not only those who are clinical

42. McFall (2006).

43. McFall (2006).



Source: Current Population Survey (CPS)

Figure 16. Economy's Employment of Social Workers and Psychologists

psychologists or social workers. Nevertheless, they are suggestive of a general trend that social workers are increasing over the period, while psychologists may be declining slightly.

Military Mental Health Professionals: Current Staffing and Demand Growth

Overall, there were about 3,100 mental health professionals on active duty in FY 2010, across the three services. Officers constituted slightly less than half of the total strength. Table 13 shows the distribution across the services.

Table 13. Mental Health Military Professionals, FY 2010

	Army	Navy	Air Force	Total
Psychiatrist	155	92	145	392
Non-Physician Mental Health Specialist[44]	356	152	471	979
Total Officers	511	244	616	1,371
Enlisted Mental Health	695	300	715	1,710
Total	**1,206**	**644**	**1,331**	**3,081**

44. Non-physician specialists consist of officers who are clinical psychologists, social workers, psychiatric/mental health nurses or other behavioral specialists.

In Table 14 we present current (FY 2010) staffing rates for mental health professionals and the expected growth in demand, as measured by authorized positions, between FY 2010 and FY 2015.[45] In FY 2010, the Army was staffed at about 97 percent of officer authorizations for mental health professionals and about 94 percent of enlisted mental health authorizations. Between FY 2010 and FY 2015, officer authorizations for mental health professionals are expected to grow by about 32 percent overall, while enlisted authorizations are expected to grow by about 21 percent overall.

Table 14. Current Staffing and Authorization Growth for Mental Health Professionals

Service	Authorizations		Percent Change	FY 2010 Inventory	FY 2010: Percent Staffed
	FY 2010	FY 2015			
Army					
Psychiatrists	172	189	10%	155	90%
Non-Physician Specialists	357	510	43	356	100
Total Officer	529	699	32	511	97
Total Enlisted	733	888	21	695	94
Total Army	1,262	1,587	26	1,206	96
Navy					
Psychiatrists	114	125	10	92	81
Non-Physician Specialists	206	274	33	152	74
Total Officer	320	399	25	244	76
Total Enlisted	412	377[46]	-8	300	70
Total Navy	732	776	5	544	74
Air Force					
Psychiatrists	155	173	12	145	94
Non-Physician Specialists	504	639	27	471	93
Total Officer	659	812	23	616	93
Total Enlisted	715	884	24	715	100
Total Air Force	1,374	1,696	23	1,331	97
All Officer	1,508	1,910	26	1,371	90
All Enlisted	1,860	2,149	16	1,710	92
Total	3,368	4,059	21	3,081	91

45. Note that an earlier table, Table 9, taken from the Assistant Secretary for Health Affairs February, 2011 report to Congress, showed staffing for officer mental health specialties across the services were generally at or above 100 percent in FY 2009. However there was a significant increase in authorizations between FY 2009 and FY 2010, reflecting continued steps to grow by at least 25 percent by September 30, 2013.

46. Navy provided authorization data that did not extend beyond FY 2012.

Naval officer mental health positions were staffed at about 76 percent of authorizations in FY 2010. Navy enlisted staffing was at about 70 percent of authorizations. Officer positions are planned to grow by about 25 percent, while enlisted positions may decline slightly. Current Navy staffing rates present the greatest challenge of the three services. The Navy believes, however, that actions it has taken will significantly improve staffing over the next several years. These include recruiting and improved retention.

Staffing of mental health professionals in the Air Force was 93 percent for officer specialties and 100 percent for enlisted in FY 2010. Officer and enlisted authorizations are expected to increase by 23 percent and 24 percent, respectively, over the period FY 2010 to FY 2015.

Overall, current (FY 2010) staffing for officer and enlisted mental health positions is above 90 percent. Though current staffing is adequate, on average, staffing in the Navy is 76 percent for officer positions and about 70 percent for enlisted. All three services face the challenge of growing over the next several years, with officer positions increasing by 26 percent and enlisted positions growing by 16 percent.

Within officer professions, non-physician mental health specialties are growing more quickly than psychiatrists. Officer non-physician mental health specialists are growing by 43 percent in the Army, 33 percent in the Navy, and 27 percent in the Air Force. Within the non-physician mental health specialties, the Navy and Air Force are planning to increase use of clinical social workers significantly. The Navy is planning to add 51 positions, an increase of 148 percent, while the Air Force is adding 80 positions, an increase of 40 percent. This is consistent with a trend in the civilian sector, where clinical social workers are increasingly substituted for some types of tasks previously undertaken by clinical psychologists and, in some cases, psychiatrists. Moreover, there is evidence, presented in the next section, that the services offer compensation levels that are quite competitive with earnings of social workers in the civilian sector, suggesting that this strategy is likely to be successful.

Earnings of Military and Civilian Mental Health Professionals

In addition to basic pay, allowances, and the tax advantage associated with non-taxable allowances, mental health professionals in the military may receive a variety of special and incentive pays. Table 15 presents the pays offered to selected officer mental health specialties.

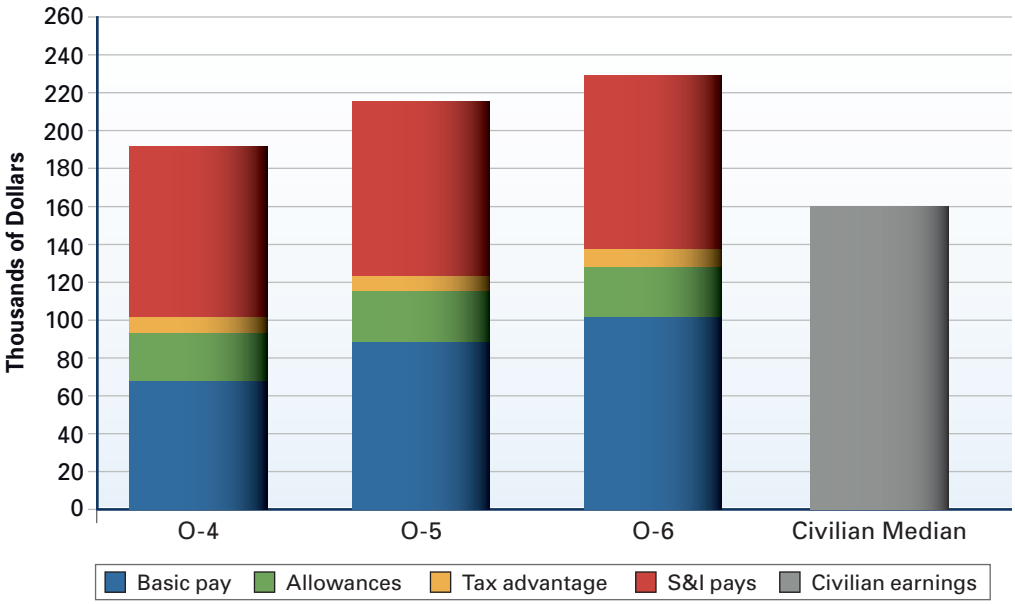
Table 15. Special and Incentive Pays Offered to Mental Health Specialists

Mental Health Occupation	Special and Incentive Pay	Approximate Amount
Psychiatrist	Board Certification Pay	$200–$500 per month
	Variable Special Pay	$400–$1,000 month
	Incentive Special Pay	$20,000 per year
	Multi-year special pay	$43,000 per year for a four-year service commitment
	Additional Special Pay	$15,000 per year
Clinical Psychologist	Board Certification Pay	$6,000 per year
	Incentive Pay (if the Graduated Retention Bonus not taken)	$5,000 per year
	Graduated Retention Bonus	$20,000 per year for those signing a four-year agreement
Clinical Social Worker	Board Certification Pay	$6,000 per year
	Graduated Retention Bonus (proposed)	Up $10,000 per year for a four-year commitment
Mental Health Nurse Practitioners	Board Certification Pay	$6,000 per year
	Special Incentive Pay	Authorized up to $20,000 per year for four-year commitment
Enlisted Mental Health Specialist	Selective Reenlistment Bonus	Award varies by service

The compensation of military health professionals compares favorably to comparable mental health occupations in the civilian economy. Figure 17 compares compensation of psychiatrists on active duty in the armed forces with the median earnings of psychiatrists in the civilian sector. Unlike some physician specialties, such as cardiologists or orthopedic surgeons, compensation for psychiatrists in the military is competitive with compensation offered in the civilian sector. It is above the median compensation offered in the civilian sector for pay grades O-3, O-4, and O-5. Note that without the special and incentive pay component of military psychiatrists' compensation, this would not be the case.[47]

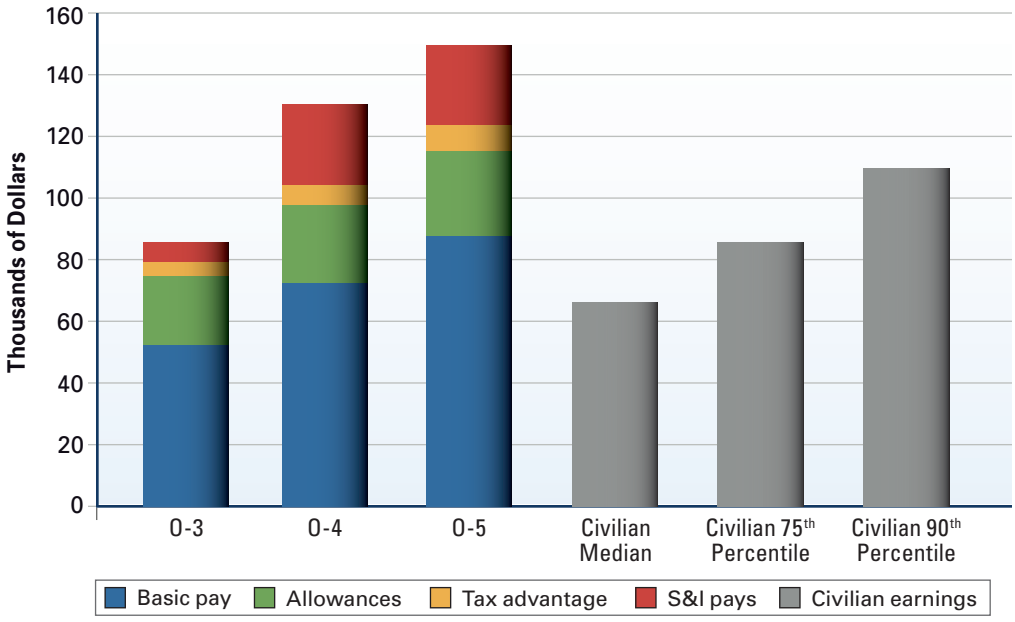
Compensation for clinical psychologists in the military is significantly greater than the median compensation levels of clinical psychologists in the civilian sector, as shown in Figure 18. In fact, military compensation is generally at or above the 75th percentile of civilian clinical psychologists for pay grades O-3, O-4, and O-5.

47. The civilian earnings estimates are from the Occupation Employment Statistics, which is a survey of establishments. It does include the self-employed. An estimate of the median earnings of psychiatrists from the American Medical Group Association (AMGA) for 2009 is $214,740. This latter estimate, however, is based on psychiatrists working in large multi-specialty groups and is, therefore, likely to be above the median earnings for all psychiatrists.



Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 17. Pay Comparison for Psychiatrists[48]

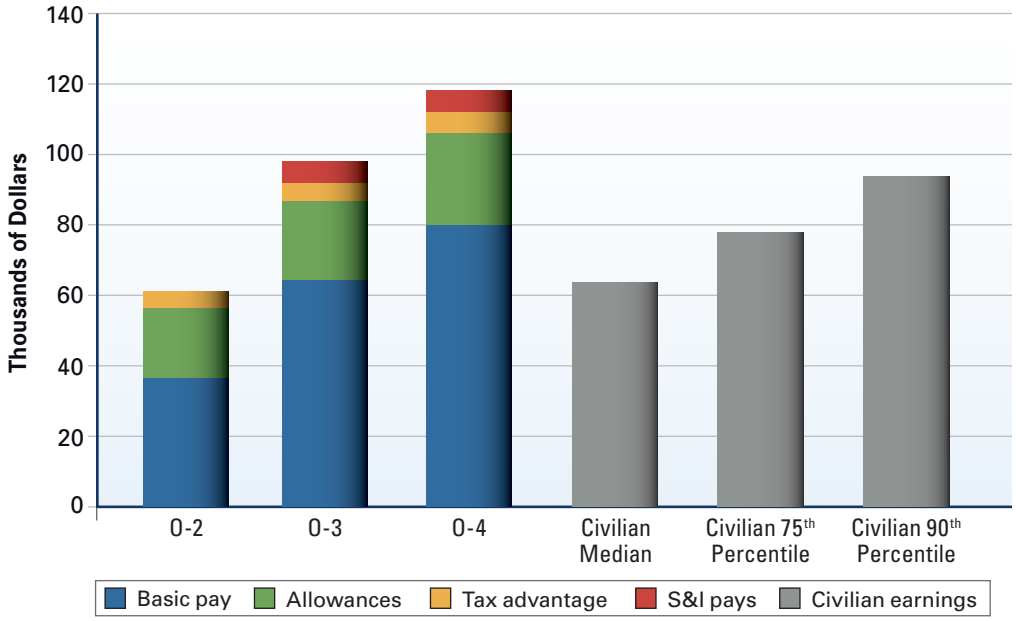


Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 18. Pay Comparison for Clinical Psychologists[49]

48. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

49 Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.



Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

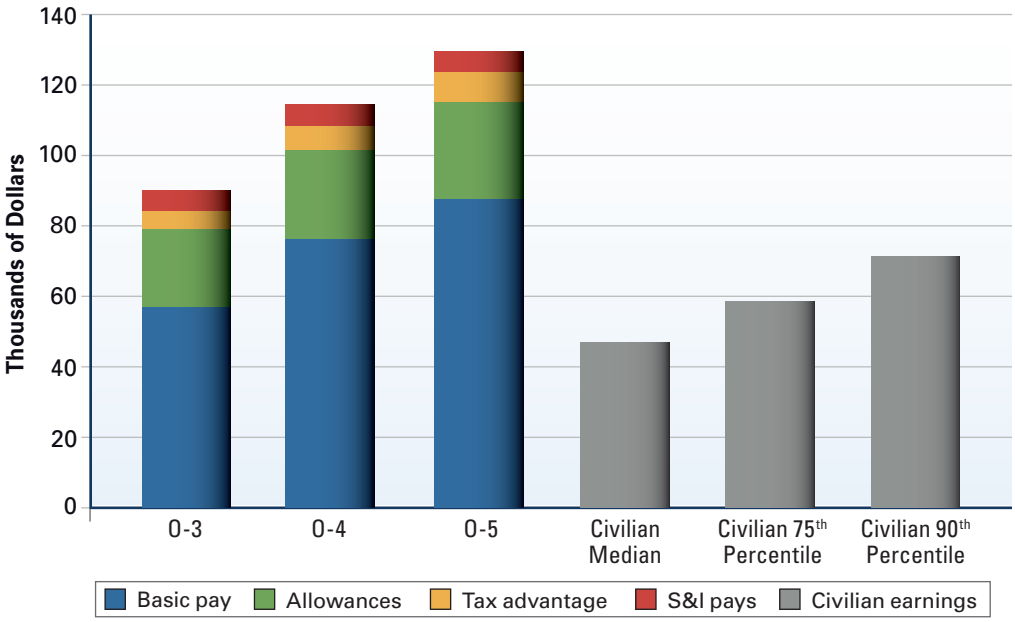
Figure 19. Pay Comparison for Mental Health Nurses[50]

Mental health nurses in the military are also compensated at or above the median levels for their civilian counterparts, as shown in Figure 19. Military mental health nurses are compensated at or above the median earnings of their civilian counterparts, and those in pay grades O-3 and O-4 are above the 75th percentile of civilian mental health nurse earnings.[51]

The final comparison of officer mental health professions is that of clinical social workers. Interestingly, the data in Figure 20 indicate that the compensation of military clinical social workers in pay grades O-3, O-4, and O-5 is above the 90th percentile of the earnings of civilian social workers.

50. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

51. The 2009 American Psychology Association Salary Survey estimates higher median earnings in 2009 for licensed clinical psychologists. Their estimate, based on 1,750 responses, was $87,000. For those with between six and nine years of experience, earnings were $75,000. The Occupational Employment Statistics, which indicates lower median earnings, is based on a survey of establishments, rather than individuals in the occupation. It is a broader survey and, arguably, more objective. However, it does exclude self-employed, who may have higher annual earnings that those who are salaried and working in establishments. See Finno, et al. (2010).

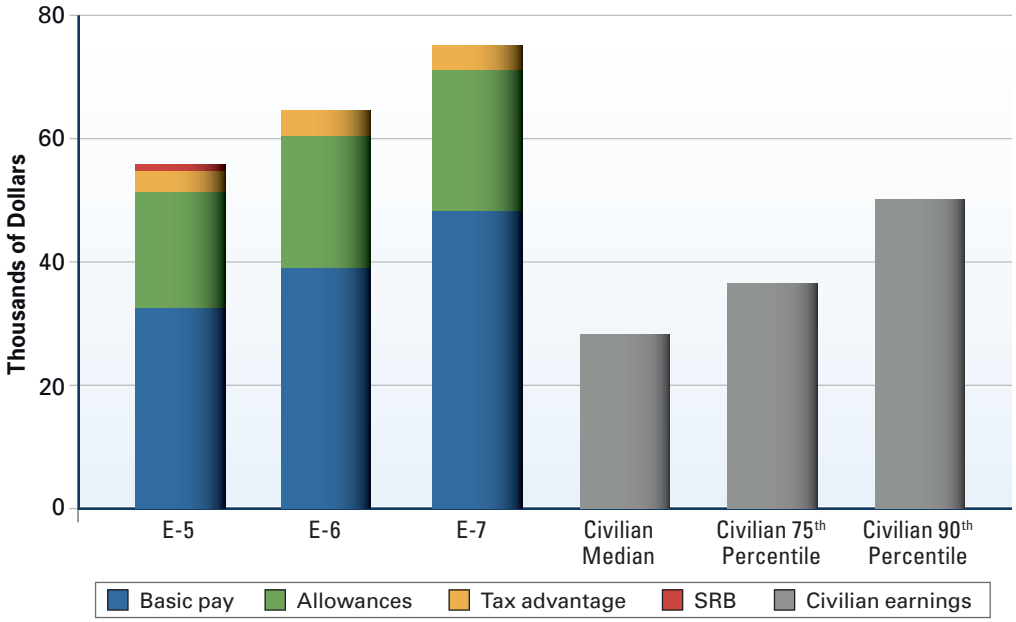


Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 20. Pay Comparison for Social Workers (Officers)[52]

Mental health professionals in the enlisted force have no obvious civilian sector counterpart. We compare them to a "psychiatric technician." From Figure 21, the earnings of enlisted mental health specialists in the military are significantly above those of psychiatric technicians. Psychiatric technicians may not represent the best comparison for enlisted mental health professionals. However, it is interesting to note that, were we to compare enlisted mental health specialists to civilian social workers, the earnings of enlisted mental health specialists would be above the median earnings of civilian social workers.

52. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.



Source: Occupational Employment Statistics for May 2009 (http://www.bls.gov/oes/oes_dl.htm) and *Selected Military Compensation Tables* (http://prhome.defense.gov/MPP/docs/GreenBook_2009.pdf)

Figure 21. Pay Comparison for Social Workers (Enlisted)[53]

Implication of Pay Comparisons

Compensation is only one dimension of an occupation. In addition, the civilian comparison occupations may not precisely capture the best alternative civilian opportunities of military mental health professionals. The pay comparisons do suggest, however, that the military should be able to compete successfully for mental health professionals in the civilian sector. Deployments, family separation, and related hardships make working conditions different in the military, compared to the civilian sector. The differences in compensation, however, are generally substantial, potentially offsetting these hardships.

The compensation differences do vary by type of health professional. The relative differences between military and civilian psychiatrists are not as great, for example, as that between military and civilian social workers. One implication of this is, as the military mental health workforce grows, it is likely to be relatively easier to grow in professions that have a greater relative compensation advantage compared to the civilian sector. In this case, if social workers can provide the mental health services

53. Military pay at the grades shown is computed at the mean year of service for that grade. Civilian earnings are based on the entire occupation. The experience level reflected in the civilian earnings estimate is the average experience of workers at the percentile shown in the comparison.

demanded by the Department of Defense, expansion of mental health services by increasing the number of social workers, relative to the numbers of psychiatrists or clinical psychologists, may provide a viable path.

Special and Incentives Pays and Retention of Mental Health Professionals

Compensation for both mental health officer and enlisted specialists is at or above comparable occupations in the civilian sector. However, non-pecuniary conditions, such as frequent deployments, complicate simple pay comparisons, and their implications for retention. For officer mental health professionals, current special and incentive pays and bonuses appear to be sufficient to maintain adequate retention. In general, the retention rates of officer mental health professionals are at or above the average retention for all officers in the respective service. Navy mental health specialties, however, experience somewhat lower retention. The recent addition of a graduated retention bonus for clinical psychologists and increases in Multi-year Specialty Pay (MSP) for psychiatrists have improved retention.

Figure 22 shows the retention rates for psychiatrists for each of the three services in FY 2010. Retention rates are generally at or above 80 percent, except for the Navy.

Similarly, retention rates for clinical psychologists in the Navy and Air Force are generally at or above 80 percent, dipping only slightly below 80 percent in years of

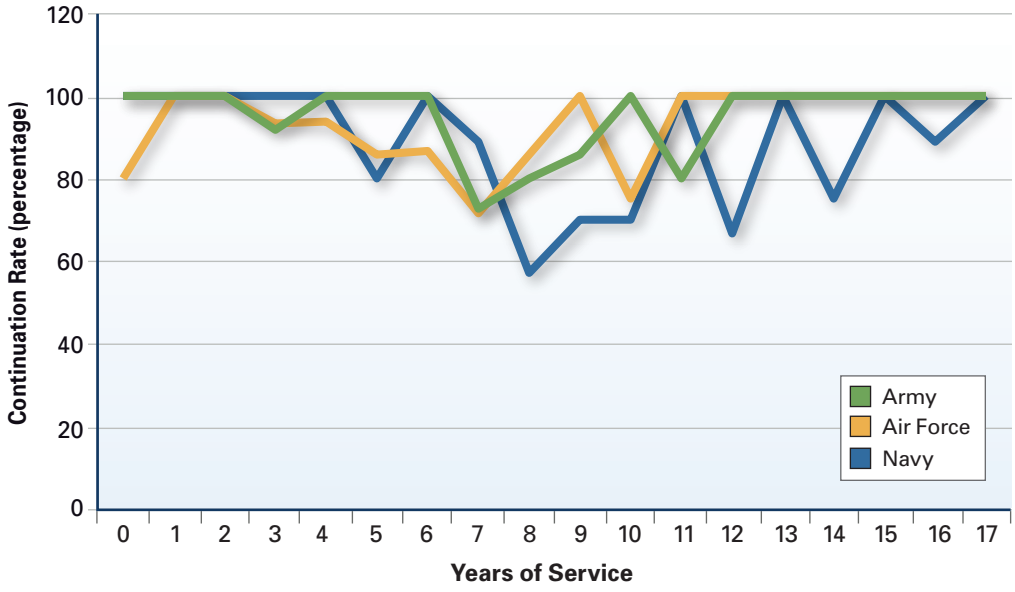


Figure 22. Psychiatrist Continuation Rates for Fiscal Year 2010

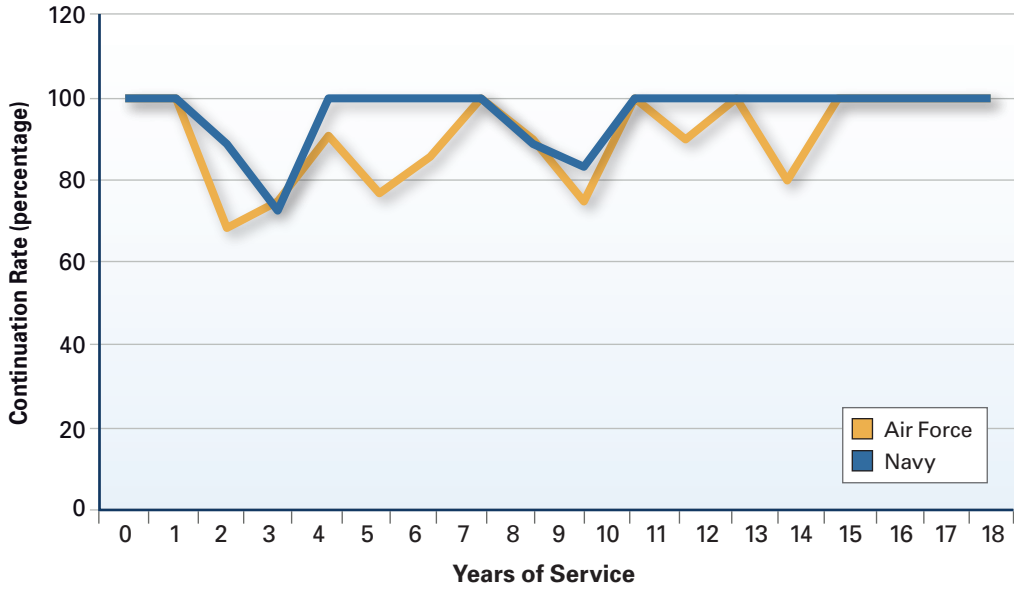


Figure 23. Clinical Psychologist Retention Rates for FY 2010[54]

service four and five, when initial obligated service is completed for many clinical psychologists (Figure 23).

Similarly, enlisted mental health specialists' compensation appears to be competitive with the civilian sector, leading to generally adequate retention rates. In Figure 24, retention rates in FY 2010 for the Army and Air Force are generally at or above 80 percent, with rates in the Army dipping to about 70 percent at year of service four—the first-term reenlistment point. Rates for Navy enlisted mental health specialists are generally lower than the other services throughout the range of years of service shown.

The Selective Reenlistment Bonus program provides flexibility to increase enlisted retention rates. In the case of the Navy enlisted mental health specialty, an increase in the Selective Reenlistment Bonus, which was set at an award level of zero in FY 2010, may improve retention in that occupation. Though significant growth is not currently planned for this specialty, its current (FY 2010) staffing relative to authorizations is only about 70 percent.[55]

54. Our data source, the Defense Manpower Data Center, could not break out retention behavior separately for Army clinical psychologists in that they were included with other non-physician mental health professionals.

55. In FY 2010, the Navy was offering an SRB only at Zone B (second-term reenlistment) for enlisted mental health specialists, and the award level was a 0.5 multiple, the lowest possible. Since that time, the SRB has been eliminated.

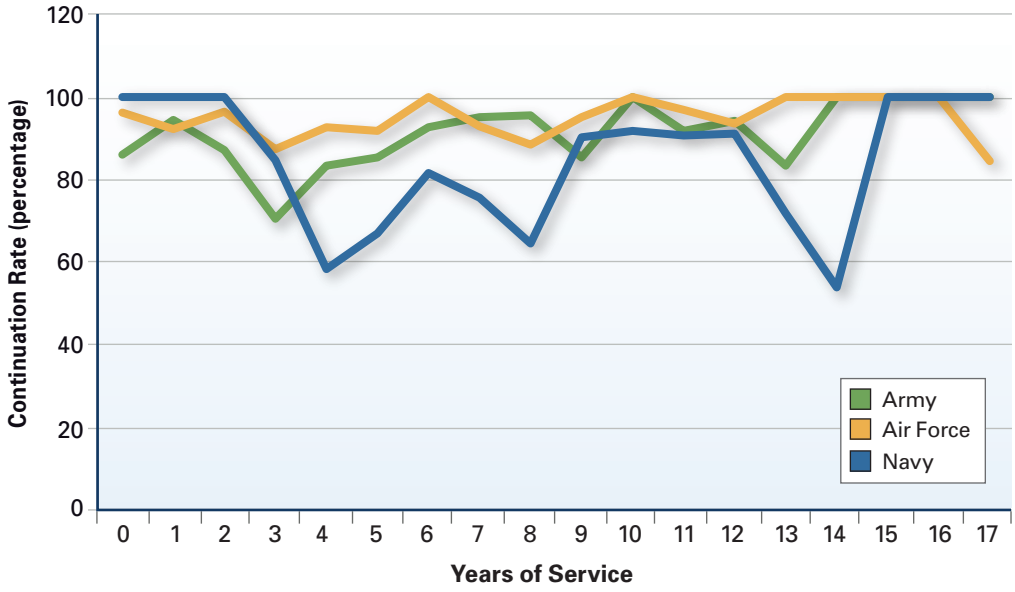


Figure 24. Enlisted Mental Health Specialty: Continuation Rates by Year of Service

Meeting the Growth Challenge: Can Special and Incentive Pays Be Applied More Aggressively?

For the most part, retention rates in most mental health specialties are adequate. Navy rates, as an exception, are generally lower than the other services'. This suggests that additional retention-related pay will have only a modest effect on retention rates and the ability to staff the increase in authorizations programmed for most specialties through FY 2015. This may change as the economy improves.[56]

Nevertheless, growth targets in many specialties are quite ambitious. Increased retention-related pay could reduce the accession burden necessary to grow for some specialties. Authorizations for psychiatrists are planned to grow by 10 percent in the Army and Navy, and by 12 percent in the Air Force. In the analysis below, we present the results of increasing the Multi-year Specialty Pay for psychiatrists by 25 percent, from $43,000 to $53,750 for a four-year commitment, on retention and on the accessions necessary to meet growth goals (Figures 25 through 27).

56. In general, there is likely to be more leverage for staffing growth through increased retention if underlying retention rates are low. Special and incentive pays can be used to improve retention even where retention is high. However, we would expect that the additional cost of improving retention rises at an increasing rate as retention rates rise. It will do so both because the rents to those who would have stayed without the increase in pay will rise, and because the supply curve for retention tends to become inelastic at high rates of retention. Hence, other ways of achieving increases in staff, such as training new entrants, are likely to become relatively more efficient for occupations with high retention rates. However, if additional staff is required urgently in the near term, increasing retention in occupations that enjoy high retention rates may be worth the cost.

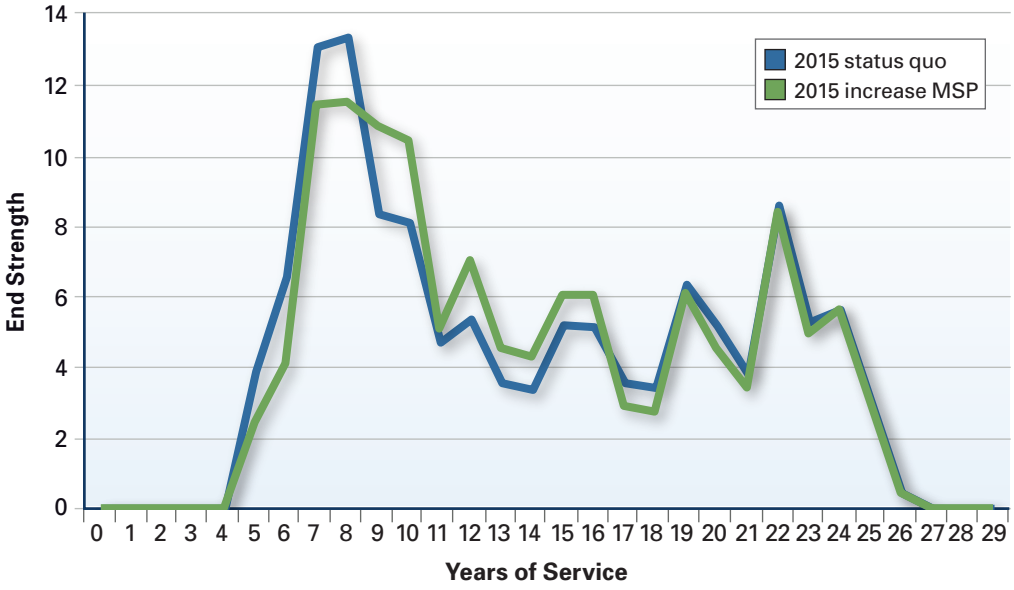


Figure 25. Effect of 25 Percent Increase in MSP on Navy Psychiatrist Retention

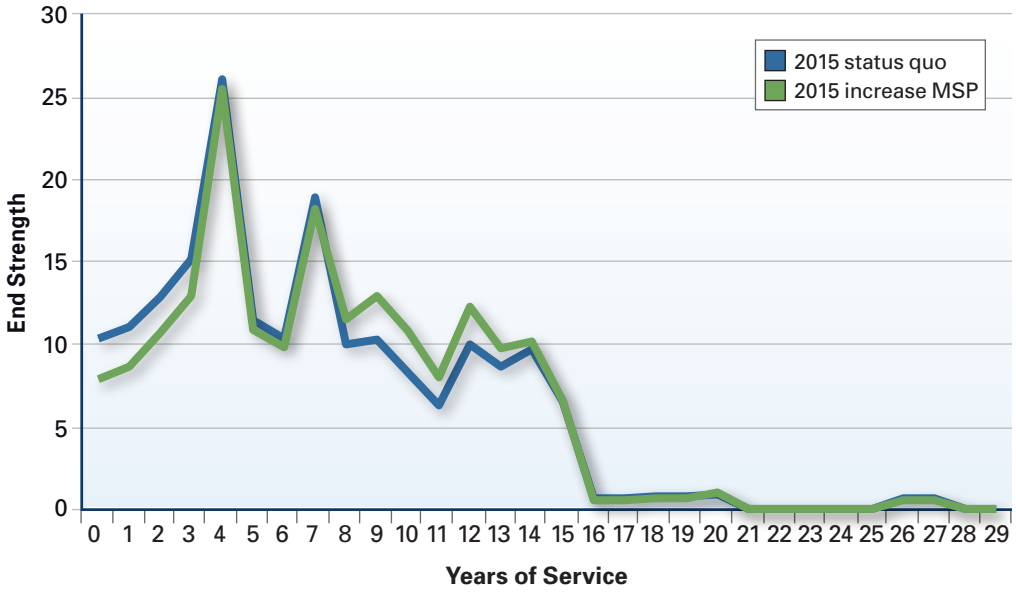


Figure 26. Effect of 25 Percent Increase in MSP on Army Psychiatrist Retention

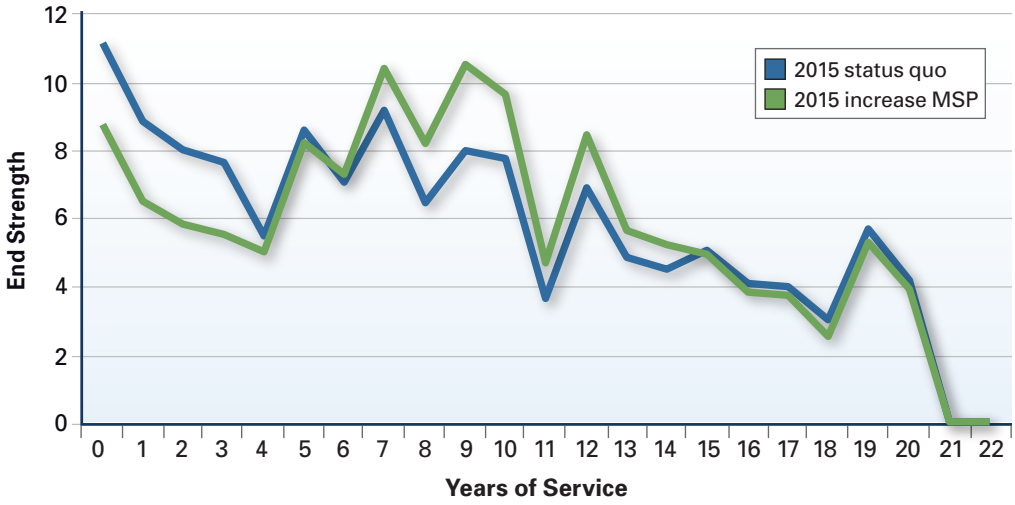


Figure 27. Effect of 25 Percent Increase in MSP on Air Force Psychiatrist Retention

Table 16 shows, under the assumption that accessions are calculated to exactly meet authorizations once retention losses are subtracted, how accession demand changes as the result of the increased retention due to the 25 percent increase in MSP for psychiatrists. Over the period FY 2012–FY 2015, accessions are 16 fewer for the Army, 19 fewer for the Navy, and 16 fewer for the Air Force as the result of the MSP increase.

Though the hypothetical increase in the MSP increases retention of psychiatrists and reduces accessions necessary to meet growth goals in each of the three services, the cost per added psychiatrist retained is substantial. We estimate that the marginal cost of an additional retained psychiatrist, resulting from a 25 percent increase in MSP, is approximately $309,000 for the Army, $462,000 for the Air Force, and $704,000

Table 16. Effect of a 25 Percent Increase in MSP on Psychiatrist Accessions

	Accession Demand	FY 11	FY 12	FY 13	FY 14	FY 15	Total
Army	Baseline	47	27	23	19	19	135
	MSP Increase	47	23	19	15	15	119
	Change in Accessions	0	-4	-4	-4	-5	-16
Navy	Baseline	20	15	14	15	18	82
	MSP Increase	20	10	10	10	13	63
	Change in Accessions	0	-5	-5	-5	-5	-19
Air Force	Baseline	7	13	15	17	18	70
	MSP Increase	7	9	11	12	14	55
	Change in Accessions	0	-4	-4	-4	-4	-16

Note: Column and row totals may not add due to rounding.

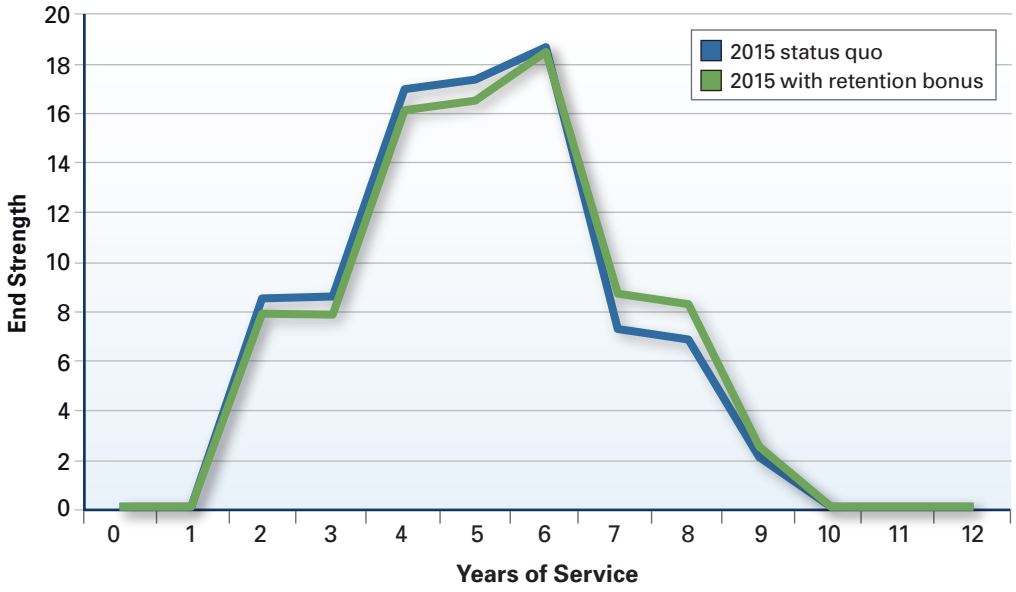


Figure 28. Effect of $10,000 per year Graduated Retention Bonus on Navy Social Worker Retention

for the Navy. These estimates suggest meeting growth goals for psychiatrists by increasing retention is quite costly.

Both the Navy and the Air Force plan a significant expansion in the use of social workers to help meet mental health demands. Recall that the Navy plans an increase of over 100 percent and the Air Force plans an increase of 40 percent in clinical social workers. The Department is considering a proposal to offer social workers a graduated retention bonus of $10,000 per year for a four-year commitment. The effect of this retention pay on retention of social workers is shown in Figure 28 and Figure 29. The effect, in absolute numbers, is relatively modest, especially for the Navy. The reason is that, though its authorizations are growing significantly, the Navy started with relatively few social workers in FY 2010.

The increase in retention from a graduated retention bonus for social workers will reduce the number of accessions necessary for the Navy and the Air Force to meet their growth requirements. This reduction is illustrated in Table 17. The cumulative reductions over the period are 3 for the Navy and 11 for the Air Force. The marginal cost of retaining an addition social worker over this period, using the proposed graduated retention bonus, is approximately $126,000 per additional social worker for the Navy and about $194,000 per additional social worker for the Air Force.

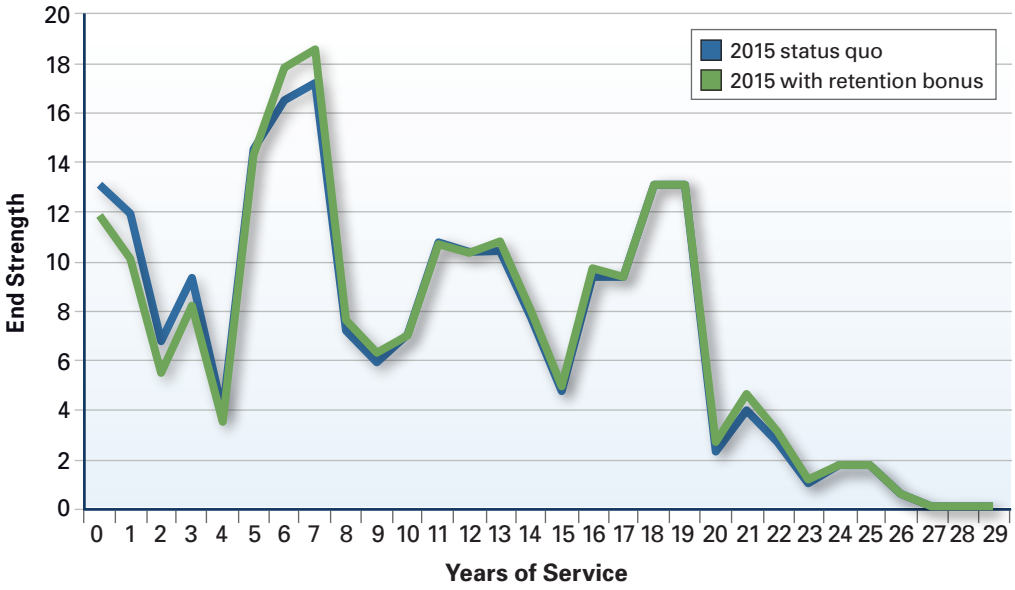


Figure 29. Effect of $10,000 per Year Graduated Retention Bonus on Air Force Social Worker Retention

Finally, recall that Navy enlisted mental health specialists were staffed well below authorized strength. We consider whether a two-level increase in the Selective Reenlistment Bonus for Navy mental health specialists, starting in FY 2012, would have a significant effect on retention and on the number of accessions required to meet authorized strength goals. The effect on retention is shown in Figure 30.

As illustrated in the chart, there is a shift toward greater experience and improved retention as a result of an increase in the SRB of two award levels. We have also estimated the reduction in accessions necessary to meet authorizations. Because of the improved retention resulting from the bonus increase, 102 fewer accessions

Table 17. Effect of a Graduated Retention Bonus on Social Worker Accession Demand

Accession Demand		FY 11	FY 12	FY 13	FY 14	FY 15	Total
Navy	Baseline	18	18	17	17	17	87
	MSP Increase	18	17	17	16	16	84
	Change in Accessions	0	0	0	-1	-1	-3
Air Force	Baseline	25	23	24	26	24	122
	MSP Increase	25	22	22	22	20	111
	Change in Accessions	0	-1	-2	-4	-4	-11

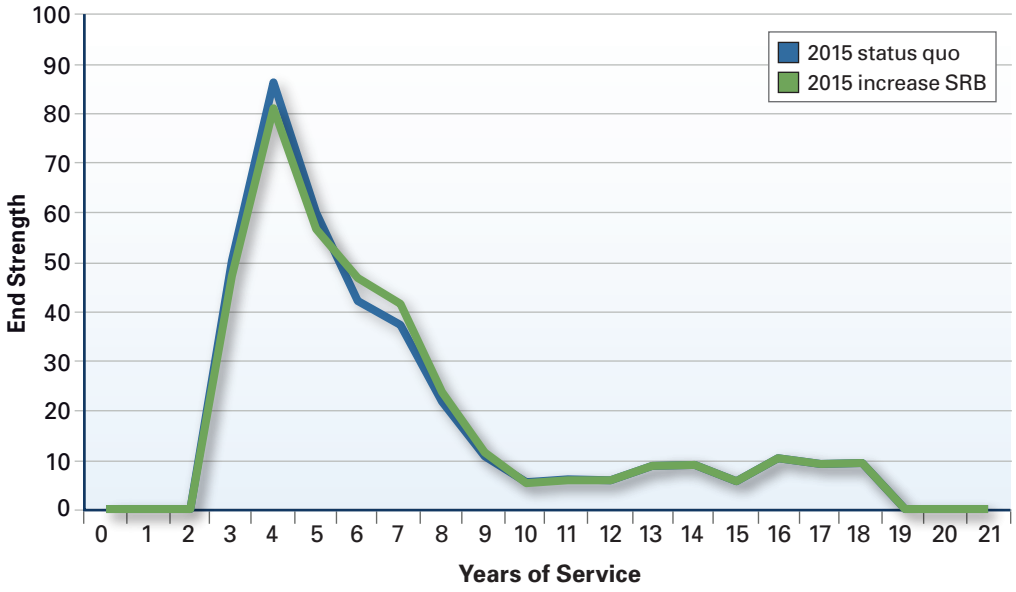


Figure 30. Effect of Two-Level Increase in Zone A SRB for Navy Mental Health Specialists Starting in FY 2012

would be necessary between FY 2012 and FY 2015 to meet strength goals. The marginal cost of retaining an additional Navy enlisted mental health specialist from a two-level increase in Zone A SRB is about $30,000.[57]

Selective Reenlistment Bonuses and Rising Marginal Costs

Increases in SRB can increase retention and reduce accessions necessary to meet strength goals. This is illustrated in the case of Navy enlisted mental health specialists, in the previous section. What is the "right" amount of SRB? Among the factors that affect efficiency of reenlistment bonuses, one is particularly important and applies to all or almost all occupations. This is the observation that the marginal cost of increasing the reenlistment bonus rises as the bonus itself is increased.

The marginal cost of a reenlistment due to a bonus increase is approximated as the increase in total costs associated with the bonus increase—the *increase* in the amount paid out—divided by the increase in reenlistments that result from the increase. As one increases the amount of the SRB, represented in the case of the Navy by an increase in the award level, higher amounts of the bonus will be paid to those who would have reenlisted in any case. Hence, the cost of obtaining one additional

57. If the marginal recruiting and training costs for Navy enlisted mental health specialists are greater than about $12,000, then increasing retention in the HM rating through a two-level increase in SRB is likely to reduce total costs in the long run, as well as improve staffing.

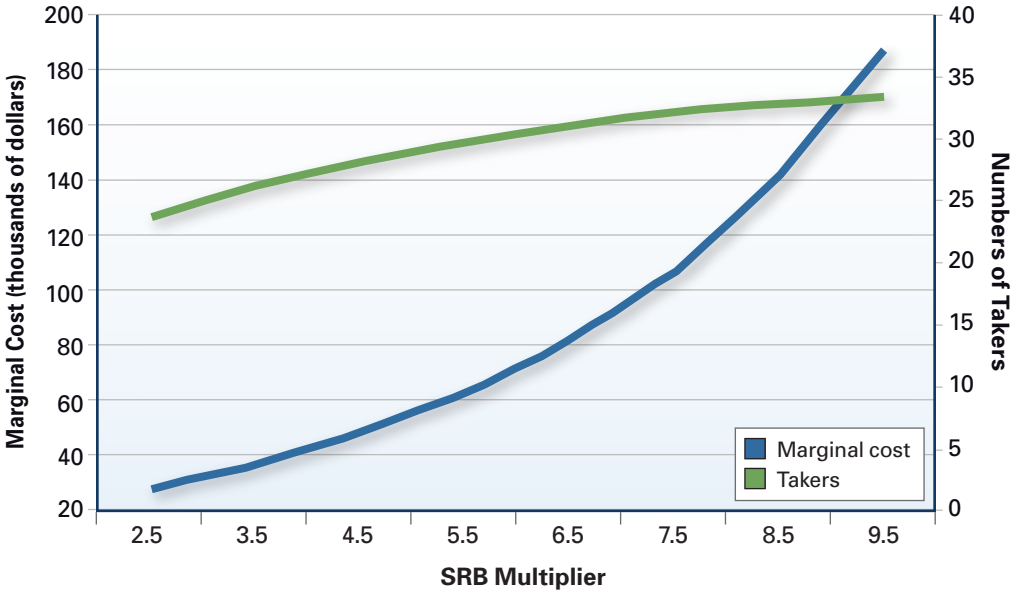


Figure 31. Rising Marginal Cost of Zone A SRB for Navy Mental Health Specialists

reenlistee by increasing the bonus rises because the added bonus increment is paid to increasing numbers who would have reenlisted anyway. A related reason that the marginal cost rises is that, at some point, the number of new reenlistments obtained for a given increase in the bonus begins to diminish. That is, as one moves up the notional reenlistment supply curve, the amount of additional reenlistments resulting from a given increase in the bonus will begin to decline eventually.

Both of these phenomena are shown in Figure 31 for the case of Navy enlisted mental health. The curve labeled "marginal cost" shows how the approximate marginal cost of an added reenlistment increases as the bonus is increased. Moving from an award level of 2.5 to an award level of 4.5 increases the marginal cost from about $30,000 per added reenlistment to about $37,000 per added reenlistment. The curve labeled "takers" shows the total number of Zone A reenlistments at each award level. Note that the slope of the curve diminishes as the bonus increases—fewer additional reenlistments are purchased as the bonus continues to increase.

What does this mean for the "optimal" reenlistment bonus? Additional (new) reenlistments become more costly to obtain as the bonus itself increases. The optimal amount of the bonus should be set at the point where the value of an additional reenlistment is just equal to the marginal cost. The value of an additional reenlistment will be related to the existing shortage in the skill, the importance of the skill to the mission, and the costs of obtaining additional staff in that skill through other means,

such as recruiting and training. In general, a higher reenlistment bonus, other things being equal, is efficient the greater the current or projected future shortage, the more important the occupation is to the overall mission, and the higher are the replacement costs—the costs of recruiting and training new entrants into the occupation.

Appendix 1 contains tables that illustrate the range of marginal costs for each of the four communities that we analyzed.

Role of Accessions in Meeting Demand Growth

The analysis conducted in this section suggests that a 25 percent increase in MSP for psychiatrists and the institution of a graduated retention bonus for social workers would have a relatively modest effect on retention and result in a modest reduction in accession requirements for psychiatrists and social workers, respectively. An increase in the SRB for Navy enlisted mental health professionals, however, has the potential to improve staffing significantly.

Based on our analysis of the potential for increases in special and incentive pays to increase retention, growth in the officer mental health professional workforce will require increasing the number of new entrants. Policies that increase retention will have only a modest effect over the next four years for the officer specialties.[58]

The services will largely meet their increased authorizations through accessions. Pipeline accessions, who are not fully trained, will be attracted by scholarship programs (HPSP), paid internships, and loan repayment. However, because of the lead times entailed in the scholarship programs, it is difficult to use these programs to meet unanticipated near-term requirements growth.[59] Fully trained direct accessions can be attracted through accession bonuses and loan repayment.[60] Moreover, because military compensation is competitive relative to pay for comparable mental health professions in the civilian sector, direct accession programs for trained mental health professionals are likely to be more successful than direct accession programs for other health professionals.

---

58. This is not inconsistent with an earlier study of health professions by the Center for Naval Analyses, regarding the tradeoff between increased retention through higher levels of special and incentive pays, and increased accessions. Brannman, et al. (2003), p. 46, concluded: "So, is it more cost-effective for DoD to add water to the bucket or to plug the holes? The results show that increasing accession subsidization results in small cost savings for all three communities, but reducing attrition through higher special pays is generally not cost-effective."

59. Similarly, medical school and other student appointments to the Uniform Services University of the Health Sciences (USUHS) are made in advance and will not flow back into operational positions for several years. Moreover, capacity at USUHS is largely fixed in the near term.

60. Because there is very little literature on the effects of accession bonuses for officer mental health specialties, and because there are currently no tools for estimating the optimal accession bonus, we are not able to recommend a specific accession bonus.

The services currently offer direct accession bonuses for most physician specialties, and to some non-physician health specialties. Psychiatrists may be offered an accession bonus of $272,000 for a four-year obligation, and clinical psychologists and social workers may be offered a direct accession bonus for a four-year commitment.[61]

There is very little literature on the effects of accession bonuses for officer health professions in general or mental health specialties in particular.[62] Brannman et al. (2003), in their analysis of accession bonuses for health professions, assumed an elasticity of 1.8, based on an analogy with enlisted recruiting. In the table below, we provide an estimate of the increase in the direct accession bonus that would be necessary to increase direct accessions by 10 percent. Because there is no empirical literature regarding the responsiveness of health profession accessions to an accession bonus, we provide the estimates under three different assumptions regarding the responsiveness to the bonus.

The measure of responsiveness is the pay elasticity. The pay elasticity, in this case, is defined as the ratio of the percentage increase in accessions that result from a one percent increase in military compensation relative to civilian earnings, over a four-year initial period of obligated service. The change in the accession bonus, then, is calculated to generate the necessary increase in military compensation to result in a 10 percent increase in accessions, given the assumed elasticity.

We calculate the accession bonus change at three values for the elasticity (Table 18). The highest, and most optimistic, elasticity is 1.5. This means that a 10 percent increase in military compensation, as defined above, results in a 15 percent increase in direct accessions. Because we are calculating the bonus increase necessary to induce a 10 percent increase in accessions, the bonus increase will be equivalent to only a 6.6 percent increase in compensation. The lowest, and most pessimistic, elasticity is 0.5. The literature on enlisted recruiting is consistent with a pay elasticity in the range of 0.8–1.0.

Table 18. Approximate Increase in Accession Bonus to Increase Direct Accessions by 10 Percent

Elasticity	Psychiatrist	Clinical Psychologist	Social Worker
1.5	$ 45,000	$20,000	$17,500
1.0	67,000	30,000	26,000
0.5	134,000	60,000	52,000

61. Assistant Secretary of Defense for Health Affairs (2010).

62. In part, this is because the number of direct accessions into the health professions each year is relatively modest. For example, a service will access fewer than 25 psychiatrists each year, only a portion of whom will be direct accessions. Most will enter under the Health Professionals Scholarship Program. This presents challenges for the usual econometric and statistical methods of estimating effects.

A strategy, in the absence of a research base, is to increase incentives flexibly over time in response to actual accession shortfalls, evaluate the response to the higher levels of incentives, and adjust incentive levels appropriately after evaluation. Our analysis indicates that military compensation for mental health professionals is competitive with the civilian sector. Hence, it is prudent to begin with relatively modest increases in accession incentives, increasing them only as experience suggests that it is necessary.

It is important that the services maintain data on the incentives offered and the results, so that a more systematic empirical analysis of effectiveness and optimal structure can be conducted in the future. Nevertheless, this will be a difficult task because most of the officer health professions are relatively small, with fewer than 30 direct accessions required each year, making traditional econometric or statistical methods of analysis difficult.

Special and Incentive Pay Policy: Consolidation for Health Professions

The number of special and incentive pays offered to health professionals, including mental health professionals, is large. There is a proposal to consolidate all, or most, of S&I pays offered to health professionals into two general types of pay:

- incentive pay and
- retention pay

This consolidation is consistent with the National Defense Authorization Act for FY 2008. Moreover, it has the potential to simplify and, perhaps, improve efficiency of S&I pays.

One policy that should be reexamined, however, is the requirement for uniformity across the services in S&I pays for a particular health specialty. Equals should be treated equally, but circumstances may vary across the services for the same profession. These circumstances could include deployment and family separation, as well as the service's plans to increase staffing in a particular specialty. One of the most valuable features of S&I pays is the flexibility to target particular issues or problems. This flexibility would be lessened if the pay were required to be the same across the services. Retention pay, in particular, may be less effective if it cannot adjust, at least temporarily, to service-specific factors, such as growth in demand or frequency of deployment. Consolidation of pays is an important and potentially efficient change to special and incentive pays, but flexibility in the application of the pay should be maintained.

Conclusions and Recommendations

Demand is growing significantly between FY 2010 and FY 2015 for most mental health specialties. Demand for psychiatrists is growing by 10–12 percent for the three services. Non-physician officer specialties are growing by 25–40 percent across the three services. In general, the services have growth goals for mental health professionals that are consistent with the requirements of the NDAA for FY 2010.

Moreover, staffing compared to authorization in FY 2010 appears to be at or above 90 percent for most mental health professions and for most services. An exception is Navy enlisted mental health, which had a significant shortfall in FY 2010, and Navy officer mental health professions, which were staffed at about 76 percent in that year. The Navy believes it has the policies and resources in place to improve its staffing significantly relative to authorizations over the next two years, despite a significant increase in officer authorizations. These include a recent increase in the Multi-year Special Pay for psychiatrists, the graduated retention bonus for psychologists, and an increased use of social workers. The Navy is also considering a graduated retention bonus for social workers. Because military compensation for these mental health specialties is very competitive with civilian compensation, the Navy's growth plans for officer mental health specialties are likely to be successful.

Social workers have the greatest percentage growth in the Air Force and Navy. Because the compensation offered by the services for social workers is quite competitive with civilian compensation for this mental health specialty, the services are likely to achieve their goals for increased numbers of social workers.

Military pay, to include S&I pays, for mental health professionals is generally at or above median earnings for comparable civilian mental health professions. Simple comparisons, however, do not account for deployment and other conditions of military service. Retention rates for most mental health specialties are adequate, though retention rates for Navy enlisted and some officer specialties are below those of the other services. Current S&I pays appear to provide satisfactory incentives for managing the force. To meet growth goals, however, the services will have to attract significant numbers of new entrants, largely through direct accession programs. Increased retention will have only a modest effect for officer specialties.

We offer the following recommendations regarding compensation of mental health professionals:

1. To meet the growth goals for mental health professionals over the next five years, the services should consider expanding efforts to recruit trained professionals using loan forgiveness and accession bonuses. We provide some rough estimates of the bonus increases necessary to increase direct accessions, but there had been very little research on this issue. We recommend that the services retain data on accession incentive offers and results so that they can be systematically evaluated.
2. Consolidation of health professions pay into incentive pay and retention pay is consistent with overall simplification and greater efficiency the services should move in this direction. However, retention pay should be applied more flexibly to meet service-specific issues, such as deployment frequency and growth demands, and not be constrained necessarily to be the same across the services for the same specialty in all cases.
3. The services should consider greater use of SRB to mitigate shortfalls and to help meet growth goals in the enlisted mental health specialties. The Navy can improve retention and staffing in its enlisted mental health specialty by using the Selective Reenlistment Bonus more aggressively in that rating. Currently, the bonus level is zero in that specialty. A two-level increase in SRB would allow the Navy to meet its staffing goals in that specialty, and reduce accession requirements into that specialty by over 100 between FY 2012 and FY 2015, substantially reducing recruiting and training costs.

Appendix 1. Marginal Effects of Changes in S&I Pays by Community

Table 19 and Table 20 are provided to demonstrate the range of marginal costs for increases in S&I pays for each of the communities included in the analysis. For enlisted communities, we simulated a 25–100 percent increase in SRB and calculated the average marginal cost. For communities that had no current SRB, we simulated increases from a baseline of either $5,000 (Army, Marine Corps) or multiplier level 2 (Navy, Air Force). For officer communities, we simulated increases of 10–40 percent in all S&I pays for a range of five years of service starting at completion of the initial service obligation. We noted cases in which we were unable to compute a marginal cost estimate, typically because there were insufficient data (e.g., a new community), or the marginal cost estimate approached infinity (when additional increases in pay produced no gains in retention).

Table 19. Average Marginal Cost of Additional Stayer Increase in SRB for Enlisted

Occupation/ Service	MOS	Zone	25% Increase	50% Increase	75% Increase	100% Increase
Special Operations						
Army	18 B-F	Zone A	$103,988	$110,825	$158,155	$ 166,227
		Zone B	90,140	101,555	115,076	130,231
		Zone C	121,400	142,130	167,246	200,309
	18Z	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	†	†	†	†
Air Force	1C2X1	Zone A	70,753	84,212	91,915	108,048
		Zone B	29,502	30,822	47,666	48,609
		Zone C	32,207	48,801	48,907	97,492
	1T2X1	Zone A	41,157	45,535	50,264	55,465
		Zone B	64,390	79,473	90,478	111,727
		Zone C	†	†	†	†
Marine Corps	0211	Zone A	†	†	†	†
		Zone B	79,749	118,231	190,773	341,143
		Zone C	50,182	75,766	122,081	218,308
	0291	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	†	†	†	†
	0321	Zone A	117,009	162,595	253,019	452,475
		Zone B	132,591	209,512	383,377	817,552
		Zone C	135,839	207,627	355,712	755,472
	2336	Zone A	162,100	240,266	411,336	605,811
		Zone B	124,594	217,479	444,207	1,001,222
		Zone C	72,787	126,894	233,534	441,437

Table 19. Average Marginal Cost of Additional Stayer Increase in SRB for Enlisted (CONTINUED)

Occupation/ Service	MOS	Zone	25% Increase	50% Increase	75% Increase	100% Increase
Navy	EOD-All	Zone A	324,003	597,754	1,161,224	2,369,920
		Zone B	358,269	707,884	1,492,299	3,262,504
		Zone C	124,021	208,092	390,611	791,453
	ND-All	Zone A	43,326	52,671	65,721	85,687
		Zone B	223,481	312,912	447,931	680,654
		Zone C	89,060	115,367	151,549	199,071
	SB-5352	Zone A	108,378	141,955	193,159	272,867
		Zone B	81,249	113,352	164,960	254,205
		Zone C	77,067	131,807	220,415	378,286
	SO-5326	Zone A	71,587	117,114	204,090	378,077
		Zone B	308,933	584,934	1,191,869	2,590,580
		Zone C	309,629	585,008	1,207,985	2,660,043
Remotely Piloted Vehicles						
Army	15W	Zone A	$13,019	$14,254	$15,063	$16,239
		Zone B	30,348	33,624	37,477	40,684
		Zone C	43,522	47,215	50,921	53,155
Marine Corps	7314	Zone A	22,103	25,269	28,451	31,733
		Zone B	†	†	†	†
		Zone C	†	†	†	†
Linguists						
Marine Corps	2671	Zone A	$ 79,101	$103,907	$144,124	$217,850
		Zone B	31,800	48,587	82,862	160,186
		Zone C	†	†	†	†
	2673	Zone A	125,485	176,267	268,670	458,648
		Zone B	†	†	†	†
		Zone C	†	†	†	†
	2674	Zone A	31,495	37,976	45,548	55,456
		Zone B	29,196	40,796	59,971	94,722
		Zone C	†	†	†	†
	2676	Zone A	81,138	102,106	136,909	185,007
		Zone B	†	†	†	†
		Zone C	†	†	†	†
Army	09L	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	†	†	†	†
	35P	Zone A	22,090	24,286	26,610	28,844
		Zone B	48,643	54,468	60,515	67,112
		Zone C	53,977	63,280	75,535	86,513

Table 19. Average Marginal Cost of Additional Stayer Increase in SRB for Enlisted (CONTINUED)

Occupation/ Service	MOS	Zone	25% Increase	50% Increase	75% Increase	100% Increase
Air Force	1A8X1	Zone A	54,156	60,673	67,428	75,120
		Zone B	111,802	130,943	157,541	187,101
		Zone C	29,878	36,111	41,534	51,322
	1N3X1	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	†	†	†	†
	9L0000	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	†	†	†	†
Navy	CTI-9216	Zone A	$21,768	$25,565	$30,129	$35,913
		Zone B	54,358	66,612	83,199	102,217
		Zone C	†	†	†	†
	CTI-9209	Zone A	21,751	25,655	30,730	37,422
		Zone B	†	†	†	†
		Zone C	†	†	†	†
	CTI-9211	Zone A	9,012	10,009	11,109	12,021
		Zone B	15,276	16,934	18,569	20,095
		Zone C	†	†	†	†
	CTI-9212	Zone A	14,458	15,705	17,709	19,591
		Zone B	54,208	60,474	74,806	82,744
		Zone C	†	†	†	†
	CTI-9203	Zone A	7,431	9,333	11,697	15,206
		Zone B	10,145	13,716	14,904	19,630
		Zone C	25,654	30,133	31,253	36,826
	CTI-9201	Zone A	†	†	†	†
		Zone B	†	†	†	†
		Zone C	30,660	38,389	39,402	49,914
Mental Health						
Army	68X	Zone A	$ 12,999	$ 13,171	$ 14,027	$ 14,906
		Zone B	24,415	25,716	27,025	28,340
		Zone C	†	†	†	†
Air Force	4C0X1	Zone A	66,512	75,865	87,381	100,289
		Zone B	81,294	99,482	119,417	139,365
		Zone C	67,721	77,389	104,183	125,680
Navy	HM-8485	Zone A	26,120	29,112	32,196	35,366
		Zone B	91,264	101,438	107,682	120,415
		Zone C	147,594	154,422	156,795	160,483

† Unable to calculate marginal cost

Table 20. Average Marginal Cost of Additional Stayer—Increase in S&I Pays for Officers

Occupation/Service	MOS	10% Increase	20% Increase	30% Increase	40% Increase
Special Operations					
Army	18A	†	†	†	†
Air Force	11S	$1,768,000	$1,835,000	$1,989,000	$2,069,000
	12S	2,226,000	2,746,000	3,518,000	4,588,000
	13D	119,000	120,000	146,000	148,000
Marine Corps	0210	†	†	†	†
Navy	114X	558,000	629,000	690,000	761,000
	113X	401,000	421,000	444,000	469,000
Remotely Piloted Vehicles					
Navy	131X	$1,190,000	$1,274,000	$1,362,000	$1,461,000
	132X	1,579,000	1,699,000	1,834,000	1,958,000
Air Force	18X	†	†	†	†
	11U	535,000	571,000	601,000	632,000
	12U	†	†	†	†
Mental Health					
Psychiatrists					
Army	60W	$ 642,000	$2,453,000	$22,528,000	*
Air Force	44P	1,008,000	4,199,000	32,255,000	*
Navy	210X	1,365,000	2,060,000	3,260,000	*
Psychologists					
Army	67D	912,000	1,111,000	1,349,000	1,635,000
Air Force	42P	545,000	649,000	772,000	909,000
Navy	230X	776,000	925,000	1,106,000	1,318,000
Mental Health Nurse					
Air Force	46P	303,000	324,000	344,000	363,000
Navy	290X	187,000	186,000	194,000	202,000
Social Worker					
Air Force	42S	66,000	67,000	81,000	82,000
Navy	230X	125,000	170,000	175,000	179,000

† Unable to calculate marginal cost
* Marginal cost calculation approaches infinity

Appendix 2. Occupational Specialty Codes Included in the Analysis

Enlisted Communities			
Special Operations	Army	Special Forces	18B-18F
		Special Forces Senior Sergeant	18Z
	Navy	EOD	NEC 5333-5337
		Diver	NEC 5341-5342
		SWCC	NEC 5352
		SEAL	NEC 5326
	Air Force	Combat Control	1C2X1
		Pararescue	1T2X1
	Marine Corps	Counterintell/HUMINT	211
		Intell Chief	291
		Reconn Man	321
		EOD Tech	2336
Linguist/Translators	Army	Interpreter/Translator	09L
		Cryptologic Linguist	35P
	Navy	Cryptologic Technician Interpretive – Arabic	NEC 9216
		Cryptologic Technician Interpretive – Persian	NEC 9209
		Cryptologic Technician Interpretive – Chinese	NEC 9211
		Cryptologic Technician Interpretive – Korean	NEC 9212
		Cryptologic Technician Interpretive – Spanish	NEC 9203
		Cryptologic Technician Interpretive – Russian	NEC 9201
	Air Force	Airborne Cryptologic Language Analyst	1A8X1
		Cryptologic Language Analyst	1N3X1
		Interpreter/Translator	9L000
	Marine Corps	Cryptologic Linguist, Middle East	2671
		Cryptologic Linguist, Asia-Pacific	2673
		Cryptologic Linguist, Western Europe	2674
		Cryptologic Linguist, Eastern Europe	2676
Mental Health	Army	Mental Health Specialist	68X
	Navy	Psychiatry Technician	HM 8485
	Air Force	Mental Health Service	4C0X1
RPV Operator	Army	Unmanned Aerial Vehicle Pilot	15W
	Marine Corps	UAV Operator	7314

Officer Communities			
Special Operations	Army	Special Forces Officer	18A
	Navy	Special Operations Officer (Explosive Ordnance Disposal)	114X
		Special Warfare Officer (SEAL)	113X
	Air Force	Special Ops Pilot	11S
		Special Ops Combat Systems Officer	12S
		Control and Recovery	13D
	Marine Corps	CI/HUMINT Operations Officer	0210
Mental Health Professionals	Army	Medical Corps – Psychiatrist	60W
		Medical Services Corps – Behavioral Sciences	67D
		Nurse Corps – Mental Health Nurse	66C
	Navy	Medical Corps – Psychiatrist	210X
		Medical Service Corps – Clinical Psychologists	230X
		Medical Service Corps – Clinical Social Worker	230X
		Nurse Corps – Mental Health/Mental Health NP	290X
	Air Force	Clinical Psychologist	42P
		Clinical Social Worker	42S
		Psychiatrist	44P
		Mental Health Nurse	46P
RPV Operator	Navy	Pilot	131X
		Naval Flight Officer	132X
	Air Force	Remotely Piloted Aircraft Pilot	18X
		Remotely Piloted Aircraft Pilot	11U
		Remotely Piloted Aircraft Pilot	12U

References

Assistant Secretary of Defense for Health Affairs. 2010. *Memorandum from the Office of the Assistant Secretary of Defense, Health Affairs, Dr. George Peach Taylor, Acting Assistant Secretary. Subject: Policy for implementing the Critically Wartime Specialty Accession Bonus for Medical Officer and Dental Specialist Officers.* November 29.

Assistant Secretary of Defense for Health Affairs. 2011. *Mental health personnel required to meet the needs of service members, retired members, and dependents: Report to Congress.* February.

Brannman, S., E. Christensen, R. Nickel, C. Rattelman, and R. Miller. 2003. *Life cycle costs of selected uniform health professions. Phase II: Impact of constraints and policies on optimal mix of accessions model.* Alexandria, Va.: Center for Naval Analyses.

Finno, A., D. Michalski, B. Hart, M. Wicherski, and J. Kohout. 2010. *Report of the 2009 APA Salary Survey.* Washington, D.C.: APA Center for Workforce Studies. May.

Haddal, C. and J. Gertler. 2010. *Homeland security: Unmanned aerial vehicles and border surveillance.* RS21698. Washington, D.C.: Congressional Research Service.

Mackin, P., J. Blayne, P. Hogan, B. Simonson, and R. Ugrinic. 2007. *Redesigning foreign language proficiency pay: Final report.* Contract No.: W74V8H-05-P-0719. Annandale, Va.: SAG Corporation.

Magnuson, S. 2010. Future remotely piloted aircraft will do more than surveillance. *National Defense.* http://www.nationaldefensemagazine.org/archive/2010/March/Pages/RemotelyPilotedAircraft.aspx.

McFall, R. 2006. Doctoral training in clinical psychology. *Annual Reviews in Clinical Psychology* 2: 21–49, p. 26.

Chapter 5

Evaluation of the Effect of CSRB Offered to Retirement-Eligible Special Forces Personnel

John T. Warner

Introduction

Over the period of the all-volunteer force (AVF), the U.S. Department of Defense (DOD) has made frequent use of bonuses to manage retention of personnel in hard-to-retain occupations. Retention bonuses have been paid to both officers and enlisted personnel, and the bulk of the bonuses have been paid to personnel at the end of their initial service obligation or at the end of the following period of commitment. There is now a substantial literature analyzing the retention effects of the Selective Reenlistment Bonus (SRB), which is paid to enlisted personnel in Zone A (2–6 years of service), Zone B (7–10 years of service), and Zone C (11–14 years of service).[1]

The National Defense Authorization Act for 2001 gave the Secretary of Defense the authority to designate certain skills as "critical" and permitted payment of retention bonuses of up to $200,000 to personnel with critical skills. The bonus was therefore named the Critical Skills Retention Bonus (CSRB). The CSRB differed from previous bonuses such as SRB by permitting larger payments. And unlike previous bonuses, CSRB was authorized for personnel with more than 14 years of service (YOS).

Faced with the problem of growing its Special Operations Force (SOF) in light of events in Afghanistan and Iraq, on October 1, 2002 the Army began paying CSRB to certain SOFs who had between 20 and 25 years of service, i.e., to personnel who were retirement-eligible.[2] SOFs could apply for CSRB after reaching the 19½-year mark and could obligate on a per-year basis beyond the 20-year point out to the

1. Asch, Warner, and Hosek (2007) review the literature on the retention effects of SRBs and Asch et al. (2010) provide an original analysis of SRB effects using data spanning the period of operations in Iraq and Afghanistan.

2. Army Milpers Message 02-256, dated September 27, 2002.

The views expressed in this paper represent those of the author and are not necessarily those of the Department of Defense.

Retention Control Point (RCP) for their rank. Thus, if the RCP was 24 years, they were eligible to receive CSRB for a maximum of four years. CSRBs were paid in a lump-sum based on the agreed-upon additional obligated service. Those in the rank of E-7 (Sergeant First Class) were authorized a bonus of $10,000 per additional year of obligated service, while those in the rank E-8 (Master Sergeant) were authorized a CSRB of only $8,000 per year of additional obligated service. Those in the rank of E-9 were not eligible for CSRB.

On January 1, 2005, the Army overhauled its CSRB program for SOF personnel.[3] The first step in the overhaul was to allow personnel to apply for CSRB at the 18½-year mark, with additional obligated service countable for bonus purposes to begin at the start of the 19th year of service rather than the 20th. This step implied that the first year of obligated service for someone just beginning YOS 19 was a year the individual would have had to serve anyway to attain retirement eligibility. The second step was to allow CSRB recipients to obligate to the end of their 25th year of service, thereby deferring their RCP if the RCP for their rank was less than YOS 25.[4] The third step was to require a minimum two-year commitment from the contract date for receipt of CSRB. The fourth step was to make E-9s eligible for CSRB. Finally, the January 2005 overhaul changed the bonus amounts, which are displayed in Table 1. These same bonus amounts have been in effect since then.

For an E-7 beyond YOS 19 who had not yet selected CSRB, the new program actually reduced the value of a two-year obligation from $20,000 to $18,000. However, it must be remembered that for someone at YOS 19, the new program effectively reduced by one year the obligated service required to attain the same total service at separation. Thus, under the new program an E-7 obligating for two additional years of service at the 19-year mark would receive an $18,000 CSRB; under the old program an E-7 at the 20-year mark would receive a $10,000 CSRB for one additional year. Thus, the payoff for the same total career length was increased by $8,000; furthermore, personnel got the bonus a year earlier under the new program.

Table 1. CSRB Award Amounts by Additional Obligated Service (Effective January 2005)

Additional Obligated Service	2 Years	3 Years	4 Years	5 Years	6 Years
Amount	$18,000	$30,000	$50,000	$75,000	$150,000

3. Army Milpers Message 04-356, dated December 30, 2004.

4. On January 31, 2006 the Army raised the RCP for E-7s from 22 to 24 years (Department of the Army, 2006). This implied that E-7 SOFs receiving CSRB in the period prior to January, 2005 would have been eligible to receive CSRB for a maximum of two years, with a maximum implied amount of $20,000. The E-8 RCP was YOS 26 throughout 2001–2009 and the E-9 RCP was 30 years. Personnel in these ranks would therefore have been eligible to receive the full five years' worth of CSRB in the 2003–2004 period.

For E-7s, the modal rank at YOS 20, the program significantly raised the payoff for longer periods of total active service compared to the older program. Under the older program, an E-7 committing to four additional years at YOS 20 would receive a CSRB of $40,000. Under the revised program, an E-7 committing to five additional years at the 19-year mark and remaining for a 24-year career would receive a CSRB of $75,000. Similarly, the value of a 25-year career was increased from $50,000 under the old program to $75,000 under the new program. Most significantly, the maximum CSRB value for a 25-year career was raised by $100,000, from $50,000 to $150,000. Furthermore, due to relaxation of up-or-out points, the revised program made career lengths possible that were not possible under the prior program.

Since under the older program E-8s received smaller CSRB amounts than E-7s, the revised program provided even larger increases for them. And since E-9s were not eligible for CSRB under the older program, the amounts shown in Table 1 reflect the increases they received under the revised program.

The CSRB program for Army SOFs represents the first time that retention bonuses have been aimed at retirement-eligible personnel, and not much analysis has been done of its effects on retention and cost. The purpose of this chapter is to study the retention effects of the program and to estimate its cost.

Methodology

Most analyses of the retention effects of military compensation formulate and estimate an economic model of retention decision-making which includes as an explanatory variable a variable measuring the economic incentive to remain in service.[5] A complication for the formal modeling approach is that the CSRB amounts that retirement-eligible SOF personnel faced were not changing randomly or smoothly for different personnel at different points in time. The CSRB was introduced at a low level in 2003 and then dramatically scaled up once-and-for-all in January of 2005. Because so many things were changing at the same time before and after the CSRB expansion, it would be difficult to identify the retention effect of the CSRB increase based simply on analysis of how retention of SOF personnel changed upon program expansion.

Although direct estimation of the retention effect of CSRB from SOF retention data alone is not likely to reveal its true effect, there is a relatively simple method of analysis that is more likely to do so. The method, called difference-in-differences (DID), is easy to implement without formal economic modeling. It says to compare

5. Descriptions of these models are available in Asch et al. (2007), as well as other references cited in that review.

changes in SOF retention before and after the CSRB expansion with changes in retention of an otherwise similar control group that was not eligible for CSRB. To the extent that retention changes of both groups are subject to common retention shocks arising from factors other than the CSRB, this method will "difference out" these common shocks and thereby identify the true bonus effect.

Due to the fact that Army SOF personnel are highly selected and trained, one might argue that there is no perfect control group for a DID analysis. However, an arguably good control group is Army Career Management Field 11 (CMF 11, Infantry). SOF personnel are selected from CMF 11 and personnel in CMF 11 often work under the same conditions as SOF personnel, and furthermore have similar deployment tempos. The analysis below attempts to identify the retention effects of CSRB using retirement-eligible Infantry personnel as a control group. Two DID methods are implemented below, a simple DID estimator and a regression-based estimator. These methods are now briefly described.

Simple DID Estimator

In the ideal framework for DID estimation, there exist two groups of individuals, a control group and a treatment group. Individuals of each group are observed during some period of time before the treatment is applied (base period) and then for a period of time after the treatment is applied. The variable $Y_{i,t,j}$ represents an outcome of interest, where j denotes the j^{th} member of group i (i = 0 = control group and i = 1 = treated group) and t denotes the time period (t = 0 = base period and t = 1 = treatment period). The average value of $Y_{i,t}$ is observed for each group and each period. Let $\bar{Y}_{0,0}$ and $\bar{Y}_{1,0}$ represent the average values of the outcome variable for the control and treatment groups, respectively, during the base period and let $\bar{Y}_{0,1}$ and $\bar{Y}_{1,1}$ represent their respective average values during the treatment period. The DID estimator of the effect of the treatment effect, denoted $\hat{\tau}$, is given by

$$\hat{\tau} = (\bar{Y}_{1,1} - \bar{Y}_{0,1}) - (\bar{Y}_{1,0} - \bar{Y}_{0,0}) \quad (1)$$

The treatment effect simply shows the difference between the change in the average value of the response variable Y for the treated group and the change in Y for the control group. The intent of the method is to difference out any common factors that are causing the response variable Y to change similarly for both groups between the base period and the treatment period. As an example, if changes in military pay or civilian unemployment cause retention of both SOFs and CMF 11 personnel to change over time, the DID estimator $\hat{\tau}$ will control for that. That is to say, a requirement for the DID estimator to be unbiased (i.e., on average give the true treatment effect τ), is that the time trend in the response variable Y in fact be the same

for the two groups. If the trends for the two groups are not the same (common), the DID estimator will be biased.

In the ideal experiment, the members of each group are the same in both time periods. This is ideal because, in addition to any trends affecting Y, any differences in Y due to fixed individual attributes such as race or gender also cancel out. But it is not necessary that the same individuals be observed before and after treatment. In fact, in the application here, different individuals reach retirement eligibility at different points in time, so the groups cannot be the same. But as Cameron and Trivedi (2005, p. 770) discuss, it is not necessary for the same individuals to be in the treatment and control groups before and after treatment; all that is required is that the composition of the groups be stable before and after treatment. If the composition of the groups were not stable, the group averages could be changing due to factors other than the treatment.

In the application here, the outcome variable is a binary indicator for whether the individual remained in service or retired during a given time period. If there are $N_{i,t}$ individuals in group i at time t, then the estimated sampling variance of the average value of $Y_{i,t}$ is given by the formula $V(\bar{Y}_{i,t}) = \frac{\bar{Y}_{i,t}(1-\bar{Y}_{i,t})}{N_{i,t}}$.

Assuming that the means in equation (1) are independent, the estimated variance of the DID estimator is given by

$$V(\hat{\tau}) = V(\bar{Y}_{1,1}) + V(\bar{Y}_{0,1}) + V(\bar{Y}_{1,0}) + V(\bar{Y}_{0,0}) \quad (2)$$

This just says that the estimated variance of the simple DID estimator in equation (1) is the sum of the estimated variances of the four group means that comprise the estimator. This variance is easy to calculate from data. The standard error of $\hat{\tau}$ is given by the square root of its estimated variance.

Regression-Based DID Estimator

In a regression framework, $Y_{i,t,j}$ is a linear function of (1) observable characteristics of the individual and any other time-varying variables ($X_{i,t,j}$), (2) a dummy variable D_i to indicate whether the individual is a member of the control group or the treatment group ($D_i = 1$ if treatment group and $D_i = 0$ if control group), (3) a dummy variable T_t for time period ($T_t = 0$ if t = 0 and $T_t = 1$ if t = 1), (4) an interaction variable that is the multiplication of D_i and T_t, and (5) a random error $u_{i,t,j}$ that accounts for all other variables omitted from the model. The regression model is written as

$$Y_{i,t,j} = \alpha + \beta X_{i,t,j} + \delta D_i + \gamma T_t + \tau (D_i T_t) + u_{i,t,j} \quad (3)$$

Holding other factors constant, the coefficient δ measures the average overall difference in Y between the two groups. The coefficient γ measures the effect of being in time period 1 rather than time period 0; it is the common time effect for members of either group. The coefficient τ on the interaction variable $D_i T_t$ is the treatment effect. To see this, note that, since $D_i T_t = 0$ for either group in the base period, the change in Y due to being a member of the treatment group in the base period is δ. Since $D_i T_t = 1$ when $D_i = 1$ and $T_t = 1$, the change in Y due to being a member of the treatment group in the treatment period is δ + τ. Thus, τ shows the extra effect on Y due to treatment. Equation (3) is easy to estimate with linear regression.

It may be shown that if the coefficient vector β were equal to 0, regression-based estimation of τ would be equivalent to the simple difference-in-means estimator given by equation (1). All that the regression approach does is to explicitly control for variation in Y arising from factors other than treatment. Furthermore, linear regression gives unbiased, consistent estimates of treatment effects even in the case where the dependent variable is binary.

Panel Data Description

The data for this analysis were provided by the Defense Manpower Data Center (DMDC). DMDC created a panel dataset containing an annual snapshot for each fiscal year (FY) in the period 2001–2009 for each individual whose primary Military Occupation Specialty (MOS) was in Career Field 11 or Career Field 18.[6] The dataset contained the individual's TAFMS (Total Active Federal Military Service) as of the start of each fiscal year, current rank, date of rank, demographic information (age, education, etc.), a separation indicator, separation date, and reason for separation. The dataset includes all individuals with a primary MOS in Career Management Fields 11 and 18 who had more than 204 months of active federal service at the start of the fiscal year. Individuals are tracked until they separate or until the end of FY 2009. Of course, individuals are not eligible to retire from active service until they complete 240 months of active federal service. In fact, personnel losses prior to the 240 month mark are negligible. Almost all losses are due to normal retirement from active duty.[7]

6. We have information on who was on active duty on September 30, 2001 (end of FY 2001), but not on separations during that year. Information on who stayed and who departed during each fiscal year does not begin until FY 2002.

7. There were only 44 separations due to death among those who separated with more than 19 years of

Table 2. Number of Observations by Career Field and Fiscal Year

FY	CMF 11		CMF18		Total	
	YOS 19+	YOS 19–23	YOS 19+	YOS 19–23	YOS 19+	YOS 19–23
2002	1,474	1,286	590	539	2,064	1,825
2003	1,677	1,493	818	739	2,495	2,232
2004	1,908	1,725	995	915	2,903	2,640
2005	1,865	1,683	947	867	2,812	2,550
2006	1,902	1,719	954	859	2,856	2,578
2007	1,932	1,745	1,027	893	2,959	2,638
2008	1,895	1,673	1,068	872	2,963	2,545
2009	1,932	1,658	1,080	887	3,012	2,545
Total	**14,585**	**12,982**	**7,479**	**6,571**	**22,064**	**19,553**

a. Includes personnel in ranks E7–E9 only.

For each career field and for both career fields combined, Table 2 shows the number of personnel at the start of each fiscal year who had 19 or more years of service at the start of the fiscal year and the number with between 19 and 23 years of service. Due to the fact that a requirement for receipt of CSRB is that personnel be at least an E-7, the counts in Table 2 are based on personnel in ranks E-7 and above. Virtually all CMF 18 personnel who have 19 or more years of service are in ranks E-7/E-9, as are most CMF 11 personnel. In all, the dataset contains 22,064 observations on individuals with 19 or more years of service, of which 19,553 observations are in the YOS 19–23 interval. Overall, there are roughly twice as many observations in CMF 11 as there are in CMF 18.

CSRB Program Summary

For each individual in the dataset who received CSRB, DMDC provided information on (1) CSRB award date and CSRB award amount.[8] Table 3 shows the number of CSRB awards by award fiscal year and amount interval. Intervals are grouped so that the maximum interval amounts are the amounts available under the revised program ($18,000; $30,000; $50,000; $75,000; and $150,000). Table 3 also shows the average award amount in each year.

service (inter-service separation codes of 30, 31, or 32); every other separation was due to normal retirement (inter-service separation code of 50).

8. Although the Defense Finance and Accounting Service (DFAS) reports most elements of individuals' military compensation to DMDC on a monthly basis, it does not report information about CSRB. DMDC therefore issued a special request to DFAS to obtain information about CSRB awards received by the personnel in our dataset. We sincerely thank Darlena Ridler of DMDC for coordinating this effort and LTC Ronald Hunter of the Eleventh Quadrennial Review of Military Compensation for spearheading the data request.

Table 3. SOF CSRB Award Amount Distribution and Average Amount, by Fiscal Year

Amount ($ in thousands)	Fiscal Year of CSRB Award							Total
	2003	2004	2005	2006	2007	2008	2009	
$1 – $18	37	8	36	12	8	13	4	118
$19 – $30	85	16	63	19	12	9	4	208
$31 – $50	44	25	62	49	12	12	5	209
$51 – $75	0	1	88	49	21	4	7	170
$76 – $150	0	0	89	163	122	133	140	647
Total	**166**	**50**	**338**	**292**	**175**	**171**	**160**	**1,352**
Average Amount ($ in thousands)	**$24.9**	**$30.5**	**$74.0**	**$106.3**	**$118.9**	**$123.5**	**$136.8**	**$92.9**

The data indicate that 1,352 individuals received CSRB over the 2003-2009 period. All but one of these individuals had a primary MOS in Career Field 18. The fact that only one individual without a primary MOS in Career Field 18 received CSRB is comforting, because maintaining a primary MOS in this career field was one of the criteria for receipt of CSRB.

Retention Rate Summary

As a prelude to analysis, Table 4 displays the average annual retention rate by fiscal year of personnel in the YOS interval targeted by CSRB, YOS 19–23. The table shows retention by career field and for the two combined.

Table 4 indicates that, during FY 2002 and FY 2003, SOF retention in YOS 19–23 was much higher than CMF 11 retention. The two career fields then had very similar retention in both FY 2004 and FY 2005. Since FY 2005, SOF retention in YOS 19–23 has risen significantly relative to CMF 11 retention. Just why SOF retention was so much higher in FY 2002 and FY 2003 is explored below.

Table 4. Retention in YOS 19–23

FY	Total		Career Field 11		Career Field 18	
	Number	Rate	Number	Rate	Number	Rate
2002	1,825	0.775	1,286	0.733	539	0.876
2003	2,232	0.782	1,493	0.753	739	0.840
2004	2,640	0.714	1,725	0.721	915	0.701
2005	2,550	0.715	1,683	0.714	867	0.719
2006	2,578	0.742	1,719	0.710	859	0.808
2007	2,638	0.760	1,745	0.717	893	0.843
2008	2,545	0.763	1,673	0.717	872	0.852
2009	2,545	0.813	1,658	0.772	887	0.888

Notes: Number includes personnel in ranks E7–E9 only. Rate is the fraction of personnel in service at the start of the fiscal year who were still in service at the end of the fiscal year.

Figures 1 through 4 compare SOF retention and CMF 11 retention in each YOS from 19 to 22 on a year-by-year basis over the FY 2002–2009 period.[9] Again, SOF retention at YOS 19, the first YOS cell in which personnel become retirement eligible, was much higher than CMF 11 retention. Retention of the two groups converged in FY 2004. Since then retention of the two groups has risen, with a tendency for SOF retention to rise relative to CMF 11 retention.

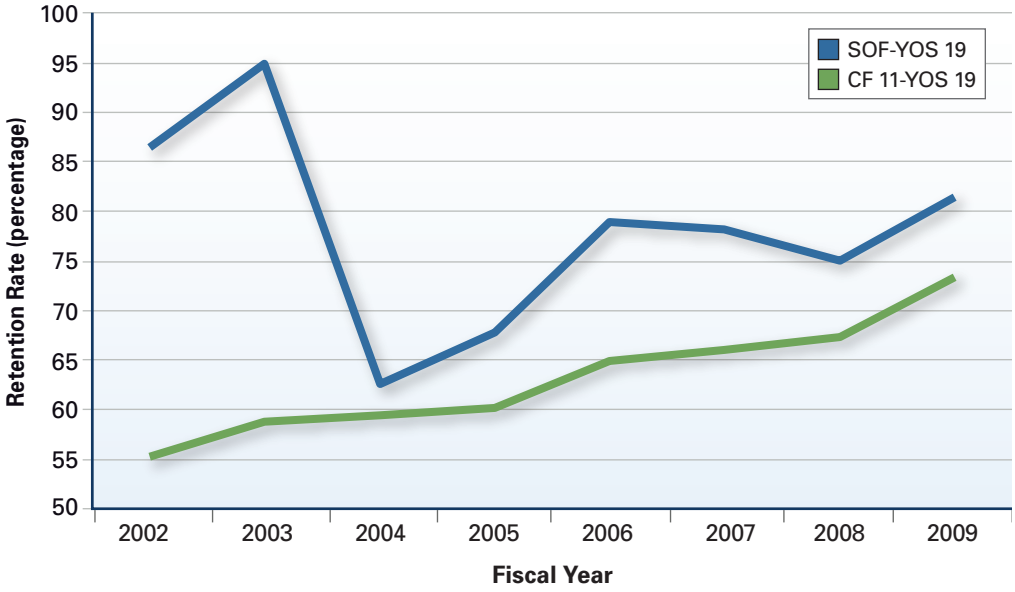


Figure 1. SOF Retention versus CF 11 Retention at YOS 19

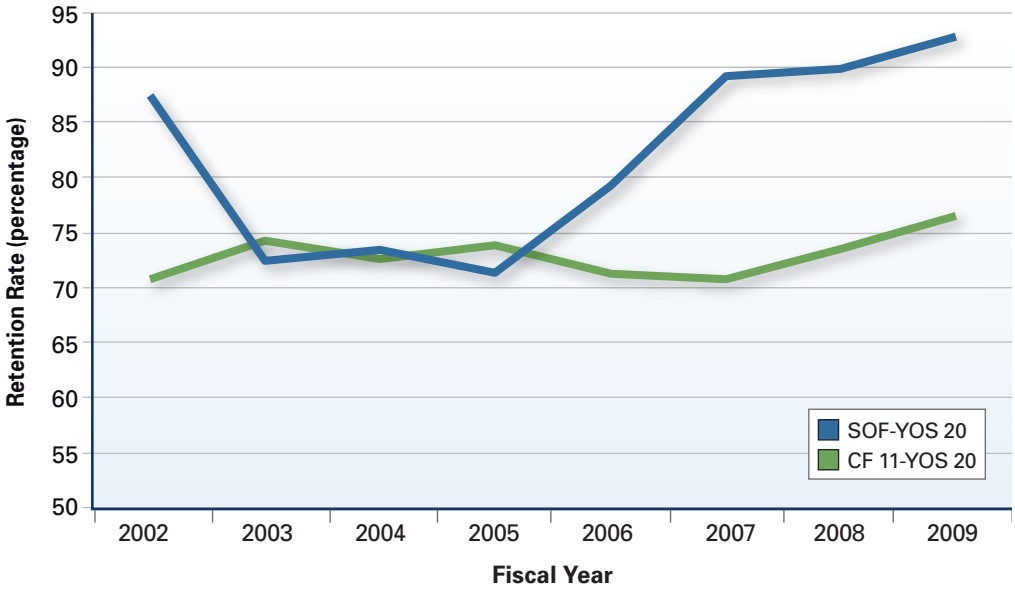


Figure 2. SOF Retention versus CF 11 Retention at YOS 20

9. The raw data underlying Figures 1 through 4 are contained in the appendix at the end of the chapter.

Figures 2 and 3 indicate that SOF retention improved dramatically relative to CMF 11 retention after 2004. Figure 4 indicates that in YOS 22, SOF retention dramatically improved relative to CMF 11 retention after 2007.

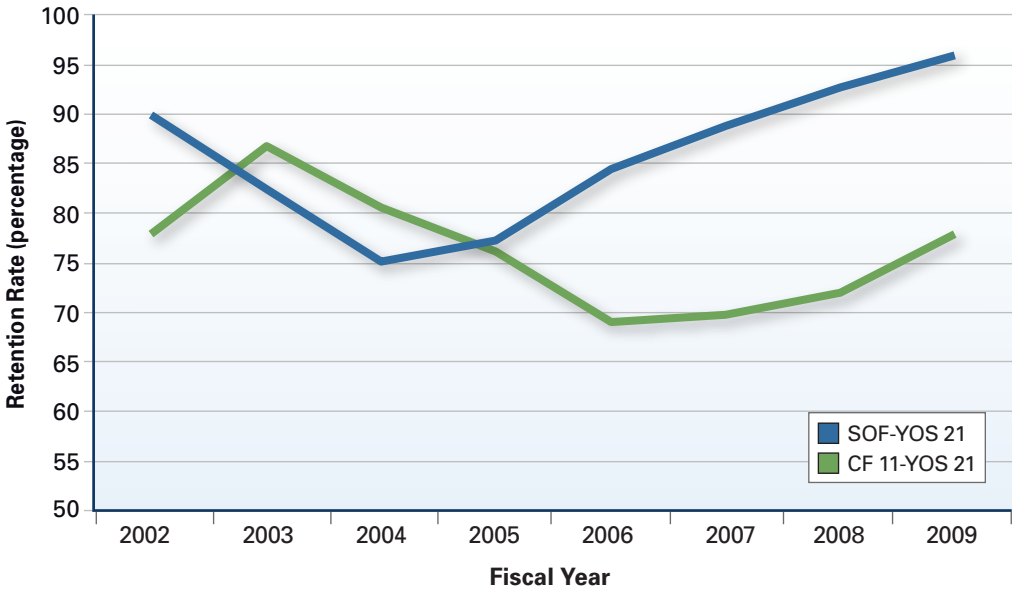


Figure 3. SOF Retention versus CF 11 Retention at YOS 21

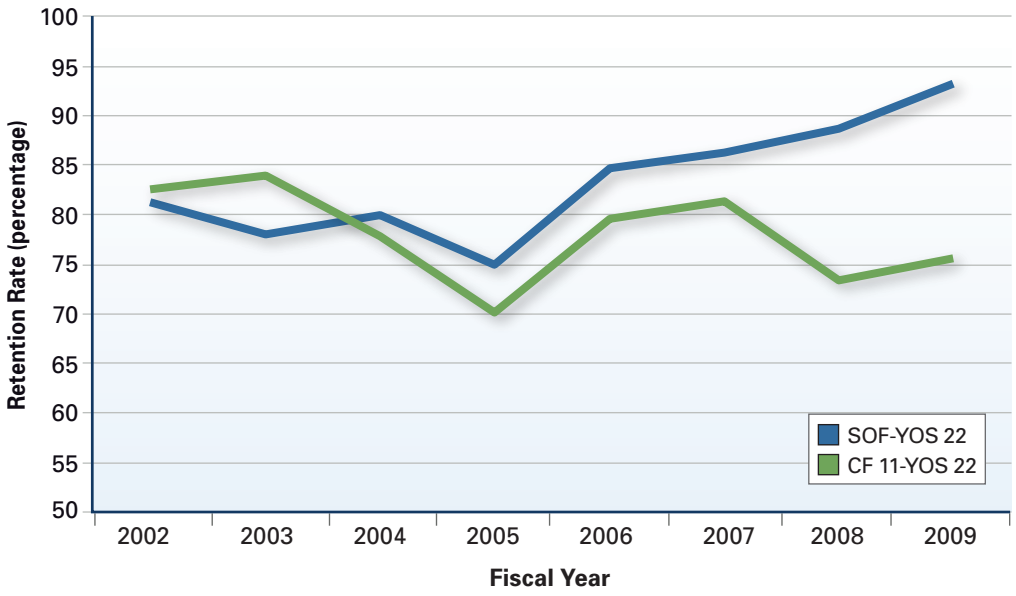


Figure 4. SOF Retention versus CF 11 Retention at YOS 22

Difference-In-Differences Analysis

The data summary in the previous section raises an important question—what base (pre-treatment) period to use for a difference-in-differences analysis of the retention effect of the CSRB program. Remember that CSRB was first implemented for SOFs at the start of FY 2003 and significantly expanded in early FY 2005. Choice of the appropriate base period is crucial to the results that follow. One could select FY 2002 as the base period, and contrast the retention in (a) limited CSRB period (FY 2003–2004) and (b) the expanded CSRB period (FY 2005–2009) with FY 2002 retention. A more limited approach would be to discard data from FY 2002 and (a) use FY 2003–2004 (full limited bonus period) or (b) use FY 2004 only as the base period.

In fact, using data from either FY 2002 or FY 2003 is problematical. The reason is that soon after the September 11, 2001 terrorist attack on the United States, planning for an operation in Afghanistan began. To ensure the right skill mix of personnel was available for such an operation, the Army suspended voluntary separations of personnel in certain MOSs, including all personnel in CMF 18. All personnel who had an ETS (estimated time of separation) date between January 15, 2002 and September 30, 2002 were initially affected, including retirement-eligible personnel.[10] (Personnel with an ETS date in this range but who were in the process of retirement separation and who had already had household goods shipped were allowed to retire.) In June of 2002, the Army extended stop-loss to SOFs with ETS dates as far out as March 31, 2003.[11] The Army lifted stop-loss for CMF 18 personnel on June 4, 2003 (about two-thirds of the way into FY 2003).[12] The presence of stop-loss for SOFs throughout most of FY 2002 and the better part of FY 2003 distorts the use of these years as part of the base period for a difference-in-differences analysis of CSRB.

The use of FY 2004 as a base period is not without its own problems. The Army implemented a new form of stop-loss policy on June 1, 2004—a unit stop-loss in which personnel assigned to units in the continental United States (CONUS) and elsewhere (OCONUS) and scheduled for deployment in support of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) were not allowed to separate if their ETS fell within a 90-day window of the start of the deployment. Such individuals were prevented from separating voluntarily until at least 90 days after the end of

10. The details of this suspension of voluntary separation for soldiers in selected specialties are contained in Milpers Message 02-048 dated December 12, 2001. SOF personnel were stop-lossed but Infantry personnel were not.

11. See Army Stop-Loss Message 4, dated June 5, 2002.

12. See Milper Message 03-184.

the deployment. Unit stop-loss did not postpone voluntary separation indefinitely, it simply delayed it. If a deployment was scheduled for one year, individuals had their expected ETS date set back by one year. Many personnel who might have wanted to separate in 2004 had their separations delayed into 2005 or even 2006.

If this is the case, FY 2004 observed retention will overstate desired retention due to the fact that some personnel who wanted to leave could not do so. Likewise, FY 2005–2006 observed retention will understate what retention would have been in the absence of unit stop-loss due to the fact that some of the separations in those years were postponed departures. The overstatement of FY 2004 desired retention will tend to make retention changes computed with data understate the changes that would have been observed in the absence of stop-loss. Whether DID analysis is thereby biased depends on whether one group was affected more by unit stop-loss than the other. We have no way of answering this question, but we have no reason to suspect that CMF 11 personnel would have been more subject to unit stop-loss than CMF 18 personnel. That is to say, the unit-stop loss implemented in June of 2004 may have affected the timing of separations of the personnel in either CMF 11 or CMF 18 by a year or so, but it should not have contaminated the relative changes observed in Figures 1 through 4.

Simple DID Estimates

Consider first all personnel in the CSRB eligibility window. Using equation (1), Table 5 constructs the DID estimator for different assumed base years. Standard errors were calculated using (the square root of) equation (2). An estimate is statistically significant at the 0.05 level if the ratio of estimate to standard error exceeds ±1.96; it is significant at the 0.01 level if the estimate exceeds ±2.64.

Table 5. Change in SOF Retention Minus Change in CMF 11 Retention (Relative to Base Period), YOS 19–23

	Base Period for DID Calculations			
	2002	**2003**	**2004**	**2003–2004**
2003	**-0.055**			
2004	**-0.163**	-0.108		
2005	**-0.137**	-0.083	0.026	-0.030
2006	-0.044	**0.011**	**0.119**	0.040
2007	-0.016	**0.039**	**0.147**	**0.070**
2008	-0.008	**0.047**	**0.155**	**0.095**
2009	-0.026	**0.029**	**0.137**	**0.070**

Note: Bold indicates difference is statistically different from 0 at the 0.01 level.

Consider a DID analysis that uses FY 2002 as the base period. The first column of Table 5 indicates that when this base period is used, SOF retention fell significantly relative to CMF 11 in FY 2003, FY 2004, and FY 2005. Furthermore, when this base period is used, SOF retention did not change significantly relative to CMF 11 retention in any of the years 2006 to 2009.

Previous discussion suggests that the presence of stop-loss for SOF personnel in 2002 makes it an inappropriate base year. Somewhat more positive results are found when FY 2003 is used as the base period. The second column of Table 5 indicates that there was no significant change in SOF retention relative to the change in CMF 11 retention in either FY 2004 or FY 2005. But, the change in SOF retention was significantly different from zero, and positive, in each of the fiscal years 2006–2009. If all of these positive changes were attributable to the CSRB expansion, they would indicate very modest program effects.

As argued above, FY 2004 is the cleanest base period. SOF stop-loss had been revoked by this time although unit stop-loss was in effect for both CMF 11 and CMF 18 personnel. According to column 3 of Table 5, use of FY 2004 as the base period yields much larger estimates of improvement in SOF retention relative to CMF 11 retention in the years following FY 2005. The differences, in fact, are quantitatively large and statistically significant. In fact, the estimates in column 3 suggest that CSRB could have raised YOS 19–23 SOF retention by as much as 11.7–15.5 percentage points relative to what it would have been in the absence of the expansion. If all of the estimated change is in fact due to CSRB, the estimates indicate relatively sizeable program effects. Use of FY 2003–2004 combined as a base period gives smaller, albeit positive and statistically significant, estimates of program effects, in the range of 7 to 9.5 percentage points. However, these estimates may be biased downward for reasons discussed earlier.

Table 5 presented DID estimates grouping everyone in YOS 19–23 together. Table 6 repeats this analysis on each YOS separately (YOS 19–22). The pattern of estimates is the same as those previously shown, with the largest estimates obtained using FY 2004 as a base year for the DID calculations. The main new insight is that the DID estimates are larger for YOS 20–22 than for YOS 19. CSRB may have raised SOF retention at the point of initial retirement eligibility, but it raised retention by larger amounts in the subsequent YOS cells. Just why this should be the case becomes evident from inspection of the data. Following the expansion of CSRB in FY 2005, most SOFs who have taken it have done so at the start of their 19th year of service; those that did not take it in YOS 19 tend to take it in YOS 20. Not only that, a high percentage of SOFs who took CSRB obligated for the maximum contract length

(Table 4). CSRB thus locks into long-term contracts individuals who would otherwise have been free to make annual retention decisions after becoming retirement-eligible. The data clearly indicate that SOFs under CSRB contract continue from one fiscal year to the next with an almost 100 percent certainty.

Table 6. Change in SOF Retention Minus Change in CMF 11 Retention (Relative to Base Period), by YOS

	Base Period for DID Calculations			
	2002	**2003**	**2004**	**2003–2004**
Panel A: YOS 19				
2003	0.068			
2004	**-0.246**	**-0.314**		
2005	**-0.162**	**-0.230**	0.083	-0.069
2006	-0.075	**-0.143**	**0.171**	0.018
2007	-0.081	**-0.149**	**0.165**	0.013
2008	-0.107	**-0.175**	**0.139**	-0.014
2009	**-0.134**	**-0.202**	**0.112**	-0.041
Panel B: YOS 20				
2003	**-0.175**			
2004	**-0.153**	0.022		
2005	**-0.182**	-0.008	-0.030	-0.020
2006	-0.084	0.091	0.069	0.079
2007	0.030	**0.204**	**0.183**	**0.192**
2008	0.000	**0.174**	**0.152**	**0.162**
2009	-0.004	**0.171**	**0.149**	**0.159**
Panel C: YOS 21				
2003	-0.163			
2004	-0.173	-0.010		
2005	-0.111	0.052	0.062	0.060
2006	0.019	**0.182**	**0.192**	**0.190**
2007	0.030	**0.193**	**0.203**	**0.201**
2008	0.045	**0.207**	**0.218**	**0.215**
2009	0.036	**0.199**	**0.209**	**0.207**
Panel D: YOS 22				
2003	-0.048			
2004	0.033	0.081		
2005	0.058	0.105	0.025	0.066
2006	0.062	0.109	0.029	0.070
2007	0.054	0.102	0.021	0.062
2008	**0.160**	**0.208**	**0.127**	**0.168**
2009	**0.175**	**0.223**	**0.142**	**0.183**

Note: Bold indicates difference is statistically different from 0 at the 0.01 level.

Difference-In-Differences Regressions

Table 7 provides regression-based estimates of the effects of the DID model. Estimates of the effects of key variables are shown for YOS 19–23 combined and for YOS 19–20 and YOS 21–23 separately. The key effects shown in Table 5 are the main SOF effect (the parameter δ in equation (3)) and five interactions between SOF and fiscal year. The coefficients on these interactions indicate how SOF retention changed relative to CMF 11 retention between the base period (FY 2004) and the fiscal year of interest. They are the key estimates of interest (τ effects). The estimated models also included five fiscal year dummies, controls for rank (E-8 and E-9), controls for YOS, controls for the individual's demographic characteristics, and controls for the number of months the individual spent in a combat zone in the previous fiscal year.[13]

Real military pay trended upward over the period of the data. In principle, the time effects included in the model should capture this upward trend if the trend is common to both SOF and CMF 11 personnel. To see whether the time effects fully absorb the pay trend, two models were estimated, one without a control for real pay (Model 1) and one with a control for pay (Model 2). The included pay variable was real basic pay (basic pay in 2010 dollars).[14] Estimates of program effects obtained with a model that includes real basic pay are less likely to be biased due to exclusion of relevant trend-related variables.

The regression-based DID estimates of CSRB effects have a similar pattern to those shown previously. Consider first the Model 1 estimates. For the whole YOS interval 19–23, the interaction effects (τ estimates) rise in value from the statistically insignificant value of 0.017 in FY 2005 to the highly statistically significant value of 0.139 in FY 2008. Estimates for FY 2007, FY 2008, and FY 2009 hover in a tight range. Going from Model 1 to Model 2, each estimate of τ falls by about 0.02–0.04 upon inclusion of real basic pay as a variable. The most affected, the FY 2009 interaction, declines from 0.116 to 0.076. Despite declining in numerical value, the interaction effects remain statistically significant, usually at the 0.01 level. FY 2007 and FY 2008 estimates are still about 0.1 with real basic pay included in the model.

When models are estimated separately for those in YOS 19–20 and those in YOS 21–23, the pattern and size of estimates are similar to estimates obtained with combined data.

13. Dummies are included for 4–6 months in a combat zone, 7–9 months, and more than 9 months.

14. Although a more comprehensive pay variable such as Regular Military Compensation (RMC) might have been preferable, it was not directly observable. Basic pay was directly observable in the data, and it is highly correlated with more comprehensive compensation measures.

Table 7. Regression Estimates of SOF Effect and SOF-Fiscal Year Interactions, FY 2004–2009 Data

	YOS 19–23		YOS 19–20		YOS 21–23	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
SOF	-0.039	-0.041	-0.056	-0.060	0.001	0.006
	(0.018)	(0.016)[a]	(0.022)[b]	(0.019)	(0.031)	(0.030)
SOF * FY 2005	0.017	0.007	0.004	-0.002	0.017	-0.008
	(0.026)	(0.023)	(0.033)	(0.030)	(0.042)	(0.037)
SOF * FY 2006	0.099	0.077	0.083	0.058	0.097	0.073
	(0.025)[a]	(0.023)[a]	(0.032)[a]	(0.030)	(0.039)[a]	(0.037)[b]
SOF * FY 2007	0.131	0.109	0.136	0.113	0.102	0.081
	(0.024)[a]	(0.022)[a]	(0.031)[a]	(0.029)[a]	(0.039)[a]	(0.036)[b]
SOF * FY 2008	0.139	0.095	0.122	0.082	0.134	0.086
	(0.024)[a]	(0.023)[a]	(0.031)[a]	(0.030)[a]	(0.039)[a]	(0.036)[b]
SOF * FY 2009	0.116	0.076	0.091	0.051	0.124	0.079
	(0.023)[a]	(0.022)[a]	(0.031)[a]	(0.028)	(0.037)[a]	(0.036)[b]
Sample Size	15,496	15,494	9,160	9,160	6,336	6,336
R-Square	0.078	0.206	0.066	0.196	0.115	0.234

a. Significant at 0.01 level. b. Significant at 0.05 level.

Note: Dependent variable was binary indicator for whether an individual who began the fiscal year was in service at end of the fiscal year. Models included controls for rank, fiscal year, the individual's demographic characteristics, and months in combat zone in the previous fiscal year. Model 2 included the individual's real basic pay in the fiscal year. Numbers in parentheses are heteroskedasticity-consistent (robust) standard errors.

Overall, the regression-based DID estimates of the relative improvement in SOF retention (provided in Table 7) are somewhat smaller than the estimates based on the simple difference-in-means estimator provided in Table 5 and Table 6. One might have expected this result given that the regression-based estimates better control for factors other than the expansion of the CSRB program in FY 2005. Nevertheless, after controlling for these other factors, it does appear that retention of retirement-eligible SOF personnel rose relative to retention of retirement-eligible CMF 11 personnel. Using FY 2004 as the base period, even the most conservative of the CSRB effects is in the range of 0.05–0.1, with many of the estimates close to 0.1.

Estimates of CSRB Program Costs

Based on the retention estimates above, how cost effective is the CSRB program? To answer this question, we (1) build a cumulative retention profile for retirement-eligible personnel assuming the CSRB program is in effect and then (2) eliminate the program, calculate the reduction in bonus costs due to program elimination, and calculate the change in retirement liabilities implied by CSRB program elimination.

Table 8 begins with a base case retention profile that assumes CSRB is in effect. The retention rates assumed for this base case are the FY 2009 retention rates for SOF personnel (column 2).[15] It is assumed for the purposes of calculation that these rates reflect those that would prevail in a steady-state. Under that assumption, column 3 of Table 8 shows the cumulative retention of retirement-eligible personnel to each YOS in the interval 19–30. The expected person-years beyond YOS 19 are the sum of these cumulative rates. According to the calculations, SOFs remain in service an extra 4.5 years on average with CSRB in effect.

Table 8. Estimating Retention Effects and Saving From Eliminating CSRB

YOS	CSRB in Effect		CSRB Eliminated: Median Effect		CSRB Eliminated: Low Effect		CSRB Eliminated: High Effect	
	Annual Retention Rate	Cumulative Retention Rate	Annual Retention Rate	Cumulative Retention Rate	Annual Retention Rate	Cumulative Retention Rate	Annual Retention Rate	Cumulative Retention Rate
19	0.814	0.814	0.714	0.714	0.744	0.744	0.684	0.684
20	0.926	0.754	0.826	0.590	0.856	0.637	0.796	0.544
21	0.958	0.722	0.858	0.506	0.888	0.566	0.828	0.451
22	0.932	0.673	0.832	0.421	0.862	0.487	0.802	0.362
23	0.816	0.549	0.716	0.301	0.746	0.364	0.686	0.248
24	0.674	0.370	0.574	0.173	0.604	0.220	0.544	0.135
25	0.625	0.231	0.625	0.108	0.625	0.137	0.625	0.084
26	0.688	0.159	0.688	0.074	0.688	0.094	0.688	0.058
27	0.750	0.119	0.750	0.056	0.750	0.071	0.750	0.044
28	0.773	0.092	0.773	0.043	0.773	0.055	0.773	0.034
29	0.214	0.020	0.214	0.009	0.214	0.012	0.214	0.007
30	0.500	0.010	0.500	0.005	0.500	0.006	0.500	0.004
Years Past YOS 19		4.514		3.001		3.392		2.654
Change in Years				-1.513		-1.122		-1.8599
Saving Per Year				$94,452		$116,822		$85,491

15. We experimented with alternative base case retention patterns, including an average of FY 2007–2009 retention rates. The calculations are insensitive to the assumed post-YOS 18 retention profile, so for simplicity we use FY 2009 rates to build the cumulative retention pattern under CSRB.

Now consider the effect of eliminating CSRB. Three scenarios are presented in Table 8. The first is a scenario based on a median estimate of the retention effect of CSRB. The median estimate assumed here is an annual retention rate difference of 0.1 due to the program. Low and high scenarios assume CSRB retention effects of 0.13 and 0.07, respectively. According to the median scenario, eliminating the program would reduce the fraction of retirement-eligible personnel remaining from YOS 19 to YOS 24 from 37 percent to 17.3 percent, a decline of more than 50 percent. Average person-years of additional service decline from 4.51 to 3.0. Under the low scenario, the retention response is more muted. Cumulative retention to YOS 24 only drops from 37 to 22 percent and additional years of service beyond YOS 18 only drop by 1.12. Under the high scenario, cumulative retention to YOS 24 drops to 13.5 percent and additional years beyond YOS 18 decline by 1.86.

To calculate the cost saving implied by these scenarios, an average CSRB payment of $136,800 (Table 4) is assumed. It is furthermore assumed that (1) CSRB payments are taken at the start of YOS 19 and (2) 80 percent of those who stay at YOS 19 receive the CSRB.[16] CSRB elimination thus saves $89,084 per person who starts YOS 19 (= 0.814*.8*$136,800). CSRB also lowers the average experience level at separation. This means more years over which the government must make retirement payments, but a lower retirement annuity. On average, the present value of retirement payments is calculated to fall upon CSRB elimination because the present value of the liability reduction due to lower average payment more than offsets the extra years over which the annuity must be paid.[17] The net saving on a per person-year basis equals the reduction in CSRB plus the reduction in present value of the retirement liability (discounted to YOS 19) divided by the reduction in person-years per retirement-eligible person.

Under the median scenario, CSRB elimination would save about $94,500 per person-year lost due to program elimination. Or to turn it around, if CSRB did not exist, its implementation would add about $94,500 per person-year gained. Under the low scenario, retention falls less upon program elimination. In this case the saving grows to about $116,800 per person-year lost. Again, to turn it around, if CSRB did not exist, implementation would add $116,800 to cost per person-year gained. Finally, under the most optimistic retention scenario, the saving (cost) due to program elimination (implementation) is only about $85,500.

16. Not everyone who stays at YOS 19 takes CSRB. The 2007–2009 average take rate at YOS 19 among those who stayed was approximately 80 percent.

17. The calculations assume a real government discount rate of 3 percent.

These cost calculations make clear that CSRB is an expensive program. The marginal cost of extra person-years obtained with the program (or, alternatively, the saving due to its elimination) is much larger than costs of SRB paid to reenlistees in Zone A and Zone B. Estimates contained in Asch et al. (2010) indicate that, for Army enlisted personnel, SRB marginal costs per person-year are around $15,000 in Zone A and $21,000 in Zone B (Table 7.13, p. 84). Why are CSRB marginal costs so much higher for senior SOF personnel than for junior personnel in reenlistment zones A and B? The answer, as it is for all military bonus programs, is that bonuses must be paid to all personnel who would have remained in service in the absence of the bonus as well as those induced to remain because of the bonus. Senior SOFs would still have relatively high retention in the absence of CSRB, so a large percentage of those who would have remained in the absence of the bonus get paid economic rents in order to induce those on the margin of staying or leaving to stay.

Plausibility of Estimates: A Check Based on the Dynamic Retention Model

How plausible are the estimates of retention effects and cost provided above? One way to check the retention estimates is to see what a structural model would have predicted the change in retention due to CSRB to be. The structural model applied here is a variant of the Dynamic Retention Model (DRM) first developed by Gotz and McCall (1984). The DRM is described in some detail in Asch, Hosek, and Warner (2007), and several recent studies have applied this model to military compensation policy. Asch and Warner (2001) used it to simulate the effects of various structural changes to the enlisted basic pay table for the Ninth Quadrennial Review of Military Compensation (QRMC). This model was also used to evaluate proposals that the Defense Advisory Commission on Military Compensation (DACMC, 2006) put forward to overhaul the military retirement system. Asch et al. (2008) developed another variant of the model to predict the effects of changes to the retirement system being considered by the Tenth Quadrennial Review of Military Compensation. Mattock et al. (2010) developed another variant of the model and used it to predict the effects of changes to various special and incentive (S&I) pays for officers.

Here we use the Asch-Warner (2001) variant of the model, which predicts the steady-state retention pattern of a generic enlisted force under alternative policies. The model was originally calibrated so as to mimic, as closely as possible, the Army enlisted force under existing compensation and personnel policies. The model was recalibrated so that it is consistent with the fact that SOF retention is higher than overall average Army retention. The model predicts that in the absence of CSRB, 21.7 percent of entrants will reach retirement eligibility. The model also predicts that,

with CSRB, the fraction of entrants who stay for a 20-year career only rises from 21.7 to 22.1 percent. This indicates that, if the CSRB has an effect on retention, its effect will be at the 20-year mark and beyond and not prior to that point. The model is based on a steady-state force of 6,000 personnel, roughly the size of the SOF force at the end of FY 2009.

The DRM predicts that, without CSRB, retention at the 19-year point would be 71.7 percent. Of those who attain retirement eligibility, 25.2 percent are predicted to remain in service to the 25-year mark, a cumulative retention rate which implies an annual average retention rate of 79.5 percent. The DRM predicts that, with CSRB, the retention rate at YOS 19 would increase to 79.1 percent. Furthermore, over half of retirement-eligible personnel (52.3 percent) would remain to the 24-year point, thereby doubling the fraction of retirement-eligible personnel who remain over the interval from YOS 19 to YOS 24. The annual retention rate implied by this cumulative retention rate is 89.8 percent.[18] The DRM thus predicts that annual retention will rise by about 10.3 percentage points for the period of time over which CSRB applies, a number close to the one assumed for the median scenario above. While this simulation exercise does not validate the econometric estimates of the effect of CSRB provided earlier, the exercise suggests that the econometric estimates are consistent with predictions from a model that has frequently been used for military compensation program analysis.

Conclusions

The CSRB program for Army SOFs represents the first time that retention bonuses have been aimed at retirement-eligible personnel, and not much analysis has been done of its effects on retention and cost. This report has studied the retention effects of the program using data from the FY 2002–2009 period, basing the estimates on a comparison of changes in SOF retention after the program was expanded in FY 2005 with changes in Infantry retention after the expansion.

Retention estimates are sensitive to the choice of a base period for the analysis. Various base periods prior to program expansion were explored. Due to the presence of skill-based stop-loss for SOFs in effect in FY 2002–2003, the only plausible base

18. A piece of corroborating evidence is provided by data in Tables 10 and 11 in the Appendix. According to Table 10, 60.5 percent of SOFs who had 19 years of service at the start of FY 2006 were still in service at the end of FY 2009, four years later. The average annual retention rate implied by this four-year rate is 88.2 percent (Table 11). Among CMF 11 personnel, only 29.2 percent of personnel who had 19 years of service at the start of FY 2006 were still in service at the end of FY 2009, which implies an annual retention rate of only 73.5 percent. That the four-year cumulative retention of CMF 11 personnel is less than half of the cumulative retention of SOFs is consistent with the predictions of the DRM.

period for the analysis is FY 2004. Assuming FY 2004 to be the relevant base period, various estimates of the retention effects of CSRB were obtained using (1) a simple difference-in-differences estimator and (2) a regression-based difference-in-differences estimator. Estimates are statistically significant and quantitatively large. Some estimates indicate that the presence of CSRB could have increased annual retention in the YOS 19–23 range by as much as 15 percentage points. Regression-based estimates are somewhat smaller, with a central tendency of around 8–10 percentage points.

These changes in annual retention imply large changes in the fraction of SOFs who reach YOS 19 who will remain in service until the 25-year mark. In fact, a 10-percentage increase in annual retention more than doubles the percentage of personnel who remain from YOS 19 to YOS 25. Though the program has had a marked effect on SOF retention, the retention improvement has not been cheap. Estimates of the marginal cost of the additional person-years induced by the program range from $85,500 to $116,800. The marginal cost of the person-years induced by CSRB is significantly higher than the marginal cost of the person-years induced by the SRB program, which is aimed at junior personnel at the end of their first or second enlistment contracts and considering reenlistment. Like other military compensation programs, the high cost of the CSRB program arises from the fact that many personnel would remain beyond the point of initial retirement eligibility in the absence of the program. In the end, the efficiency of the program depends on the value of having more experienced personnel, as well as the cost of obtaining that extra experience.

Appendix: Tables for SOF Analysis

Table 9. Retention Rates in Career Fields 18 and 11, By Fiscal Year and Year of Service[a]

FY	Years of Service at Start of FY							
	19	20	21	22	23	24	25	26
Career Field 18 (SOF)								
2002	0.867	0.873	0.898	0.813	0.933	1.000	0.706	1.000
2003	0.947	0.724	0.824	0.781	0.720	0.850	0.722	0.778
2004	0.623	0.738	0.750	0.800	0.712	0.588	0.515	0.643
2005	0.677	0.713	0.771	0.750	0.683	0.857	0.333	0.563
2006	0.788	0.792	0.844	0.847	0.762	0.867	0.778	1.000
2007	0.784	0.891	0.887	0.863	0.826	0.617	0.611	0.810
2008	0.753	0.897	0.925	0.886	0.826	0.616	0.543	0.619
2009	0.814	0.926	0.958	0.932	0.816	0.674	0.625	0.688
CMF 11 (Infantry)								
2002	0.697	0.734	0.778	0.824	0.709	0.811	0.440	0.714
2003	0.709	0.759	0.866	0.840	0.630	0.850	0.525	0.900
2004	0.699	0.752	0.803	0.778	0.519	0.797	0.420	0.758
2005	0.669	0.756	0.762	0.704	0.636	0.708	0.457	0.700
2006	0.694	0.736	0.705	0.796	0.584	0.703	0.476	0.650
2007	0.695	0.721	0.736	0.820	0.607	0.792	0.596	0.750
2008	0.690	0.758	0.761	0.738	0.619	0.722	0.509	0.879
2009	0.778	0.791	0.801	0.768	0.630	0.867	0.761	0.833
Difference								
2002	0.170	0.139	0.120	-0.012	0.224	0.189	0.266	0.286
2003	0.238	-0.035	-0.043	-0.059	0.090	0.000	0.197	-0.122
2004	-0.076	-0.014	-0.053	0.022	0.193	-0.208	0.095	-0.115
2005	0.007	-0.043	0.009	0.046	0.048	0.149	-0.123	-0.138
2006	0.095	0.056	0.139	0.050	0.178	0.164	0.302	0.350
2007	0.089	0.169	0.150	0.043	0.219	-0.175	0.015	0.060
2008	0.063	0.139	0.164	0.148	0.206	-0.106	0.034	-0.260
2009	0.036	0.136	0.156	0.163	0.186	-0.192	-0.136	-0.146

a. Includes personnel in ranks E7–E9 only.

Table 10. Cumulative SOF & CMF 11 Retention, YOS 19+, by Fiscal Year

YOS 19 FY	Number of Years Beyond YOS 19							
	0	1	2	3	4	5	6	7
SOF Cumulative Retention Rate Over Interval								
2002	0.867	0.627	0.471	0.353	0.269	0.166	0.090	0.062
2003	0.947	0.699	0.539	0.456	0.377	0.232	0.145	
2004	0.623	0.444	0.375	0.323	0.267	0.180		
2005	0.677	0.536	0.475	0.421	0.343			
2006	0.788	0.702	0.650	0.605				
2007	0.784	0.703	0.674					
2008	0.753	0.697						
2009	0.814							
CMF 11 Cumulative Retention Rate Over Interval								
2002	0.697	0.529	0.425	0.299	0.175	0.138	0.070	0.059
2003	0.709	0.533	0.406	0.324	0.196	0.142	0.108	
2004	0.699	0.528	0.372	0.305	0.189	0.164		
2005	0.669	0.493	0.363	0.268	0.169			
2006	0.694	0.500	0.381	0.292				
2007	0.695	0.527	0.422					
2008	0.690	0.546						
2009	0.778							
Difference in Cumulative Rates Over Interval (SOF – CMF 11)								
2002	0.170	0.098	0.046	0.054	0.094	0.028	0.020	0.003
2003	0.238	0.166	0.133	0.133	0.181	0.091	0.037	
2004	-0.076	-0.084	0.002	0.018	0.078	0.016		
2005	0.007	0.043	0.112	0.153	0.175			
2006	0.095	0.202	0.269	0.313				
2007	0.089	0.176	0.251					
2008	0.063	0.152						
2009	0.036							

Table 11. Average Annual SOF & CMF 11 Retention, YOS 19+, by Fiscal Year

YOS 19 FY	Number of Years Beyond YOS 19							
	0	1	2	3	4	5	6	7
SOF Average Annual Retention Rate Over Interval								
2002	0.867	0.792	0.778	0.771	0.769	0.741	0.709	0.706
2003	0.947	0.836	0.814	0.822	0.823	0.784	0.759	
2004	0.623	0.666	0.721	0.754	0.768	0.751		
2005	0.677	0.732	0.780	0.805	0.808			
2006	0.788	0.838	0.866	0.882				
2007	0.784	0.839	0.877					
2008	0.753	0.835						
2009	0.814							
CMF 11 Average Annual Retention Rate Over Interval								
2002	0.697	0.727	0.752	0.740	0.705	0.719	0.685	0.702
2003	0.709	0.730	0.741	0.754	0.722	0.722	0.727	
2004	0.699	0.727	0.719	0.743	0.717	0.740		
2005	0.669	0.702	0.713	0.719	0.700			
2006	0.694	0.707	0.725	0.735				
2007	0.695	0.726	0.750					
2008	0.690	0.739						
2009	0.778							
Difference in Average Annual Rates Over Interval (SOF – CMF 11)								
2002	0.170	0.065	0.026	0.031	0.064	0.022	0.024	0.005
2003	0.238	0.106	0.073	0.068	0.101	0.062	0.032	
2004	-0.076	-0.060	0.001	0.011	0.051	0.012		
2005	0.007	0.030	0.067	0.086	0.107			
2006	0.095	0.131	0.141	0.147				
2007	0.089	0.113	0.126					
2008	0.063	0.096						
2009	0.036							

References

Asch, B., J. Hosek, and J. Warner. 2007. The new economics of manpower in the post-Cold War era. In: *Handbook of Defense Economics* Volume 2. Edited by T. Sandler and K. Hartley, 1075–1138. Amsterdam: Elsevier.

Asch, B., J. Hosek, M. Mattock, and C. Panis. 2008. *Assessing compensation reform: research in support of the 10th quadrennial review of military compensation*. Santa Monica, Calif.: RAND Corporation.

Asch, B. and J. Warner. 2001. A theory of compensation and personnel policy in hierarchical organizations with application to the U.S. military. *Journal of Labor Economics* 19: 523–562.

Defense Advisory Committee on Military Compensation. 2006. *The military compensation system: Completing the transition to an all-volunteer force*. Arlington, Va.: DACMC.

Gotz, G. and J. McCall. 1984. *A dynamic model retention model of Air Force officer retention: theory and estimation*. R-03028-AF. Santa Monica, Calif.: RAND Corporation.

Mattock, M., B. Asch, J. Hosek, C. Whaley, and C. Panis. 2010. *Towards improved management of officer retention: a new capability for assessing officer retention*. DRR-5184-OSD. Santa Monica, Calif.: RAND Corporation.

Part III

Combat Compensation

Chapter 6

History of Combat Pay

Brandon R. Gould
Stanley A. Horowitz

Executive Summary

The purpose of recognition for combat risks originated in Badge Pay for combat infantry in World War II. Designed to boost flagging infantry morale, Badge Pay awarded $10 per month to holders of a Combat Infantryman's Badge, earned through combat service, and $5 to those with an Expert Infantryman's Badge, earned through proficiency in training. To proponents in the Congress and the Department of the Army, the uniquely harsh and hazardous conditions of infantry service impaired infantry morale and justified special recognition. The fact that infantry pay was considerably less than other specialties had a similar effect on morale and provided a secondary justification for token compensation.

Unlike its successors, Badge Pay was not a combat pay in the traditional sense. Although other servicemembers endured similar risks and discomforts, only the infantry could receive Badge Pay, and once awarded, an infantryman would continue to receive compensation until the entitlement was curtailed in 1949. Future pays would extend eligibility beyond the infantry but restrict benefits to the periods of risk exposure. Still, by introducing the general concept of recognition and rewarding the "hazards and hardships" of infantry service, Badge Pay established precedents for future special pays.

Authorized in 1952, Combat Pay for servicemembers deployed to Korea represented the first modern form of direct combat compensation. Combat Pay awarded $45 per month to members serving at least six days in designated "combat units" or those wounded, injured, or killed by hostile fire. Defined by statute, "combat units" were effectively restricted to frontline ground units with the intent that special recognition extend only to those enduring the worst "hazards and hardships" of war. Receipt of additional special and incentive pays, such as flight or submarine pay, was banned. This narrow, conditions-based interpretation of the purpose of recognition echoed its predecessor, Badge Pay, but angered the Navy and Air Force, whose members faced slim prospects of eligibility. Almost immediately upon enactment,

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

the other services and their supporters in the Congress sought to replace the criterion of "unit designation" with broad, geographically-based zonal eligibility.

From the perspective of its opponents, the dual standard of "hazards and hardships" was both administratively burdensome and distributionally inequitable. The Navy and Air Force argued that risk alone deserved recognition. During the Korean War several proposals to expand eligibility from the perspective of "recognition for risk" were introduced and subsequently rebuffed in the Congress and executive commissions.

These setbacks ultimately proved temporary when the Navy and Air Force succeeded in in convincing the Congress to relax narrow, unit-based recognition with broad, zonal eligibility during the Vietnam War. In 1963, Combat Pay, which had statutorily expired with the Korean armistice, was reauthorized as Hostile Fire Pay (HFP). The legislative history of HFP indicated continuity in purpose and policy with its Korean War predecessor. As favored by the Army, eligibility would be restricted to those serving at least six days with designated frontline "combat units," effectively excluding members of the Navy and Air Force. However, unlike Korean War Combat Pay, which codified eligibility criteria into law, the authorization of HFP granted the Department of Defense near-complete discretion over its administration. Initially, the Department followed narrow historical precedent, continuing the dual standard of "hazards and hardships" and the policy of unit-based eligibility. However, as a result of internal deliberations, likely stemming from the unprecedented combat environment in Southeast Asia, the Department reversed course in 1965 and replaced the practice of designating combat units with the policy of zonal eligibility for Vietnam. The six-day criterion was also rescinded. Immediately upon implementation of this directive, the number of HFP recipients quintupled. Although the purpose of HFP remained "recognition" in spirit, the substance of combat pay policy had shifted dramatically. No longer was recognition reserved to those who endured the worst "hazards and hardships"—all within the designated area who faced any level of risk were entitled to recognition. In the immediate aftermath of zonal eligibility, the Department, the Gates Commission, and the Second Quadrennial Review of Military Compensation attempted to tighten eligibility criteria to include only those routinely exposed to hostile fire. Opposed by the Air Force and Navy, all of these attempts failed.

The decades after the Vietnam War saw the entrenchment of the policy of zonal eligibility and the perspective demanding "recognition for risk." In the absence of major conflict, the Department issued few new designations in the late 1970s and early 1980s. In 1983, the bombing of Marine barracks in Beirut and violence against servicemembers in El Salvador prompted the Department and the Congress

to reevaluate combat pay policy. As HFP was traditionally reserved for the overt hazards of open warfare, existing policy struggled to recognize the latent risks of low-intensity conflicts that characterized post-Vietnam military deployments. The Congress redressed the omission by authorizing a new special pay—Imminent Danger Pay (IDP)—recognizing the risk of "physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions" short of open warfare. This change enhanced the relevance of combat pay to contemporary military deployments but once again lowered the risk threshold for pay eligibility.

The authorization of IDP also opened the floodgates for new designations. Beginning in 1983 with five designations, the number grew to 34 in 1993, peaking at 52 in 2003. Because the risks of Imminent Danger areas were latent, new designations could extend indefinitely, often with minimal reference to actual hostile events within designated areas. As the number of designations accumulated in the 1980s and 1990s, the length of designations experienced similar growth. For designations issued in the 1980s, the average designation length stood at 10.14 years; in the 1990s, designation length grew to 11.14 years. Of the 16 designations initiated since 1999, 15 remain active today.

Although the increasing number of low-intensity designations for IDP corresponded to the risk environment of military deployments in the 1980s and 1990s, modern HFP/IDP may struggle to appropriately recognize the overt risks of the combat operations in Iraq and Afghanistan. Whereas previous decades featured either only high-end or low-end designations—HFP for Vietnam in the 1960–70s, IDP designations thereafter—the coexistence of designations for open warfare and low-intensity conflicts is a source of dissonance in modern combat pay policy. The status quo, wherein deployments in Afghanistan and Athens receive identical recognition despite vastly different hazards and hardships, defies conventional notions of equity. The wide distribution of risks receiving special pay may also dilute the impact of recognition on servicemember morale. In 2003, the Bush Administration grappled with this imbalance by proposing to extend a temporary raise in HFP/IDP (to $225/month) only for members deployed to Iraq and Afghanistan (all others would receive HFP/IDP at $150/month). The raise was made permanent for all personnel, and the dissonance in recognition persists to this day.

In summary, while combat pay has adhered to its broad historical purpose of risk recognition, the specific application of recognition has evolved considerably in response to new conflict environments and political coalitions. Originally intended to narrowly recognize only those enduring the worst "hazards and hardships" of frontline combat, modern combat pay now recognizes servicemembers exposed to *any* degree of risk.

1. Introduction

A. The Purpose of Recognition and the Evolution of Combat Pay

In every major conflict beginning with World War II, the United States has recognized the extreme and uncontrollable risks of combat with special pay for combat service. Beginning with Badge Pay of the 1940s and continuing through today's Hostile Fire Pay/Imminent Danger Pay (HFP/IDP), members of the Armed Services deployed to hazardous areas have received token combat compensation. Although policy on rewarding risk has changed substantially over time, combat pay has largely remained faithful to its original intent: to recognize those enduring the risks of combat. The purpose of recognition for combat service is both unique among special and incentive pays and essential to understanding the historical development of modern day HFP/IDP. Unlike other justifications for special pay, the purpose of recognition entails an abstract, not concrete, objective. Consequently, throughout the past half century, interpretations by stakeholders in the Congress and the military and revisions of prevailing political perspectives on combat recognition have driven the process of policy change to combat pay. As a result, combat pay has evolved from a narrow benefit reserved for the extreme hazards and hardships of frontline service to a broad-based entitlement providing recognition for any level of hostile risk.

It is impossible to understand the evolution of combat pays without reference to the broader history of special and incentive pays. Ever since 1886, the military has provided a host of special and incentive pays to supplement basic pay.[1] The majority of these pays serve one of two purposes—manpower incentives or compensation for conditions of service. Basic military compensation is determined primarily by rank and years of service, regardless of a member's skills or occupation. If unaltered by manpower incentives, such a system of uniform compensation would produce an excess of manpower in less scarce, more desirable occupations and a deficit in high skill, high risk, or otherwise undesirable duties. With regard to compensation for conditions of service, the dissonance between varying occupational skills and risks and constant military pay would clash with the concept of "fair" compensation. Special and incentive pays have historically served as the means of fine-tuning individual compensation to meet the problems arising from a common military pay scale.

The vast majority of special and incentive pays correspond to the two aforementioned purposes: achieving manpower objectives or compensating for the individualized costs of service. "Incentive" pays—which include critical skill reenlistment bonuses, pays for medical personnel, and career compensation for

1. Diving Duty Pay was established by Navy Department directive in 1886.

aviators and submariners—strive to bridge shortfalls in scarce, risky, or undesirable occupations or acquire and maintain undersupplied skills to meet military manpower needs. "Compensatory" pays—such as Family Separation Allowance, death and disability benefits, and several Hazardous Duty pays—attempt to rectify the uneven distribution of risks, costs, and sacrifices across the force out of a sense of fundamental "fairness."[2] Both "incentive" and "compensatory" pays address specific problems—manpower needs or individual sacrifices—with tailored responses that can be evaluated and modified on the basis of their effectiveness.

In contrast to other special and incentive pays, combat pay stands alone. Throughout its history, combat pay was intended to neither provide incentives for combat service nor compensate for combat risks. Because exposure to the enemy is involuntary, incentives have little bearing on the supply of combat service personnel. Because exposure to hostile risk is unpredictable and the costs of combat are immeasurable, the military cannot provide ex-ante compensation for the sacrifices of combat service. Instead, the problem that combat pay strives to solve is more nuanced. Although combat is the universal obligation of all military service, combat risks and costs are borne by only a fraction of servicemembers. Unlike the host of other special and incentive pays, combat pay was intended to *recognize* service under conditions of extreme and uncontrollable risk.

As the purpose of recognition is distinct from either manpower incentives or cost compensation, recognition is unrelated to these specific and measurable problems within the military pay system. Because of the undefined objective of risk recognition, political and military stakeholders must supply the specific policy details. Who is to be recognized? For what risk circumstances? Why is recognition necessary? Given the context of the military's universal combat obligation yet wide variation in risk, the answers to these questions are not immediately apparent.

Behind the historical evolution of combat pay policy are ongoing clashes between competing perspectives justifying recognition of combat risks. Historically, Service perspectives on risk recognition are strongly correlated with the expected beneficiaries of special pay. When the Army alone stood to benefit from Combat Pay in Korea, it was opposed by the Navy and Air Force; three decades later, when Imminent Danger Pay (IDP) promised broader benefits for all, few objections were aired. Changes in combat environments also influence the predominant perspective on risk recognition. The shift from a stalemated frontline in Korea to a fluid counterinsurgency in South Vietnam favored recognition based upon general risks within a geographic area rather than the specific hazards and hardships of frontline unit assignment.

2. Examples of "compensatory" pays include parachute duty pay, demolition duty pay, flight deck duty pay, experimental stress duty pay, personal exposure pay, non-crewmember flight pay, and toxic fuels and propellants and chemical munitions exposure pay.

Political perspectives on risk recognition historically define the groups deserving recognition relative to others already receiving special pay. In Korea, the existence of special pays for aviators and submariners prompted calls for recognition pay for frontline infantry units; in Lebanon and El Salvador, unexpected military casualties demanded similar recognition for the latent risks of low-intensity conflicts as the hazards of open war. Equalization of special pay among individuals exposed to risk supplied a politically powerful motivation behind extending recognition pay to new and broader groups. Though recognition itself has remained the core justification of combat pays, recognition relative to groups already receiving benefits has driven every change in policy and perspective in the historical development of modern HFP/IDP.

B. Outline of the Report

The following sections of this report detail the historical development of combat pay from Badge Pay in World War II to HFP/IDP in deployments to multiple low-intensity conflicts with omnipresent hostile risks. Each section highlights the competing perspectives on risk recognition and exposes the internal political dynamics and external risk factors that produced changes to combat pay.

Section 2 documents the origins of direct combat compensation in Badge Pay of World War II. Though not a "combat pay" in the modern sense, Badge Pay established two critical precedents—by citing recognition as a justification for special pay and forging a narrow but dedicated political constituency within the infantry for combat compensation.

Section 3 details the authorization, administration, and evaluation of Combat Pay for U.S. ground forces in the Korean War. Combat Pay recognized the hazards and hardships of front-line service and attempted to equalize special pay across various hazardous duties. Narrow administration of the pay drew criticism from the Air Force and Navy, who adopted a new perspective on risk recognition that opened the door for future geographically-based eligibility expansions.

Section 4 discusses the policy, perspectives, and potential causes behind the emergence of broad zonal eligibility for combat pay in Vietnam. Originally intended to follow the Korean War example, the newly authorized Hostile Fire Pay (HFP) conferred greater discretion on the Department of Defense, which allowed advocates within the Navy and Air Force to successfully replace frontline unit recognition with broader, risk-based geographic eligibility that reflected the combat environment in Vietnam.

Section 5 explores the entrenchment and extension of Vietnam-era policies and perspectives on combat compensation in the post-Vietnam risk environment.

The authorization of IDP in 1983 and the subsequent proliferation of the number and length of deployments for low-intensity risks are characteristic of continuing trends in combat compensation. However severe risks in prolonged wars in Iraq and Afghanistan clash with the policy status quo for HFP/IDP, wherein all risks receive equal recognition.

Section 6 summarizes the historical trends in combat pay policy and concludes with a potential path forward for HFP/IDP in the contemporary risk environment.

2. Badge Pay: Recognizing Infantry in World War II

A. Authorization of Infantry Badge Pay

Badge Pay, the first authorized combat pay, originated as a limited measure to improve the morale of frontline infantrymen in World War II. The uneven distribution of the hazards of combat service motivated recognition for those exposed to combat risks. In World War II, infantry were a small fraction of the force, but suffered the large majority of casualties. In North Africa, for example, the infantry comprised twenty percent of the American force, yet suffered seventy percent of military casualties.[3] In addition to these extreme risks, combat infantrymen endured the severe hardships of frontline service, including exposure to the elements; deprivation from sleep, warmth, and leisure; and the omnipresent threat of enemy fire. Despite experiencing the worst hazards and hardships of war, combat infantrymen, controlling for rank, were paid less than their counterparts in other Services and occupations.

As a result of this imbalance in hazards, hardships, and pay, the Army was faced with a deterioration of morale in its frontline units. According to Army Major General Miller G. White, "the differences in the life of that Infantry soldier as compared to the life of any other soldier…the hardships he undergoes and the knowledge of these differences had a very adverse effect on the morale of the average Infantry soldier." That infantry morale "didn't compare with the other branches" was especially troublesome because "the maintenance of high morale and pride of service, so essential to the winning of battles, is nowhere more important than in the infantry."[4]

As a first step toward bolstering morale, the War Department created the Expert Infantryman and Combat Infantryman badges in 1943. These badges were meant to provide symbolic recognition to infantrymen for proficiency in training and performance in combat. The Expert Infantryman's Badge was awarded for

3. *H.R. Rep. No. 78-1700* (1944).

4. *Pay of Expert and Combat Infantrymen: Hearing on S.1973 and S. 1787, Before the Senate Committee on Military Affairs*, 78th Cong. (1944).

meeting high standards of proficiency upon completion of infantry training. The Combat Infantryman's Badge was awarded for service in combat under hostile fire. At the time of authorization, neither badge conveyed material benefits upon its owner. Rather, the Army believed that symbolic recognitions, like non-monetary distinctions in other occupations, would foster a sense of *esprit de corps* among the infantry. Improved morale, in turn, would contribute toward individual excellence and overall combat performance.[5]

In addition to the badges, the Army engaged in other activities to support infantry morale during World War II. To achieve greater pay equality across occupations, the Army accelerated infantry promotions at a faster rate than other specialties. To counteract negative stereotypes, the Army launched a public relations campaign highlighting the prestige of infantry service.[6] Badge Pay was the next element of the Army's strategy for improving infantry morale.

The idea for special pay for the combat infantry did not originate within the military. Prominent American war correspondent Ernie Pyle is largely credited with fathering the concept of Badge Pay and leading the political struggle for its authorization. Pyle's dispatches from the European front dramatized the desperate living conditions of frontline infantrymen. In his columns, Pyle repeatedly stressed the need to "give recognition to that poor old sonavabitch who lies up there in the mud and cold and rain for weeks at a time, never dry, never warm, eating cold food out of cans, dirty and unshaven and sleepless, and constantly under mortar, artillery or rifle fire."[7] Special compensation, Pyle argued, was already given to aviators and submariners whose occupations were arguably less risky and more comfortable than the "dogface" infantryman "who lives like a beast and dies in great numbers."[8] Extending token compensation to the combat infantry would recognize the extreme hazards and hardships they endured.

Responding to Pyle's advocacy and widespread support for infantry special pay, the War Department introduced its proposal for Badge Pay in June of 1944. The proposal awarded $5 per month for an Expert Infantryman Badge and $10 for the Combat Infantryman Badge. Two justifications were offered in support of the proposal. The first echoed Pyle's call for recognition of the hazards and hardships of frontline service. Although none could match the total number of infantry casualties, other occupations, such as submariners and fighter pilots, experienced similarly high

5. H.R. Rep. No. 78-1700 (1944).
6. *Hearing on S.1973 and S. 1787* (1944).
7. Ibid.
8. 90th Cong. Rec. 6,570 (daily ed. June 5, 1944).

death rates,[9] but combat hardships, not hazards, were what set the infantry apart from the rest of the military. Congressional testimony from Pyle and Secretary of War Henry Stimson expounded upon the severe and unique nature of frontline infantry hardships:

> Sec. STIMSON: The conditions in which the Infantry render service—constant exposure to extremes of temperature; going sleepless and sleeping in rain and mud; fighting for days without relaxation from strain or lightening of the monotony—cannot be changed and their effect must be recognized. They imperatively require the creation of incentives which will not merely help men overcome the inevitable hardship and unpleasantness but will affirmatively build up among them that individual pride and pride of service which are essential to the highest military morale.[10]

> Mr. PYLE: Of the one million men overseas, probably no more than 100,000 are now in actual combat with the enemy. But as it is now, there is no official distinction between the dogface lying for days and nights under the constant mortar fire on an Italian hill and the headquarters clerk living in a hotel in Rio de Janeiro… Their two worlds are so far apart that the human mind can barely grasp the magnitude of the difference. One lives like a beast and dies in great numbers. The other is merely working away from home. Both are doing necessary jobs, but it seems to me the actual warrior deserves something to set him apart.[11]

The pay discrepancy between the infantry and other military occupations provided a second justification for combat compensation. According to Major General White, average annual pay for the infantry stood at $749 in 1944, below that of the Field Artillery ($758) and Signal Corps ($834), and beneath the $763 annual figure for the Army as a whole. An additional $5 to $10 per month would bring infantry compensation nearer to the level of the other branches and the technical services.[12] Badge Pay would also redress the asymmetry in special pays between the Army and the other Services. If pilots received flight pay and the Navy had hazard pays for submarine and diving duty, the argument went, the infantry should have a pay of their own to recognize combat hazards. Equalization of both average pay levels

9. Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs, *Report of the 1971 Quadrennial Review of Military Compensation: Hostile Fire Pay*, Second Edition, December 1971. In World War II, the following occupational specialties suffered similar casualty rates as the combat infantry, in which one of every 7.5 members deployed were killed in action:

Infantry	1:7.5 (all)	1:7.6 (enlisted)	1:7.2 (officers)
Air Corps	1:15.7 (all)	1:23.9 (enlisted)	1:4.8 (officers)
Submariners	1:7.7 (all)		

10. H.R. Rep. No. 78-1700 (1944).
11. 90th Cong. Rec. 6,570 (daily ed. June 5, 1944).
12. *Hearings on S.1973 and S. 1787* (1944).

and hazardous duty pays imposed a concrete structure for Pyle's abstract concept of "recognition." Major General White, Senator Charles Tobey, and Secretary Stimson were the lead advocates of this perspective.

> Mr. STIMSON: Duty in the infantry is exceptionally arduous and unremitting, that it must perforce be rendered in conditions peculiarly harsh and unpleasant, and that, for his reward, the infantryman must be content with pay rates below the average rate for all arms, and notably below the rates paid to certain noncombatant arms.[13]

> Mr. TOBEY: Airmen, submarine sailors, divers, and a few such branches already receive added compensation on the premise that these services are hazardous. Certainly front line operatives are in as hazardous a spot as any, and are devoid of the comforts which these others enjoy.[14]

Despite the conflict between these twin motives of recognition and equalization, the legislative testimony reflected a general consensus that Badge Pay existed to bolster infantry morale. For Pyle and his backers in the Congress, infantry morale was intrinsically valuable from the perspective of fairness; recognition for the infantry's disproportionate sacrifice expressed national solidarity and was simply the right thing to do. For proponents in the Army and War Department, morale was extrinsically valuable: an infantry with high morale was more effective than a dispirited corps. Furthermore, pay for Expert Infantrymen would induce trainees to strive for excellence prior to combat deployments. During World War II, these subtle differences in perspective—pay for recognition or equalization, morale as intrinsically or extrinsically valuable—converged on a single policy, Badge Pay.

B. Evaluation and Criticism of Badge Pay

In a sense, Badge Pay was not "combat pay" as currently understood, but rather special pay for the combat infantry. Several critical features distinguish Badge Pay from modern combat pays. Most importantly, eligibility for the pay did not relate to service in combat. Eligibility for the Expert Infantryman Badge required achievement of high proficiency standards during training, not actual combat experience. Badge Pay proponents argued that the infantry training regimen entailed similar hardships (and, to a lesser extent, hazards) as frontline service, but the fact remains that the Expert Infantryman Badge did not recognize actual combat.

Neither did receipt of Badge Pay depend on an infantryman's presence on the battlefield. Upon earning his badge, an individual would continue to receive Badge Pay as long as the pay was authorized. In theory, a soldier could meet the minimum

13. H.R. Rep. No. 78-1700 (1944).

14. *Hearings on S. 1973 and S. 1787* (1944).

obligations for an Expert or Combat Infantryman's Badge, exit the war theater, and receive monthly compensation until the pay was terminated in 1949. Although questionable from the perspective of risk recognition, the permanence of Badge Pay was entirely consistent with the Army's efforts to bolster infantry morale and equalize overall infantry compensation with other military occupations.

Furthermore, Badge Pay did not cover the combat hazards and hardships experienced by non-infantry military specialties. Despite serving alongside the infantry and enduring the same conditions, artillerymen, tank crews, and special forces units could neither hold a Combat Infantryman's Badge nor receive the pay that came with it. Only one exception was made: Combat Medics embedded with infantry units were authorized to receive the pay in 1945, but all other specialties remained ineligible. The exclusion of soldiers exposed to equivalent risks and hardships from the compensation embodied the narrow intent of the pay. Badge Pay targeted a specific problem—infantry morale—with a specific solution—special infantry pay. The disproportionate hazards and hardships of frontline infantry service featured prominently in the legislative debate, but combat risks themselves were not yet incorporated into the criteria for special recognition.

The disconnect between exposure to combat hazards and eligibility for Badge Pay did not escape congressional criticism. Leading the opposition to Badge Pay, Senator Tobey and Representative Samuel Weiss introduced a broader proposal for combat pay that recognized risk in general, rather than focusing specifically on the infantry. The Tobey and Weiss bill offered members of the Armed Forces deployed to the front lines special pay at fifty percent of base pay while actively engaged in combat. In months when the member was no longer on the frontlines, the bonus would no longer be paid.[15]

In defense of his alternative, Senator Tobey argued that his proposal was preferable to Badge Pay for two reasons. First, the alternative recognized combat hazards and hardships in general, rather than focusing specifically on an occupational specialty (the infantry). As such, the proposal was more equitable toward non-infantry members of the Armed Forces who endured the same conditions as the combat infantryman. Second, because bonuses were only paid during periods of combat service, the pay was simultaneously more generous and less costly than the continuous Badge Pay.[16]

Neither of these arguments proved persuasive to proponents of Badge Pay. The particular conditions of infantry service—namely omnipresent hazards, unremitting hardships, and inferior basic pay, Major General White argued—necessitated

15. Ibid.

16. Ibid.

special pay to bolster flagging infantry morale. To improve infantry morale, pay must be restricted to the infantry itself. From this infantry-centric perspective, the permanence of Badge Pay was beneficial, as it stabilized gains in morale, not an expensive or inequitable feature, as Tobey argued. On the contrary, Tobey's proposed bonus rate of fifty percent of base pay exceeded mere token recognition and worsened compensation differentials between high and low paid specialties. Finally, any pay that depended on tracking individual deployments would either be administratively infeasible or must grant eligibility across such a broad combat area as to render its morale value meaningless.[17]

Ernie Pyle, in written testimony, anticipated problems in administering the Tobey proposal as well. Pyle feared that unless the pay was restricted to the infantry, it would soon expand beyond its intended scope. Voicing these concerns, Pyle warned that "Congress, maybe not quite getting the point of what the proposal was made for, will want to give [combat pay] to anyone who is ever in danger from enemy action. If it is made that way, it will be so broad as to destroy the value of doing it at all."[18] If Tobey's proposed pay were expanded in such a manner, not only would combat morale improvements diminish, but broader eligibility would place an undue burden on the finances of a fully mobilized military.

In the face of Pyle's criticism and War Department opposition, the Tobey-Weiss proposal was shelved. However, defeat proved temporary. Following the repeal of Badge Pay in 1949, the perspective behind the Tobey-Weiss bill—that the hazards and hardships of frontline combat deserved recognition—resurfaced as the principal justification for Combat Pay in the Korean War. This move from occupational-based recognition for the combat infantry to conditions-based pay for frontline soldiers initiated the development of modern combat pay. Eventually, as Pyle feared, the Congress would authorize pay "to anyone who is ever in danger from enemy action" marking the complete transition to hostile risk as the object of recognition.[19]

C. Legacy of Badge Pay

Badge Pay became law on June 30, 1944. Despite the cessation of hostilities within fourteen months, holders of Expert Infantryman and Combat Infantryman Badges continued to receive additional pay until 1949. In 1948, the President's Commission on Military Compensation, better known as the Hook Commission, conducted a comprehensive study on military special and incentive pays, including Badge Pay. Special pay for the combat infantry, the Hook Commission judged, was neither necessary nor appropriate under current circumstances. The end of World

17. Ibid.
18. Ibid.
19. Ibid.

War II had rendered special pay for combat service irrelevant, and there was no need for additional incentives to attract and retain volunteers in the combat arms. Arguing that all special pays should be justified on the basis of military manpower requirements, the Hook Commission dispensed with the concept of recognition and recommended the abolition of Badge Pay.[20] The Career Compensation Act of 1949 codified these recommendations into law and suspended monthly payments to the infantry.

Despite its termination, Badge Pay set two important precedents. First, in addition to manpower incentives and cost compensation, Badge Pay established "recognition" as a legitimate justification for special pay. Through the Tobey-Weiss proposal, the relationship between the hazards and hardships of combat and eligibility for recognition pay formed the basis of future combat pays. Second, Badge Pay incubated the political coalition that would advocate for the authorization of future combat pays. Eligibility restricted to the infantry, although criticized by the Congress, engendered a unified base of support within the Army for reinstituting recognition pays during wartime. To consolidate support within the Army, eligibility for Korean War Combat Pay extended beyond the infantry to all soldiers serving on the frontlines of combat. Backed by this united constituency, the Army revived proposals for combat pay almost immediately upon American entrance into the Korean conflict. Delays in the authorization of Combat Pay in Korea may have reflected the still-narrow scope of the coalition backing special pay, but it is unlikely that any such provision would have passed without the precedent of Badge Pay.

3. Combat Pay: Clashing Perspectives on Recognition in Korea

Combat Pay for frontline soldiers in the Korean War reprised the narrow scope of Badge Pay. However, the debate over authorization and administration of Combat Pay introduced a new perspective—broad recognition for risk—in opposition to the standard of narrow eligibility. When superimposed upon subtle shifts in eligibility policy, this new perspective eventually transitioned opponents of Combat Pay in the Navy and Air Force into advocates for geographically-based pay eligibility for varying degrees of risk. Although, in practice, Combat Pay in Korea strongly resembled Badge Pay in World War II, the emergence of a new perspective on risk recognition, combined with the abandonment of infantry exclusivity, paved the way for the development of modern HFP in Vietnam and beyond.

20. Under Secretary of Defense for Personnel and Readiness, *Military Compensation Background Papers: Hostile Fire Pay*, Sixth Edition, 2005.

A. Political Struggles over Authorization of Combat Pay

The authorization of Combat Pay for Korea traveled a much more circuitous route than Badge Pay in World War II. As early as July of 1950, only weeks after North Korean forces crossed the 38th parallel, the Army introduced a proposal to provide "hazard duty pay" to personnel in combat.[21] In contrast to World War II, pay equalization, not hazard recognition, provided the driving force behind this proposal. The fact that specialists such as aviators, parachutists, and submariners received special pay for hazardous duties, yet troops in combat did not, was unacceptable to the Army. The soldiers who endured the greatest risks and hardships and shouldered the vast majority of casualties should not want for a hazard pay of their own. To remedy this "gross inequity," the Army argued, Congress must either authorize special pay for combat service or suspend all existing hazardous duty pays during a time of war.[22]

The Army's proposal was a direct challenge to the special and incentive pays of the other Services. Unsurprisingly, the Navy and Air Force immediately voiced their opposition to the new pay. The Army's proposed pay for combat duty, the Navy and Air Force argued, was not comparable to other hazardous duty pays because "members who are entitled to incentive pay are generally volunteers for the duty… known to be continually hazardous."[23] Two years prior, the Hook Commission had explicitly rejected the concept of special pays that were not designed to meet military manpower requirements. Combat service was neither voluntary nor suffering from recruitment or retention deficits. Hence, combat pay was not necessary under the prevailing perspective on special and incentive pays. Neither was combat pay appropriate, the Navy argued, because "extra pay should not be required for the performance of the primary duty for which the Armed Forces exist."[24] (Note that neither the Navy nor the Air Force stood to benefit from the proposed "hazard duty pay," which would have accrued predominantly to ground forces.) Just as the asymmetry in special and incentive pays motivated the Army's proposal for combat pay, expectations of eligibility restricted to the ground forces motivated the Navy and Air Force to oppose it.

The Secretary of Defense sided with the Army. The Department's opinion echoed the Army's justification for a new special pay to equalize compensation for combat service with other hazardous duties. Adjudicating the dispute, Assistant Secretary of Defense Marx Leva posited that "compensation received by the soldiers, sailors,

21. Ibid.

22. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

23. Secretary of the Navy, Memorandum to Secretary of Defense, *Proposed Amendment to the Career Compensation Act to Provide Special Pay for Combat Duty*, November 22, 1950.

24. Ibid.

and airmen who go into combat should be more nearly equal than it is now" and concluded combat pay could remedy the disparity.[25] Secretary of Defense George Marshall agreed, and submitted legislation in December of 1950 for the authorization of Combat Pay.

In their opinions, Marshall and Leva outlined the framework for Combat Pay, which the Congress would leave relatively unchanged. Like Badge Pay, the scope of recognition was narrow. Only those routinely exposed to the hazards and hardships of frontline service would receive pay. To be eligible in a given month, an individual must spend at least six days in "combat," defined as either engagement with enemy forces or "direct support" of engagement. Critically, no individual could receive Combat Pay and another hazardous duty or incentive pay at the same time.[26] This restriction effectively excluded aviators, submariners, and other specialists from any prospects of eligibility, guaranteeing opposition by the Navy and Air Force in the Congress. Pay rates were proposed at $100 for officers and $50 for enlisted personnel, equivalent to the prevailing rates for other hazardous duty incentive pays.[27] By restricting eligibility to ground forces, yet modeling Combat Pay after existing hazardous duty pays, the Department's proposal rebuked the other Services and granted the Army practically everything it had desired, setting the stage for a contentious political struggle.

The Department's proposal was approved by the Bureau of the Budget and forwarded to the Congress on January 19, 1951. Hearings were held, and several additional proposals were introduced in both chambers, but a floor vote did not occur. Legislative efforts stagnated until 1952. Although the specific reasons for postponement were not recorded, the delay between the introduction of legislation and its eventual consideration may have reflected the nature of the political coalition backing combat pay. Despite its best efforts, the Army alone could not muster the critical congressional support in the face of opposition from the Navy and Air Force. The Department, though supportive of combat pay in general, did not wish to alienate the other Services by advancing the Army's agenda. It is likely that the combat pay proposal would have died quietly in 1951, were it not for the cohesive Army coalition forged by Badge Pay that kept the proposal alive until more favorable political conditions arose.

The turning point for Korean War Combat Pay came with the emergence of a dedicated sponsor on the Senate Armed Services Committee. In March of 1952, Senator Russell Long (D-LA) introduced the Department's Combat Pay proposal as an amendment to the Armed Forces Pay Raise Act of 1952. Offered on the floor of

25. Ibid.

26. Combat Duty Pay Act of 1952, Pub. L. No. 82-488, 66 Stat. 517, 538-539 (1952).

27. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

the Senate, the amendment bypassed the committee process, where previous efforts had bogged down. Consideration on the floor guaranteed an up or down vote and ensured that the proposal would receive a higher priority than past efforts.

Like his legislative strategy, Long's tactics proved superior to previous Departmental efforts. Whereas the Army had previously stressed equalization of special and incentive pays for hazardous service, Long and his co-sponsors emphasized the need to recognize the extreme hazards and hardships of frontline combat service:

> Sen. LONG: [the] amendments have one specific purpose: to grant at least a small amount of recognition to those members of our Armed Forces who undeniably have borne the brunt of all the hazards, discomforts, devastation, disease, dirt, and death involved in our country's opposition to Communist aggression in Korea… It is not alone the hazard of instant death at the hands of an enemy often unseen, nor is it solely the uncomfortable conditions under which these men must live, for which we should compensate; it is the combination of all of these factors which make up the daily life of the doughboy in combat. All day and every day, for periods which often are terminated only by his success or his failure in action against the enemy, he must live in indescribable filth, without even the barest comforts of life, under conditions of extreme cold or unbearable heat, often without food, and always with the ever-present threat of sudden death, loss of limb, or other irreplaceable physical harm. Even should none of these events occur, the mental and physical stress occasioned by living in their constant presence is alone sufficient to warrant our recognition and gratitude. [28]

Long's emphasis on the need to recognize the hazards and hardships of combat service echoed World War II-era appeals in support of Badge Pay. His emotional testimony reframed the debate in terms of sacrifice and patriotism, rather than as a pay dispute between the squabbling Services. Though he was certainly motivated, in part, by the asymmetry in hazardous duty pays,[29] his appeals for recognition rather than equalization captured the moral high ground from pay opponents and attracted congressional support to the Army's cause. That Long was a respected member of the Senate, rather than a representative of the military, lent credibility to his arguments as well.

Long also demonstrated a willingness to compromise. Although he preferred the Department's recommended monthly pay levels of $100 for officers and $50 for enlisted personnel, supporters in the Congress argued that "the blood that comes

28. 98th Cong. Rec. 3,106 (1952).

29. Long on pay equalization: "The present provisions for hazard and incentive pay for personnel in other services have created an anomalous situation which it is now our duty to correct".

from the body of a private… is just as precious as the blood that comes from a major."[30] If he supported the Department's pay differential, Long risked losing some of his core supporters. With only token resistance, the officer-enlisted differential was dropped, and an amendment set Combat Pay at a flat rate of $50 per month. To this day, officers and enlisted personnel serving in designated Hostile Fire or Imminent Danger areas still receive the same rates of special pay in recognition of their hazardous service.

Long's proposal also anticipated a major concern that the Department did not: the Congress's fear of the cost of Combat Pay. The Department's proposal had ceded administrative discretion over eligibility criteria, including the definition of "combat," to the military. Although the Department repeatedly asserted their intent to maintain narrow eligibility, the Congress remained skeptical, fearing that, if left unchecked, the pay would eventually cover the entire Korean peninsula at great cost to the war effort. General Lawton Collins predicted less than sixty percent of Army troops in Korea would receive the pay, but he conceded under questioning that eligibility could fluctuate with changing conditions on the ground.[31] Under DoD administration, Senators Harry Byrd (D-VA) and Richard Russell (D-GA) voiced fears of unchecked pay expansion in hearings on Combat Pay, excerpted below.

> Sen. BYRD: You are opening up a very broad field here. You practically leave it, as I see it here, largely to the commander in the field…I think terrific pressure is going to be brought to bear to make it so that it will be a much broader application of this than you now contemplate. I fear that. I can see no reason why we shouldn't write it into the law…There may be another chief of staff who is not opposed to [wider eligibility] and may want to broaden it and extend it, because there are going to be a lot of instances when soldiers are going to contend that they are just as much entitled to this award as somebody else being on the front line when there is no shooting…[32]
>
> Sen. RUSSELL: I am heartily in favor of the principle of that bill, but it is one that is subject to great abuses, and it is my desire…to see that it is truly a combat pay bill and not a bonus for all who happen to be in the Far Eastern theater during the time that some men were engaged in combat in Korea.[33]

Responding to concerns of DoD overreach, Long's bill left little room for administrative maneuvering. Individuals would be eligible for combat pay only if

30. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

31. *Hearings on S. 579, Before the Senate Committee on Armed Services* (April 5, 1951).

32. Ibid.

33. *Hearings on S. 579* (June 16, 1951).

"physically present and serving with a combat unit in Korea which is subjected to hostile fire for a minimum period of six days per month." To prevent an overly generous interpretation, a "combat unit" was defined as a unit "regimental size or smaller… which in the performance of their mission either, first, come into direct contact with the enemy…or, second, which are subjected to hostile fire while furnishing direct fire or service support to those units which are in direct contact with the enemy."[34] Eligibility based upon strict statutory criteria guaranteed that only extreme hazards and hardships would be recognized and limited the Department's ability to expand the pay beyond the Congress's (or the Army's) narrow intent. During the war, less than twenty percent of troops deployed to Korea and adjacent waters received Combat Pay,[35] but when the Department gained discretionary authority over eligibility in 1963, HFP quickly expanded to all servicemembers within the combat area.

The combination of statutory eligibility criteria and the rhetoric of recognition assembled a strong legislative coalition in support of Combat Pay. However, despite his best efforts, Long's proposed amendment to the Armed Forces Pay Raise Act of 1952 was rejected.[36] This proved a temporary setback, as a similar amendment offered by Senator Blair Moody (D-MI) passed without dissent three days later. Moody's amendment was identical to Long's proposal, save for the rate of Combat Pay, which was lowered to $45 per month. In conference, the House rejected Moody's amendment, citing the lack of hearings on Combat Pay. However, less than three months later, Moody, undeterred, attached Combat Pay as an amendment to the Appropriations Act of 1952. The House initially objected in conference but withdrew its objection once support grew behind the principle of recognition for frontline combatants. On July 10, 1952 the Combat Pay amendment cleared the House on a unanimous vote, and Combat Pay became law.[37]

Although his initial amendment had failed, Long's strategic guidance proved instrumental to the enactment of Combat Pay. Left to its own devices, the Army was unlikely to succeed in the face of congressional skepticism and opposition from the other Services. Long's strategic decisions to emphasize frontline recognition and constrict eligibility criteria reframed the legislative debate in the familiar terms of Badge Pay. From this well-accepted perspective, Long was able to assemble a political coalition behind Combat Pay. Even after repeated setbacks—the failure of the initial amendment, defeat in conference, and reservations in the House—the

34. 98th Cong. Rec. 3,107 (1952).

35. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

36. The reason for this rejection is unclear. There does not appear to be evidence supporting or rejecting the possibility that the amendment was defeated on its merits. Given the ease with which the subsequent proposals were adopted, perhaps procedural problems were to blame for this initial failure.

37. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

Senate coalition remained intact. Through the passage of Combat Pay, the principle of recognition had gained its place as a justification for special pay, and some form of combat pay has existed ever since.

B. Pay Administration and Its Critics

Administration of Combat Pay during the Korean War followed its narrow statutory authorization. Soldiers assigned to designated "combat units" became eligible only after six days of engagement with the enemy. Those receiving flight, submarine, or other special and incentive pays for hazardous duty were barred from eligibility for Combat Pay. In addition to eligibility for frontline service, a servicemember who was killed or injured by hostile fire, regardless of unit assignment, was eligible for Combat Pay for up to three months after the hostile event. This provision, which will be discussed in greater depth in section 3.C, afforded some degree of eligibility outside of frontline ground units, including Naval and Air Force personnel. As a result of the narrow statutory eligibility requirements, an average of roughly 15 percent of the military and 19 percent of the Army deployed to Korea received Combat Pay in a given month.[38]

Although consistent with legislative intent and historical precedent, narrow eligibility provoked a backlash within the Congress and the Services. Only one year after authorization, the Services voiced their criticisms of Combat Pay to the President's Commission on Incentive, Hazardous Duty, and Special Pays, commonly known as the Strauss Commission. Unsurprisingly, the Navy and Air Force proposed sweeping changes to the pay. In their comments to the Commission, the Navy proposed lifting the ban on multiple pays, eliminating the six-day combat requirement, and extending eligibility to the crews of ships exposed to hostile fire (as opposed to only those killed or wounded). Even the Army, which disproportionately benefited from Combat Pay, griped that "ground troops immediately to the rear of combat units [who] also live in discomfort and are exposed to the danger of guerilla harassments and enemy bombing" were ineligible based on their unit designation.[39]

Despite the Services' complaints, the Strauss Commission endorsed the existing purpose and scope of Combat Pay. As argued by Senator Long one year earlier, Combat Pay existed for "special recognition for the front line soldier whose duties were not only extremely hazardous, but were generally performed with far fewer

38. Statistical Information Analysis Division, *Military Personnel Historical Report 1953*, Department of Defense, 2011. Note: The Second QRMC uses the combat pay eligibility figures (46,000 for Army, 4,000 for Marines) for 1952. The deployment statistics used are from 1953, so there is an overlap issue with the percentages. Still, the actual percentages for 1952–53 amounted to only a fraction of the total deployment in Korea.

39. Commission on Incentive-Hazardous Duty and Special Pays, *Differential Pays for the Armed Services of the United States*, Volume 1, March 1953.

comforts than were available in the other services." Narrow eligibility was essential because "the morale value of the pay…would be decreased if the pay was authorized for individuals who face only occasional risks from enemy fire or explosion." The Commission dismissed Service recommendations to eliminate the six-day eligibility requirement and the ban on multiple pays, and explicitly "opposed…a broader expansion of combat pay on an area basis."[40] The report did recommend corrections to several minor eligibility inequities. Because ships experienced disproportionately high casualty rates from isolated hostile events, the six-day combat requirement should not apply to ships. Likewise, Naval minesweepers, which faced sustained operational risks, should be eligible based on the number of days spent minesweeping, rather than the number of explosions in a given month. Addressing the Army's concern for combat support personnel, the Commission recommended that ground forces who were killed or wounded by hostile fire should also receive Combat Pay, regardless of unit assignment. As an aside, the Commission also recommended linking Combat Pay rates to the lowest hazardous duty pay of $55 per month. These modest recommendations resulted in no legislative changes.[41] The general purpose of recognition for hazards and hardships and narrow scope of eligibility remained intact through the Korean War.

Critics of narrow eligibility found a voice in the Congress, as well. In January of 1953, Representative James Van Zandt (R-PA) introduced a bill replacing unit-based eligibility requirements with eligibility for all personnel serving in a geographic "combat zone." In remarks on H.R. 2766 entitled "The Combat Pay Act of 1952 is Highly Discriminatory and Should Be Revised," Van Zandt cited several specific cases to argue that unit-based pay was inequitable. A group of Marines, for example, was denied combat pay after the group was "withdrawn from actual combat after five days of heavy fighting because of casualties and the necessity to rest."[42] Eligibility for Naval vessels, Van Zandt argued, was even more inequitable; only 24 of the 481 ships receiving hostile fire in Korean waters received Combat Pay from 1950 to 1952. The statutory ban on multiple special pays also unfairly denied Combat Pay to combat aviators and frontline medical personnel.[43] In addition to these inequities, the process of determining the "combat" status of a unit was far too subjective and administratively burdensome, especially when applied retroactively. Zonal eligibility, Van Zandt argued, would resolve administrative inefficiencies and

40. Ibid.

41. It is unclear whether the Strauss Commission's recommendations had any effect on the administration of Combat Pay during the Korean War. Under the statutory authorization for Combat Pay, there would seem to be little flexibility on the eligibility issues for ships and minesweepers, for example. However, some allowances may have been made.

42. 99th Cong. Rec. Appendix A466 (daily ed. February 6, 1953).

43. Ibid.

extend recognition on the principle of combat risk, rather than the arbitrary six-day, combat-unit statutory requirements.

Van Zandt's proposal reignited the inter-Service debate over Combat Pay. The Navy immediately embraced zonal eligibility for Combat Pay and urged passage of H.R. 2766. It bears mentioning that, once authorized in 1952, Combat Pay's opponents quickly shifted strategy from opposition to demanding eligibility for their servicemembers. The Army, despite expressing reservations to the Strauss Commission on the administration of Combat Pay, opposed the proposal. As summarized by the Second Quadrennial Review on Military Compensation (QRMC), "The crux of [the Army's] argument was that in any given zone or area in ground combat there are degrees of exposure to risk and miseries, which range from the almost unbearable conditions of the front line rifleman to the relative comfort and greater safety of headquarters personnel."[44] The Navy's position drew no distinction based upon degrees of hazard within a designated area; all servicemembers faced some degree of risk, therefore all should receive recognition pay. As in 1950, the Department sided with the Army and warned that "putting combat pay on a zonal or area basis might well destroy whatever value had been gained from the Combat Duty Pay Act of 1952."[45] With the drawdown of combat operations in Korea, congressional interest in Combat Pay waned, and the Van Zandt proposal was not enacted. Eventually, Van Zandt's perspective, recognition for any degree of risk rather than eligibility for extreme frontline hazards and hardships, would triumph in the more dynamic counterinsurgency in Vietnam.

C. Emergence of New Perspectives on Risk Recognition

Although formal attempts to broaden eligibility failed during the Korean War, new features of the Combat Duty Pay Act signaled the possibility for future eligibility expansions based on Navy and Air Force perspectives, hereafter referred to as "recognition for risk." In contrast to occupational or unit-based combat pays, which recognized only the most severe frontline risks, this competing perspective sought recognition for all those participating in an operation in which members were exposed to some degree of hostile risk. The potential for broader eligibility redirected political strategies from advocating or opposing combat pay to challenging or defending existing eligibility standards. The concept of pay equalization—championed by the Army in World War II and Korea—would soon be used by the Navy and Air Force to justify recognition for varying degrees of combat risk beyond the frontlines. The clashing perspectives on risk recognition embodied by the Strauss Commission and

44. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

45. Ibid.

H.R. 2766 would eventually result in zonal eligibility in Vietnam. To some extent, the roots of this decade-long struggle over policy and perspective can be directly traced back to subtle changes in language and intent of the still-narrow Korean War Combat Pay.

The first and most important distinction between Combat Pay and its predecessor, Badge Pay, is the group each pay sought to recognize. While Badge Pay recognized members of the infantry to redress the morale deficit of that particular occupational specialty, Combat Pay recognized frontline soldiers, regardless of occupational specialty, based upon the extreme hazards and hardships of combat service. The shift from occupational eligibility to conditions-based eligibility (hazards and hardships) was critical to the abstract intent and practical administration of combat compensation. Theoretically, after Korea, recognition was accorded *a posteriori* on the basis of the circumstances of service, rather than *a priori* on the basis of occupational choices or assignment. For specialties and Services previously excluded from Badge Pay, this shift in perspective eliminated any intrinsic ban on recognition for combat service.

The implications of this distinction were immediately recognized in the Congress and the military. In hearings on Badge Pay, advocates had clung to narrow eligibility restricted to infantrymen. War correspondent Ernie Pyle warned of broader eligibility: "I suspect that the average person discussing this proposal would want to give fight pay to everyone who served on the Anzio beachhead, for they were all certainly in danger. Yet the bulk of our troops up there, the supply troops and reserves and what not, were living either in houses or dugouts, and were living comfortably." Army Major General White agreed: "He [Pyle] is talking about the Infantry soldier, the man with the rifle. Under our bill only he gets the pay. Under Senator Tobey's bill everybody gets the pay."[46] Even under the most extreme hazards and hardships, such as those on the Anzio beachhead, recognition for the infantry should not be compromised.

Debate over Combat Pay in Korea cited virtually the exact same scenario, but a shifted perspective on recognition produced different eligibility outcomes. Just as Pyle tabbed Anzio as his archetypal test case, General J. Lawton Collins cited Normandy to define where Combat Pay should operate. "For the first ten days," General Collins argued, "everybody in that relatively small beachhead was subject to great hazards, and therefore…up until a certain date, yes, anybody operative on shore within that beachhead was in direct support of these front-line combat units; and, therefore, would be entitled to the pay."[47] On the frontlines of battle, combat hazards and

46. *Hearings on S. 1973 and S. 1787* (1944).

47. *Hearings on S. 579* (April 5, 1951).

hardships, though varying to some small degree, were a shared experience. Because all soldiers—infantry and non-infantry alike—endured such conditions, all should be recognized through combat pay. Under this new perspective, eligibility in Korea would depend upon combat conditions, not occupational specialties.

Once recognition became a matter of the conditions of service, it was easier for former opponents to engage in a debate over what service conditions merited recognition. The Army fought to retain narrow eligibility based on the extreme hazards and hardships of frontline service. Whereas infantry exclusivity had prevented the other Services from participating in Badge Pay, the lifting of the occupational ban to Combat Pay freed the Navy and the Air Force to pursue eligibility for their own members. Responding to the potential for combat benefits, the other Services dropped the strategy of outright opposition to combat pay in favor of redefining the service conditions that deserved recognition to gain eligibility for their members who faced some degree of risk, but not the extreme hazards and hardships of frontline combat. This strategic recalibration was apparent in the Services' comments to the Strauss Commission and the Navy's support of H.R. 2766. Eventually, calls to expand eligibility proved more persuasive than attempts to withhold or deny pay. The political coalitions and policy strategies behind all future eligibility expansions can be traced back to this single change in perspective from occupational eligibility to recognition for the conditions of combat service.

In addition to the shift in perspectives, the Combat Duty Pay Act of 1952 authorized a secondary eligibility pathway that granted recognition on the basis of risk alone. Under the law, six days of service in a designated frontline "combat unit" constituted the primary means of eligibility for Combat Pay. However, soldiers also gained eligibility if they were killed or wounded by enemy action in Korea, regardless of their unit assignment.[48] This secondary pathway was deemed necessary for the fair treatment of military casualties (after all, those killed by hostile fire made the ultimate sacrifice of combat) and received little discussion during congressional hearings. However, the presence of this event-based standard in the authorization for Combat Pay marked a departure from the prevailing perspective on conditions-based recognition. Whereas recipients eligible by unit assignment deserved recognition for the hazards and hardships of service, combat casualties received pay solely on the basis of exposure to risk. As such, event-based eligibility dispensed with the dual standard of "hazards and hardships."[49] Once the dual standard was no longer essential for one form of Combat Pay eligibility, pressure mounted to make risk the sole object of

48. Combat Duty Pay Act of 1952, Pub. L. No. 82-488, 66 Stat. 517, 538-539 (1952).

49. The hazards and hardships of infantry service were also cited as justification for Badge Pay for the combat infantry in World War II.

recognition, facilitating pay expansion to varying degrees of risk exposure. During Vietnam, the introduction of zonal eligibility marked the replacement of Combat Pay's dual standard with the perspective stipulating risk, regardless of degree, as the sole object for recognition.

The existence of this secondary, risk-based eligibility criterion also influenced Service strategies toward combat pay. Whereas Badge Pay was restricted to the infantry, and unit-based Combat Pay corresponded to ground forces, hostile casualties were distributed throughout the force. A sailor at sea, for example, may not face combat risks on a "routine and continuing basis," but if he were injured in an isolated incident, eligibility for Combat Pay would follow.[50] Now that their members would be eligible, it was much easier for the Navy and Air Force to drop their principled opposition to Combat Pay, and instead push for broader eligibility. Conveniently, event-based eligibility also provided an alternative perspective—recognition for risk—with which to make their case for further expansion.

In summary, the history of Combat Pay in Korea displayed both continuity with, and change from, Badge Pay. On the surface, little appeared to change from Badge Pay. As before, the rhetoric of recognition backed by the motive of pay equalization won the day in the Congress. Narrow eligibility extended only to those on the frontlines who endured the hazards and hardships of combat. Recipients of other special and incentive pays remained ineligible. Despite challenges, the Congress, the Strauss Commission, and the Department resisted expansion of Combat Pay beyond its narrow intent. As in World War II, only a fraction of the force in Korea—under 20 percent—actually received combat pay.[51]

But beneath the surface, the undercurrents of change promoted the shift from occupational recognition to compensation for service conditions, which erased the line between those eligible and ineligible for combat pay. Once recognition was a matter of circumstance, rather than status, the debate over combat pay shifted from existential to definitional in nature. Freed from occupational bans, former opponents abandoned their stance and assembled a political coalition to advocate eligibility for their own members. Recognition for risk, a perspective intended to grant eligibility for military casualties, emerged as the primary challenger to the dual standard recognizing both the hazards and hardships of combat. Ultimately, the clash of perspectives on recognition in Korea set the stage for the changes that would come in Vietnam.

50. Office of the Assistant Secretary of Defense for Manpower, *Revised Recommendations Relating to Pay and Allowances of Members of the Uniformed Services,* Volume 7, December 31, 1962.

51. *Report of the 1971 QRMC: Hostile Fire Pay,* Second Edition, December 1971; *Military Personnel Historical Report 1953.*

4. Hostile Fire Pay: Recognition for Risk in Vietnam

The present-day form of combat pay evolved as a result of changes made during the Vietnam War. Although initially intending to follow historical precedent, the military quickly replaced narrow, unit-based recognition with broad, zonal eligibility for Southeast Asia. This drastic change in policy resulted from a shift in perspective from conditions-based eligibility and the dual standard of the hazards and hardships of combat to the concept of recognition solely on the basis of risk. Once implemented, the legislative, administrative, and philosophical changes of the Vietnam era would prove permanent. The 1963 authorization of HFP remains intact, and the concept of "recognition for risk," regardless of degree, has attained greater prominence in the intervening decades through the authorization of IDP in the 1980s.

The emergence of the modern form of HFP, however, came at the cost of a clean break with its combat pay predecessors. Embracing the perspective of "recognition for risk" and the policy of zonal eligibility entailed abandoning the pay's narrow administration. The equity, political defensibility, and administrative feasibility of zonal eligibility, proponents argued, justified its greater cost and diluted focus. Formal military recognition of the extreme hazards and hardships of combat, the historical relationship between risk and reward, and recognition's salutary effect on the morale of frontline soldiers were lost in these changes.

A. Preliminary Changes to Hostile Fire Pay Invite Future Expansion

Initial attempts to provide combat pay for members of the Armed Forces in Vietnam emulated the narrow examples of their World War II and Korean predecessors. Calls to reauthorize combat pay followed the initial escalation of the American commitment in 1962. Leading the way once again, the Army offered a proposal modeled on the basis of Korean War Combat Pay. The proposal was reviewed alongside other special and incentive pays by the Office of the Assistant Secretary of Defense for Manpower's Task Force on Military Compensation (hereafter referenced as the Gorham Commission), which affirmed the Army's proposal and, after considering several alternatives, recommended the outlines of a reauthorized combat pay.

The Gorham Commission's report validated recognition, rather than incentives or compensation, as the policy justification for combat pay. Because "the hazards and hardships of combat are currently experienced by a small percentage of the Armed Forces," recognition "payment should be restricted to those individuals normally subjected to the hazards and discomforts of combat." If pay expanded beyond the

frontline combatants, the effect of recognition on military morale and, extrinsically, combat effectiveness would diminish.[52] To maintain combat pay's effects on morale, the Commission explicitly rejected zonal eligibility. As in the Korean War, it indicated that exceptions to the dual standard of "hazards and hardships" should be made for those killed or injured by hostile fire and, echoing the Strauss Commission, crewmembers of ships or aircraft exposed to hostile fire in a given month. From a conceptual standpoint, the Gorham Commission's recommendations represented an exact copy of the narrow perspective behind Korean War Combat Pay.

In its policy recommendations, the Commission appeared to make only minor deviations from historical precedent but failed to anticipate the consequences of its main recommendation: greater administrative discretion for the DoD. In total, the Commission made four policy recommendations: raising the rate of combat pay to $55 per month, renaming combat pay "Danger Pay," delegating administrative discretion over combat pay to the Department, and eliminating the statutory ban on multiple special and incentive pays.[53] The first two recommendations had limited impact, while the second pair opened the door for broader eligibility. All four recommendations were incorporated in the 1963 authorization of HFP. Though seemingly innocuous, the elimination of the ban on multiple hazardous duty pays and the delegation of greater administrative authority to the DoD had far-reaching consequences. Ironically, the proposal for the delegation of authority originated from the Army, which historically desired narrow pay eligibility, but had criticized the inflexible statutory restrictions of the Combat Duty Pay Act. To remedy perceived statutory inflexibilities, the Army recommended that the Secretary of Defense be permanently empowered to "invest combat pay 'during such periods and in such geographical areas as he may prescribe.' "[54] A permanent combat pay would prevent the need for legislative reauthorizations in future conflicts, and greater DoD discretion would enhance responsiveness to combat conditions and mitigate the perceived distributional inequities of the Korean War.

Departmental discretion, especially under the watchful eyes of the Army, seemed to the Commission to have few drawbacks. Despite requesting greater authority, the Army intended to administer combat pay according to historical precedent. Eligibility would be determined by six days' service with a designated combat unit. Receipt of multiple hazardous duty pays, which the Army opposed, would be banned.[55] Without objection from the Air Force and Navy, who deemed the matter "not a

52. *Revised Recommendations Relating to Pay and Allowances of Members of the Uniformed Services.*

53. Ibid.

54. Ibid. Army proposal for combat pay to Secretary of Defense.

55. *Revised Recommendations Relating to Pay and Allowances of Members of the Uniformed Services.*

high priority,"[56] future struggles over eligibility criteria appeared unlikely. Indeed, greater flexibility adhered to the Commission's guiding principle "that the legislation authorizing Combat Duty Pay be both broad enough to include those individuals who are regularly exposed to the tensions and discomforts of combat, as well as those subjected to actual enemy fire, and restrictive enough so as to single out and convey special recognition of the recipients."[57]

The Commission signed off on the Army's proposal for greater administrative discretion, but then broke with the Army and questioned the need for the statutory ban on multiple hazardous duty pays.[58] Both of the Commission's recommendations were forwarded to the President and incorporated into the legislative authorization for HFP in 1963. In the hands of conservative OSD administrators, greater discretionary authority may have amounted to a minor revision; however, greater discretionary authority liberated former opponents in the Navy and Air Force to pursue their preferred perspective—recognition for risk. Like the shift from occupational eligibility, elimination of the statutory ban on multiple special and incentive pays dismantled formal eligibility barriers for aviators, submariners, and other specialists and enlisted these groups into the internal struggle for eligibility restructuring. Within two years, the critics within the Department would emerge triumphant. Their new perspective (recognition for risk) and policy (zonal eligibility) amounted to an about-face of historical precedent. Without the Gorham Commission's recommendations for greater administrative discretion and diluted statutory restrictions, these changes in policy and perspective may not have been possible.

For the most part, the recommendations of the Gorham Commission were incorporated into the Uniformed Services Pay Act of 1963, which authorized HFP under Section 310 of Title 31 of the U.S. Code. Although the Department and the Gorham Commission anticipated that HFP would differ little from Combat Pay in Korea, the delegation of discretionary authority was the most striking feature of the new law. In a side-by-side comparison, the 1952 authorization for Combat Pay amounts to 849 words, more than double the 324 words of its 1963 successor. The 1952 Act, which can be found in Appendix A to this report, provides definitions for ten terms,[59] while the authorization for HFP leaves all definitions and

56. Interestingly, the Marine Corps opposed the legitimacy of combat pay altogether despite the fact that, second to the Army, their members were a primary beneficiary. In their comments to the Commission, the Marine Corps argued that "combat is the fundamental reason for having a military force, and that anyone choosing the military service as a vocation accepts the fact that he is subject to the hazards and discomforts of combat duty."

57. *Revised Recommendations Relating to Pay and Allowances of Members of the Uniformed Services.*

58. Ibid.

59. Combat Duty Pay Act of 1952, Pub. L. No. 82-488, 66 Stat. 517, 538-539 (1952). The 1952 Act contains statutory definitions for the following terms: uniformed services, member, officer, secretary, incentive pay, special pay, combat unit, actual combat on land, military unit, and Korea.

interpretations thereof to the discretion of the Secretary of Defense. Although the Congress anticipated combat pay administration would follow historical precedent, the legislation abandoned all references to eligibility for designated "combat units." Replacing the "combat unit" criterion was the more malleable standard of "duty in an area in which he was in imminent danger of being exposed to hostile fire or explosion of hostile mines and in which, during the period he was on duty in that area, other members of the uniformed services were subject to hostile fire or the explosion of hostile mines." Neither "area," "imminent danger," nor "hostile fire" was defined in the statute. Trusting that the Secretary would maintain tight eligibility standards, the 1963 Act also dropped the six-day requirement and the ban on multiple hazardous duty pays. As a token reference to cost containment, the Act stipulated that HFP be suspended "in a time of war declared by Congress."[60]

The 1963 authorization effected a shift of power over combat pay from the Congress to the Department. After 1963, the Secretary of Defense could not only designate new conflicts or units for HFP, but, more importantly, the Department gained control over the regulations structuring pay eligibility. By law, "any determination of fact" made under the Secretary's regulatory and administrative authority was "conclusive" and "may not be reviewed by any other officer or agency of the United States."[61] At the moment of passage, Departmental discretion appeared likely to preserve the status quo; however, within two years, the internal rulemaking process would institute a complete transformation in the perspective and policy on combat compensation.

Just as the Department and Gorham Commission failed to anticipate future changes to combat pay, the Congress did not acknowledge these consequences of delegating discretion when evaluating and ultimately passing HFP. The legislative history of the Uniformed Services Pay Act of 1963 confirms widely-held expectations that the Department intended to use its newfound authority to maintain the historical precedent of narrow eligibility, but the tone of the congressional debate indicated support behind broader recognition perspectives and eligibility policies. In testimony before the Senate Armed Services Committee Norman S. Paul, Assistant Secretary of Defense for Manpower, suggested that, as in Korea, frontline forces in Vietnam would receive combat pay. Of the "approximately 12,000 troops assigned in South Vietnam," Paul estimated, "between 2,200 and 2,800 of these 12,000 members would qualify for special pay."[62] This figure was subsequently confirmed by Secretary of the Army Cyrus Vance and cited by Representatives Charles E. Bennett (D-FL) and Torbert MacDonald (D-MA), who projected special pay "for the men who are

60. Uniformed Services Pay Act of 1963, Pub. L. No. 88-132, 77 Stat. 210, 216 (1963).

61. Ibid.

62. *Military Pay Increase: Hearings on H.R. 5555, Before the Senate Committee on Armed Services* (July 16–18, 1963).

actually fighting in Vietnam" would cost a maximum of $1 to $2 million per year. To constrain both eligibility and costs, Secretary Vance anticipated the development of regulations similar to those from Korea:

> The Department presently contemplates that such regulations will require that a member must be assigned to and physically present with his unit not less than six days of the month in order to qualify; that the mission of the unit itself must be such that it is subject to hostile fire, or the member must be acting as an adviser with an allied unit subject to such fire. Such unit will not be larger than a brigade, combat command, regiment group, or other similar organization… These are similar to the limitations imposed by regulations during the Korean War.[63]

Representatives of the military assured the Congress that there were no plans to expand the pay to other countries, such as South Korea, or modify eligibility requirements.[64] Zonal eligibility, highlighted by this exchange between Secretary Vance and Senator Howard Cannon (D-NV), was out of the question:

> Sen. CANNON: Would you give the committee your views as to how [the combat pay] provision would be implemented?
>
> Sec. VANCE: Yes sir; I would. This would be implemented by a Department of Army regulation, based upon policy guidance from the Department of Defense. As I see it, at the present time it would apply only to South Vietnam. If it is applied retroactively, I believe it would apply only to southeast Asia. I think that we can clearly define those who should receive such pay. This is not administratively difficult and it should be done.
>
> Sen. CANNON: Of course, it could be argued that all of our personnel in the entire country such as Vietnam, would be subject to hostile fire or explosion. What are your comments on that?
>
> Sec. VANCE: That is not the intent. It would be quite clearly spelled out as to those who would be entitled to it, and those who would not, and it would not include all in South Vietnam. Indeed, I believe it would only include—our estimates are 2,000 or 3,000 of a total of 12,000.
>
> Sen. CANNON: And it would be limited to people actually subjected to the hazards.
>
> Sec. VANCE: Yes, indeed sir.
>
> Sen. CANNON: And you would, I presume, issue regulations that would limit the application, so that would be very clear?
>
> Sec. VANCE: That is correct.[65]

63. H.R. Rep. No. 88-208 (1963).

64. *Hearings on H.R. 5555* (August 5, 1963).

65. *Hearings on H.R. 5555* (July 16–18, 1963).

Keeping with his concern for pay expansion, Cannon successfully argued in favor of a House provision that suspended payment of combat pay during times of war declared by the Congress, when the entire military faced reasonable expectations of exposure to hostile action.[66]

Assurances of continuity with historical precedent masked the growing support within the Congress for the perspective of recognition for risk and the policy changes it entailed. Whereas the predominant perspective behind Combat Pay in the Korean War demanded recognition for both the hazards *and* hardships of frontline combat service, debate over HFP focused almost exclusively on the hazards, *not* hardships, of military service. In the two hearings, three committee reports, and one entry in the Congressional Record on HFP, not one member of the Congress or the military cited the "hardships" or "discomforts" of combat in justification of special recognition, and only one passing mention of "frontline soldiers" can be found.[67] Rather the quote below from the official report of the Senate Committee on Armed Services was characteristic of congressional emphasis on hazards, not hardships:

> During this period of world tension a limited number of members of our Armed forces are assigned to duties in various parts of the world where they are exposed to the hazards of injury and death from hostile fire. This pay will provide tangible recognition for a dangerous task to which only a small proportion of our servicemen are assigned. The Department of Defense strongly urges the enactment of this proposal.[68]

Recognition was still justified, but the conditions deserving recognition were changing. The absence of the historical dual standard of "hazards and hardships" reflected a shift from Korean War era "conditions-based" recognition, which encompassed only severe risks, toward the perspective of recognition for *any* degree of risk. If any risk were sufficient for recognition, then special pay need not be restricted to those serving on the frontlines of combat, as the dual standard had done. Logically, all who were exposed to the same risks as frontline soldiers deserved equal recognition. Although such a concept seems reasonable, it was argued that, in practice, the perspective of recognition for risk could not be contained to the most extreme cases of combat risk. If both frontline soldiers and bomber pilots, for example, were recognized for exposure to extreme risk of routine enemy fire, it would be difficult to exclude other groups exposed to lesser risks from special pay. In Korea, the dual standard facilitated such a division; frontline soldiers endured the most dire risks and severe discomforts, hence the conditions-based perspective successfully restricted recognition to these members. The deletion of the "hardships" element

66. Ibid.

67. 109th Cong. Rec. 8,080 (1963).

68. S. Rep. No. 88-387 (1963).

removed the final conceptual barrier to recognition for those behind the frontlines who faced varying degrees of combat risk. Once freed to pursue recognition (both statutorily and, now, conceptually), formerly excluded groups would advocate and accomplish expansions in eligibility for successively lower levels of risk. As predicted more than a decade earlier, the shift to "recognition for risk" allowed combat pay policy to gradually expand coverage, ultimately ending with eligibility for members facing *any* degree of risk.

B. Explanations for the Decline of the Dual Standard

The unprecedented combat environment in Vietnam and contemporaneous changes in other special and incentive pays may have partially justified departure from the dual standard of "hazards and hardships." Arguably the unique combat risks of a counterinsurgency and proposed changes to Foreign Duty Pay diminished the relevance of hardships to the scope of combat recognition. The dual standard, apologists declared, had developed on the battlefields of Korea where casualties peaked along defined frontlines and risks dissipated towards the rear. In the jungles of Vietnam, conversely, nowhere was safe and combat risk was impossible to estimate. In a counterinsurgency, traditional concepts of "hazards," "hardships," and "front lines" became muddled and unconnected from each other. Arguably, the conditions-based perspective and its dual standard were inappropriate for Vietnam. Hazard alone, the risk-based perspective concluded, was a fair and equitable standard for recognition in such an environment. From this reasoning flowed the corollary of zonal eligibility: all within the area faced risk; all should receive recognition.

Complementing this conceptual shift, contemporaneous changes to Foreign Duty Pay may have also displaced the need to recognize combat hardships, in the minds of legislators. The Uniformed Services Pay Act, which included the authorization for HFP, proposed sweeping changes to various special and incentive pays, particularly Foreign Duty Pay. Judging Foreign Duty Pay for enlisted personnel outside the continental United States wasteful and unnecessary, the Department recommended its repeal in 1963. The Congress declined, but fundamentally restructured Foreign Duty Pay, giving the Secretary of Defense discretion to apply the pay to areas with "undesirable climate, lack of normal community facilities, and accessibility of location."[69] As a result of further revisions in 1998, Foreign Duty Pay is now known as Hardship Duty Pay and is available in "places where living conditions are substantially below that which members generally experience in the United States" as designated by the Secretary of Defense.[70]

69. Ibid.

70. Under Secretary of Defense for Personnel and Readiness, *Military Compensation Background Papers: Hardship Duty Pay*, Sixth Edition, 2005.

One could argue that the incorporation of undesirable deployment conditions into eligibility for Foreign Duty Pay substituted for combat pay's dual standard, but this line of reasoning is misplaced and historically inaccurate. With respect to legislative history, there is no evidence, either explicit or implied, that the changes in Foreign Duty Pay were related to the reauthorization of combat pay. The military favored wholesale elimination of Foreign Duty Pay, and the revised Foreign Duty Pay shared neither the intent, eligibility, nor objectives of the dual standard of combat pay. On a conceptual level, combat pay existed to *recognize* service under conditions of extreme hazard (and hardship); Foreign and Hardship Duty Pays compensated for the "greater-than-normal rigors" and substandard living conditions of designated deployments. The pays had distinct eligibility cohorts as well. Whereas the same level of combat pay was available to officers and enlisted personnel alike, only enlisted personnel received Foreign Duty Pay, which fluctuated in value by enlisted rank. Most importantly, the revised Foreign Duty Pay and the dual standard of combat pay did not reward the same service conditions. The former compensated for routine, localized inconveniences such as intemperate climates, isolated locations, and underdeveloped infrastructure and technology. The latter recognized the extreme hardships inherent only in combat duty including "constant exposure to extremes of temperature; going sleepless and sleeping in rain and mud; fighting for days without relaxation from strain or lightening of the monotony."[71] Just as limited telephone access was not comparable to the crippling fear of enemy bombardment, the revised Foreign Duty Pay could not possibly substitute for the recognition of combat hardships provided by the dual standard of combat pay.

C. Policy Shift to Zonal Eligibility

The initial implementation of HFP followed the narrow precedent of its Korean War predecessor. In November of 1963, the Department released Department of Defense Instruction (DODI) 1340.6 which reprised the restrictive eligibility criteria of Combat Pay. As in the past, assignment to a designated "combat unit not larger than a brigade" determined eligibility for HFP. The six-day service requirement was also revived, as well. In deference to the recommendations of the Strauss and Gorham Commissions, the instruction relaxed some of the more onerous restrictions on eligibility for aircraft and naval vessels, especially minesweepers.[72]

Initially, the Department kept to the narrow confines of DODI 1340.6. As an example, in May of 1964, the Department denied an eligibility claim from the U.S. Health Service for military surgical teams aiding the civilian population in South

71. H.R. Rep. No. 78-1700 (1944).

72. Department of Defense, *Instruction 1340.6*, November 21, 1963.

Vietnam. Despite the risks the surgical teams faced, the Department judged they were not "attached to or supporting combat units or assisting Vietnamese combat units."[73] Likewise, the Department denied a July 1964 eligibility request by the Advanced Research Projects Agency (ARPA) for members overflying combat territory during ARPA operations. As a result of the Department's narrow interpretation of the 1963 Combat Duty Pay Act, only approximately one quarter of U.S. forces stationed in Vietnam—roughly the same fraction predicted in congressional hearings—received HFP prior to 1965.[74]

However, in May of 1965 the Department responded to a request from the Commander in Chief for the Pacific by deleting many of the restrictive provisions of DODI 1340.6. Under the new implementing instructions, which are excerpted below, the following three changes were made:

> (1) All personnel physically located in areas designated by the Secretary of Defense were eligible for Hostile Fire Pay with the stipulation that Unified Commanders concerned had the prerogative to further restrict the pay to specific locations within the area designated.
>
> (2) The six-day criterion was eliminated.
>
> (3) Any members killed, wounded, or injured by hostile fire, explosion of hostile mines, or any other hostile action any place in the world were granted Hostile Fire Pay regardless of whether or not the incident occurred in a previously designated area.[75]

The first change revolutionized the official perspective and policy behind combat pay. Breaking with World War II and Korean War precedents, occupation and unit assignment were no longer elements in the eligibility process. No more would combat pay be reserved for the infantry or frontline soldier. In place of unit assignment, the instructions extended eligibility to "areas designated by the Secretary of Defense." Zonal eligibility, the goal of combat pay critics since 1953, had been achieved. The empowerment of Unified Commanders to "further restrict the pay" within designated areas proved a feeble attempt to curtail pay expansion. Lacking incentive or inclination, rarely did Commanders in Vietnam or elsewhere impose more stringent standards upon the Secretary's designations. With a simple revision, the number of recipients (and budgetary cost) of HFP quintupled to include all military personnel within Vietnam (see Figure 1).

---

73. Deputy Assistant Secretary of Defense for Military Personnel Policy, *Memorandum for the Assistant Surgeon General for Personnel, U.S. Public Health Service: Special Pay for Duty Subject to Hostile Fire,* August 20, 1964.
74. *Report of the 1971 QRMC: Hostile Fire Pay,* Second Edition, December 1971.
75. Ibid.

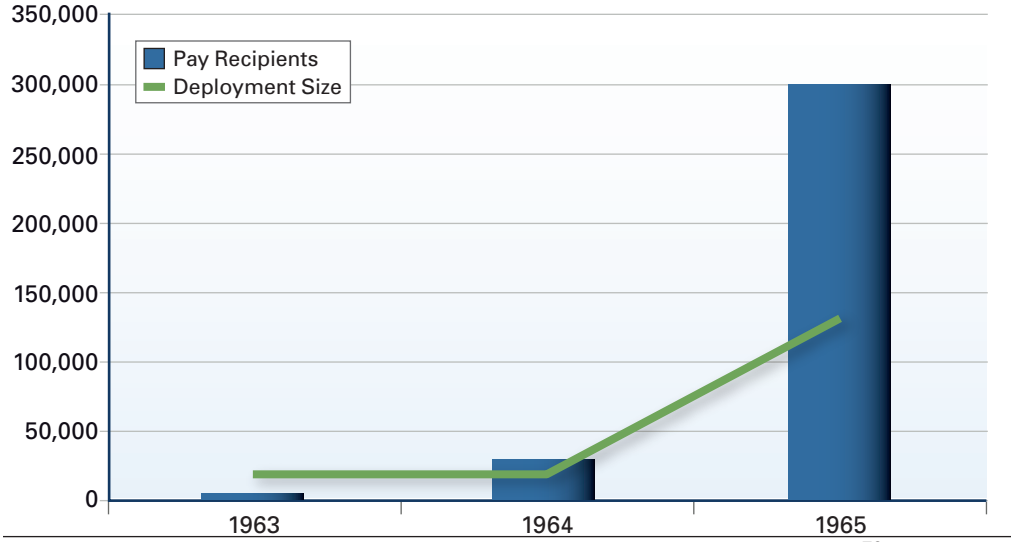


Figure 1. Hostile Fire Recipients Before and After Zonal Eligibility[76]

D. Theories behind the Emergence of Zonal Eligibility

The reasons for such an abrupt policy reversal are not apparent. Previous studies fail to provide insight into the internal DoD decision-making process that resulted in the 1965 revision. Primary sources indicating the rationale for the switch to zonal eligibility are not available in the public domain or historical record. However, the 2nd QRMC, without citing a particular source, suggested that changes in the combat environment supplied the primary motivation for the policy reversal:

> The rationale for the first provision [listed in section 4.C above] was essentially that the evolution of the war and the engulfment of more extensive land areas in Vietnam, coupled with increased United States participation and changing roles and missions, dictated a changed approach to insure [sic] an equitable basis upon which entitlement to Hostile Fire Pay could be based.[77]

The QRMC's explanation is reasonable yet unsatisfying. Unarguably, Vietnam was different from Korea, and, as previously documented, these differences influenced policymaker perspectives on risk and recognition. However, even if risk conditions supply the underlying causes, the collective actions of individuals and organizations

76. Deployment size reflects the number of troops deployed to designated areas at a given time. Pay recipients reflects the number of troops receiving HFP in a given year. Because individual deployments do not necessarily coincide with calendar years, the annual number of recipients under zonal eligibility will always exceed the deployment size at a given time.

77. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

are required to effect policy change. Although the QRMC's identification of the root cause of zonal eligibility in the Vietnam risk environment is likely correct, the explanation excludes the historical and political process that yielded policy change.

Although the details of this epochal episode are unavailable, two theories may be offered as speculation: a scenario in which the Department itself pushed for administrative changes from the top down, and one in which concerted pressure from the Services prompted policy change from the bottom up. Under the first scenario, the Department enters Vietnam intending to administer HFP according to narrow historical precedent. Despite these intentions, when faced with the new combat environment—counterinsurgency—and a massive manpower buildup (from 15 thousand to 129 thousand troops), the Department faced overwhelming administrative challenges determining what qualified as a "combat unit." As administrative burdens began to consume undue manpower, provoke challenges and complaints, and detract from the overall war effort, the Department, on its own, made the decision to abandon the cumbersome process for the more transparent policy of zonal eligibility. Such a theory derives its credibility from repeated congressional (and occasionally Departmental) criticism that determining "unit-based" eligibility was administratively taxing and a waste of Departmental resources.[78]

However, there are many reasons to be skeptical of top-down, Departmental explanations. For one, most of the criticism cited in the historical record is attributable to opponents of narrow pay eligibility. When pressed, sympathetic members of the Congress and the Department itself repeatedly cited few problems with the administration of Combat Pay in the Korean War.

> Sec. VANCE: I think we can clearly define those who should receive such pay. This is not administratively difficult, and it should be done.
>
> Gen. WHEELER: As Secretary Vance mentioned, we have had our people check out possible administrative difficulties. We believe that we can handle this without undue strain.

78. A small sample of critiques of the "difficulty" of administering Korean War Combat Pay:

> Rep. FORD: For every fighting outfit that goes into the field, for every ship that goes into combat waters, for every aircraft unit that sends a plane into combat, you are going to have to have more administrative officials trying to interpret these provisions than you have people in combat. You are going to have people determining whether or not a ship, a plane, a group, or an individual has been in combat under the definition of this amendment…Your combat units will be bogged down with red tape. (98th Cong. Rec. 9,434 (1952)).
>
> Rep. VAN ZANDT: Obviously no records were maintained for the specific purpose of designating units that were actually fired on for certain days prior to the enactment of the Combat Pay Act, thus the administration of the act retroactively is expensive and difficult. (1953).

> Rep. BENNETT: Combat pay or hostile fire pay has already been the law, with certain modifications, in World War II and the Korean war and no administrative difficulties were encountered in its administrations.[79]

Admittedly, the fluid counterinsurgency in Vietnam presented a more complex administrative challenge than the stalemated frontlines of Korea, but these differences did not necessarily preclude the Department from drawing *any* distinction among the various hazards (and hardships) experienced by American forces in Vietnam. To say that headquarters personnel or offshore forces, for example, faced risk in no way implies that their expectation of hostile fire was comparable with infantry or Marines on jungle patrols. Wherever such crude demarcations failed to recognize actual hostile fire outcomes, pay for those killed, wounded, or exposed to enemy action arguably would remedy eligibility inequities. Furthermore, the Department's actions immediately following the release of the restrictive DODI 1340.6—the denial of eligibility for surgical teams and ARPA pilots in Vietnam—suggested that its resolve to restrict eligibility remained intact, at least as of August 1964.

The apparent absence of an internal deliberative process accompanying the policy change casts further doubt on top-down explanations. Admittedly, "unit-based" administration of combat pay in Vietnam likely was more challenging and burdensome in Vietnam than Korea, but, when measured against the historical record, it seems unlikely that the Department, on its own, reversed eligibility policy within two years. Administrative feasibility appears, at best, to be a secondary contributing factor to the emergence of zonal eligibility.

Concerted pressure from the Services, the scenario offered by the second theory, may be a more likely cause of policy change. On the side of narrow eligibility stood the Army, with members of the combat infantry as core supporters of "unit-based" recognition for the hazards *and* hardships of frontline combat. In opposition to precedent and policy, the Navy and Air Force backed zonal eligibility to extend and (from their perspective) equalize benefits for their own members who faced risk but were ineligible under present regulations. Two other players—the Congress and the Marine Corps—largely withdrew from the proceedings; the former delegated discretionary authority to the DoD, and the latter was unconvinced that combat pay was justified at all. Without these historical (Congress) and situational (the frontline Marines) potential allies, the Army stood alone before Departmental decision makers who, although sympathetic to narrow eligibility, on this theory declined to impose their will on legislative or administrative struggles.

79. *Hearings on H.R. 5555* (July 16–18, 1963).

Proponents of narrow eligibility had to defend existing prerogatives. The incumbent coalition had nothing to gain from the already favorable status quo and faced only intangible penalties to morale upon a loss. In contrast, challengers from the Navy and Air Force benefited little from existing policies but stood to gain considerably from zonal eligibility. Tasked with adjudicating the inter-Service debate, the senior officials in the OSD initially favored the Army from a philosophical and cost perspective, but preferred to minimize interagency conflict and alleviate administrative distractions from the war at hand.

The combat environment in Vietnam tipped the scales further. In a dynamic counterinsurgency, the historical linkage between frontline service, enemy hazards, and combat hardships was eroding. In the legislative record, support for the new perspective of recognition for risk increased, while support for the dual standard of "hazards and hardships" decreased. Even the Army, which had resisted past expansions, cautiously supported eligibility for "ground troops immediately to the rear of combat units [who] also live in discomfort and are exposed to danger."[80]

For a time, OSD held its ground, but given the balance and motivation of the Services and OSD's desire to minimize conflict, expansion was inevitable. Unfortunately, no internal memos by the Army, Navy, Air Force, or the Office of the Secretary of Defense have been found that would confirm or refute this speculative account of the emergence of zonal eligibility. Although the historical record leaves much to be desired, in the author's opinion it seems likely that the Navy and Air Force, backed by the perspective of recognition for risk, won the "inside" battle against the Army to achieve eligibility for HFP throughout the Vietnam combat zone.

E. Entrenchment of Zonal Eligibility

From this point forward, zonal eligibility proved impossible to contain. As early as 1965, OSD and external commissions introduced numerous proposals to rein in expanded eligibility, all of which failed. In 1965, the OSD supported H.R. 9075, which tied a raise in the rate of HFP to $65 per month to tightened eligibility standards for members passing through the combat zone but not assigned to Vietnam. Anticipating the exclusion of bombers from the Strategic Air Command based in Guam from HFP, the Air Force immediately opposed the revision.[81] In a memorandum to the Assistant Secretary of Defense for Manpower, the Air Force argued:

80. *Differential Pays for the Armed Services of the United States.*

81. *Report of the 1971 QRMC: Hostile Fire Pay,* Second Edition, December 1971.

> The administration of Hostile Fire Pay on a simplified geographical basis is preferable to a system depending in part on determinations by individual judgments. Providing the degree of risk is sufficiently great to justify Hostile Fire Pay for other members in a designated area, all persons in or over the area should receive the pay.[82]

The Air Force prevailed, and the Department's proposed changes were dropped from the legislation (but the pay raise was not), which passed on August 21, 1965. Subsequently, the Department expanded, not retracted, eligibility for members stationed outside designated Hostile Fire zones with a 1968 Directive granting pay "to all members of a group…ship…[or] airplane…when only one member may be killed or wounded by hostile fire…[or] when a hostile act occurs, but no one is wounded or killed."[83] Initiated by the Navy in response to the surprise attacks on the USS Liberty and USS Pueblo, no Air Force objections accompanied the directive.[84]

As the war progressed, outside forces began to question the practice of zonal administration of HFP. The most authoritative of these critiques originated from the President's Commission on the All-Volunteer Force, commonly known as the Gates Commission. As part of President Nixon's efforts to transition to an all-volunteer military force, the Gates Commission reviewed all existing special and incentive pays in the 1970s. Despite combat pay's lack of a manpower justification, the Commission judged the purpose of recognition for combat risks to be justified "as a matter of equity."[85] The administration of HFP, however, needed work. Zonal eligibility, though intended to equalize recognition on the basis of risk, produced inequities of its own:

> A small fraction of the military force is sometimes required to serve under conditions of risk to life and limb that are not only greater than those faced by most service personnel but exceptionally high even among those serving in a combat zone. As a matter of equity as well as to provide compensation flexibility in conflict situations, the Commission recommends that a new and higher maximum level of hostile fire pay of $200/mo be enacted. Eligibility for this maximum level of hazardous duty pay should be restricted to those who in the course of their duties are regularly exposed to hostile fire and only for the period of such exposure. The current levels of hazardous duty pay should be provided to others in the combat zone who take higher than normal risks but are not regularly exposed to hostile fire.[86]

82. Department of the Air Force, *Memorandum for the Assistant Secretary of Defense for Manpower: Revision of Hostile Fire Pay Directive,* October 8, 1965.

83. Department of Defense, *Directive 1340.6*, August 1, 1968.

84. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

85. President's Commission on an All-Volunteer Armed Force, *Report of the President's Commission on an All-Volunteer Armed Force*, February 1970.

86. Ibid.

In response to zonal eligibility, the Gates Commission recalled earlier historical justifications for combat pay. Conceding some role for recognizing the risks within a designated combat zone, the report argued that the wide distribution of risk within such zones awarded equal recognition for unequal risks. Exposure to the most extreme risks—those of frontline combat—was both predictable and worthy of higher recognition, the Commission argued. Lacking a distinction based on the degree of risk, the significance of the pay and its impact on military morale might diminish. Accordingly, the Gates Commission proposed a two-tiered pay that conveyed extra recognition for actual combat beyond the generalized hazards within a combat zone.[87] This formulation—though entirely reliant on the perspective of recognition for risk—represented a hybrid of the current policy of zonal eligibility and its predecessor, Combat Pay for frontline soldiers in the Korean War.

The recommendations of the Gates Commission were opposed by the Congress and the military. In June of 1971, Senator Mark Hatfield (R-OR) introduced a version of the Gates proposal as an amendment to H.R. 6531, a bill amending the Selective Service Act of 1967.[88] Despite preserving existing payment levels for zonal eligibility, the amendment immediately encountered skepticism and hostility. Leading the congressional opposition, Chairman of the Armed Services Committee John Stennis (D-MS) argued that the Commission's proposed changes to HFP would be inequitable and administratively infeasible:

> The degree of exposure to combat is difficult to determine. The Vietnam War is a perfect example, as I have already indicated of this fact. Areas which under previous type combat operations would commonly be considered safe, in many cases are as dangerous as a military fire zone. A combat exposure role and a combat area are unpredictable and changeable. An amendment such as this amendment proposes would create gross inequities, even more so than in Korea where there was far more of a battleline, a battle area, and a hostile fire area.[89]

After a short debate, Senator Hatfield's amendment was rejected by a margin of 27 to 47, with 26 members not voting.

The 2nd QRMC conducted a more thorough review of the proposed two-tiered HFP, but arrived at the same result as Chairman Stennis. On the whole, the 2nd QRMC was favorably disposed toward the current form of HFP. Reviewing the recent developments in the administration of HFP, the QRMC observed that "During the eight years which have elapsed since the enactment of Public Law 88-132, a broad and

87. Ibid.

88. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

89. 117th Cong. Rec. 59,581 (daily ed. June 21, 1971).

flexible policy has evolved" that "has proven to be responsive to Vietnam and other contingencies." Zonal eligibility was preferable to the "numerous inequities" caused by "conservative application of the law" based on unit assignment. Judging the pay "valid," "credible," and "flexible," the QRMC concluded there was little need for revision.[90]

The 2nd QRMC feared that the Gates Commission's proposal for a two-tiered pay would upset the carefully-crafted balance between risk, recognition, and equity that HFP had achieved. The QRMC surveyed the Services' positions toward the proposal, with the following results. Unsurprisingly, the Army agreed that "the amount of HFP should vary on the basis of increasing degree of probability of exposure to hostile fire" and proposed three pay levels within designated combat zones. All the other Services opposed the creation of a multi-tiered HFP; the Navy judged such proposals inequitable, while the Marine Corps and Air Force cited its administrative infeasibility. In its report, the QRMC sided with the majority on grounds of equitability and administrative concerns. Like the "unit-based" pays before it, the QRMC feared that the administration of a two-tiered pay system was incapable of recognizing the "nature of the Vietnam conflict where no clear-cut battle lines exist and where 'safe zones can be more dangerous than military fire zones.' "[91]

With respect to equity, the QRMC judged that a two-tiered pay would insufficiently recognize the hazards faced by mariners, aviators, and casualties of hostile action. With respect to combat casualties, it was inequitable that members killed, wounded, or missing in action were eligible for only one day of the higher pay rate, while unharmed members of their units continued to receive the increase for twenty days thereafter. A comparison of historical casualty rates for ground forces with Naval and Air Force personnel, the QRMC argued, also proved problematic for tiered compensation. While the Army in Vietnam experienced similar casualty rates in routine operations as in fixed battles, the Air Force and Navy in World War II suffered the overwhelming majority of combat deaths in short-lived engagements like the battle of Midway and the bombardment of Schweinfurt, Germany. "If the Gates recommendations were applied," the QRMC warned, ground units "would have received the higher rate for much longer periods than those suffering greater casualties in more intense yet shorter clashes with the enemy."[92]

In addition to administrative and equity concerns, the Gates Commission's report on the transition to an all-volunteer force provided an unfavorable context for the proposal for a two-tiered combat pay. The overriding purpose of the Gates Commission was to assess and propose policies that would meet military

90. *Report of the 1971 QRMC: Hostile Fire Pay,* Second Edition, December 1971.

91. Ibid.

92. Ibid.

manpower requirements in a zero draft environment.[93] Consequently, like the Hook Commission before it, the Gates Commission viewed special and incentive pays as tools to induce accession and retention in undersupplied skills or duties. Because the recommendation emerged from a context of manpower incentives, the tiered HFP proposal was received with skepticism by the QRMC. Despite assurances by the Gates Commission that the purpose of the higher tier was to *recognize* (not incentivize) exposure to extreme hazards, the QRMC feared that "a differential rate based on exposure has the connotation that the purpose of the pay is attraction and retention rather than special recognition as shown in this study."[94] Reprising the positions of historical opponents to pay differentials (see discussion on Badge Pay under "Political Struggles over Authorization of Combat Pay," page 16), the QRMC argued that "pay based on exposure equates risk with monetary compensation and implies that is possible to place a price tag on human life." Both claims—that tiered pay incentivized risk or placed "a dollar value on human life"—were inconsistent with historical precedent and the plain language of the Commission's proposal.[95] In Korea and the early stages of the Vietnam conflict, combat pays existed solely to recognize the extreme hazards (and hardships) that the proposed higher tiers targeted. However, the proposal's context within the Gates Commission report may have proved too daunting to overcome.

Following the report of the 2nd QRMC and the drawdown of American troops in Southeast Asia, the issue of HFP receded from public consciousness. HFP recipients dropped from a peak of over 1.25 million in 1968 to a mere 4,612 by 1974.[96] Throughout the 1970s, designations for Vietnam and the surrounding areas remained active to continue payment of Hostile Fire benefits to prisoners of war and missing soldiers. New designations would not come until the Iranian Hostage Crisis at the end of the decade. With few recipients and greatly reduced expenditures, no further actions were proposed or taken on HFP until 1983. After repelling several challenges in the later stages of the Vietnam War, the status quo of HFP—the perspective of "recognition for risk" embodied in the policy of zonal eligibility—became a widely accepted and entrenched component of military compensation.

In summary, the Vietnam era featured sweeping changes to both policy and perspective on risk recognition that gave birth to the modern form of combat pay. As a result of the unprecedented combat environment in Southeast Asia and

93. A substantial, across-the-board increase in basic military pay was the Commission's most prominent recommendation, and basic pay issues received the greatest analytical attention.

94. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

95. Ibid.

96. Statistical Information Analysis Division, *Military Personnel Historical Report 1968–74*, Department of Defense, 2011.

the advocacy of former opponents in the Services, the perspective demanding recognition for risk, regardless of degree, replaced the dual standard recognizing the extreme "hazards and hardships" of frontline combat. Despite intending to follow historical precedent, the Department, using its newly-authorized administrative discretion, reversed "unit-based" eligibility criteria in favor of broad zonal eligibility. Broadened eligibility, though more relevant to combat risks in Vietnam, quadrupled pay expenditures and sacrificed the narrow focus on frontline morale of previous combat pays. As a result of eligibility changes, HFP expanded dramatically from its early projections of two to three thousand recipients to well over one million beneficiaries by the end of the 1960s. The changes in policy and perspective proved durable, surviving numerous challenges during the Vietnam era and persisting, largely unchanged, to the present day.

5. Hostile Fire Pay/Imminent Danger Pay: Expansion of Risk Perspectives to Lower Hazard Thresholds

The Vietnam-era shifts in policy and perspective on risk recognition were carried to their logical conclusion in the decades that followed. Despite the lack of combat risks comparable to Vietnam, Korea, or World War II, combat compensation in the 1980s and 1990s grew more, not less, generous. In part due to changes in the nature of combat threats and military deployments, eligibility for combat pay expanded to lower-risk areas with the authorization of IDP in 1983. IDP embraced continuity rather than change with respect to prevailing perspectives on risk recognition. With the absence of large-scale, sustained conflicts and the rise of peacekeeping operations and terrorism threats in the decades following Vietnam, the political and philosophical foundations of combat compensation remained unchanged, and pay policy adjusted on the margins. Through continuity more than change, the modern form of combat pay has evolved.

A. "Recognition for Risk" and the Authorization of Imminent Danger Pay

The authorization of IDP represents the sole significant policy change to combat pay in the decades following Vietnam. The new entitlement resulted from the adaptation of the perspective of "recognition for risk" to the lesser hazards of low-intensity conflicts that characterized contemporary military deployments. After Vietnam, eligibility for HFP dwindled to only a handful of soldiers per year. From 1976 to 1982, an average of 506 soldiers per year received HFP, down from a peak of over 1.28 million in 1968.[97] Accompanying this precipitous decline, military deaths

97. Under Secretary of Defense for Personnel and Readiness, *Military Compensation Background Papers: Military Compensation Statistics Tables*, Sixth Edition, 2005.

from hostile actions hovered around zero for the entire period.[98] With few recipients and fewer casualties, HFP vanished from the political scene for nearly a decade.

The absence of eligibility, casualties, or political attention did not imply a similar absence of risks in military deployments. After Vietnam, the military shrunk its size but expanded its scope. Whereas thirty percent of the nearly two million members of the Armed Services were deployed to Southeast Asia in 1970, twenty-two percent of the Armed Services were scattered across 122 different nations in 1979.[99] In 1982, attachments of at least thirty troops were deployed to potentially dangerous countries including Korea, Somalia, Colombia, Sudan, Turkey, and El Salvador. Although none of these locations was eligible for HFP, the latent risks of domestic instability and hostile fire in these deployments would eventually be realized.

Following three years without a hostile military death, the terrorist bombing of the Marine Corps barracks in Beirut resulted in the deaths of 241 Marines. Months earlier, Lieutenant Commander Albert Schaufelberger was gunned down by Sandinista guerillas, who threatened further violence in San Salvador.[100] Both incidents drew public attention to the previously unacknowledged hazards of foreign deployments and sparked a political debate on combat compensation. That soldiers in both countries were ineligible for HFP prior to the unanticipated tragedies drew the attention of critics in the Congress and the military. Continued exclusion from combat pay, critics argued, was unacceptable from the perspective that risky deployments deserved recognition.

In response to the events in Lebanon and El Salvador, Representative Patricia Schroeder (D-CO) introduced an amendment to the Department of Defense Authorization Act of 1984 granting "HFP for members serving in areas threatening imminent danger." In brief congressional testimony, Representative Schroeder argued that the existing system of determining eligibility for HFP on a "case-by-case basis" was inadequate for recognizing the risks faced by "an American soldier or sailor in Beirut or San Salvador." It was "wrong," Schroeder claimed, that the family of a member killed by hostile fire only "gets one month's pay of $65" for the death of their loved one. In place of event-based eligibility, Schroeder proposed extension of zonal eligibility to foreign areas where servicemembers were "subject to the threat

98. Statistical Information Analysis Division. *Military Casualty Information: Active Duty Military Deaths 1980–2010*, Department of Defense, 2011.

99. Statistical Information Analysis Division, *Military Personnel Historical Report 1979*, Department of Defense, 2011.After longstanding deployments in Germany (52.2% of overseas force) and Japan (10.1%), Korea at 8.5% of the overseas deployment represents the largest potentially-hostile deployment. The remainder of the top ten deployments are the United Kingdom (5.0%), the Philippines (3.1%), Italy (2.6%), Panama (2.1%), Spain (1.9%), Turkey (1.1%), and Greece (0.7%).

100. 129th Cong. Rec. 20,971 (1983).

of physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions." Under Schroeder's proposal, soldiers deployed to designated dangerous areas such as Lebanon or El Salvador would receive IDP of $65 per month even if not exposed to actual hostile fire.

Schroeder's proposal received near-unanimous support within the executive and legislative branches. After removing retroactive eligibility for Lebanon and El Salvador at the urging of the administration, the amendment passed without dissent on the floor of the House of Representatives. With the passage of the Defense Authorization Act on September 13, 1983, IDP became law. Immediately upon implementation on October 1, the Secretary of Defense designated Lebanon and El Salvador for the newly authorized pay. Accompanying Operation Urgent Fury, Grenada and Carriacou were designated later in the month. As a result of these new designations, the number of recipients of the new HFP/IDP jumped from an all-time-low of 4 in 1982 to 3,646 in 1984. Following the drawdown of operations in Grenada, Lebanon, and El Salvador, the number of recipients dropped to approximately 300 for the next two years (see Figure 2).

Unlike previous policy changes, the authorization of IDP in 1983 did not result from a significant shift in perspectives on combat pay. Ever since the fundamental changes to HFP in 1965, the perspective of "recognition for risk" had guided the administration of combat pay. Historically, hostile risks were concentrated in areas where the United States was engaged in open warfare with a known adversary. In the

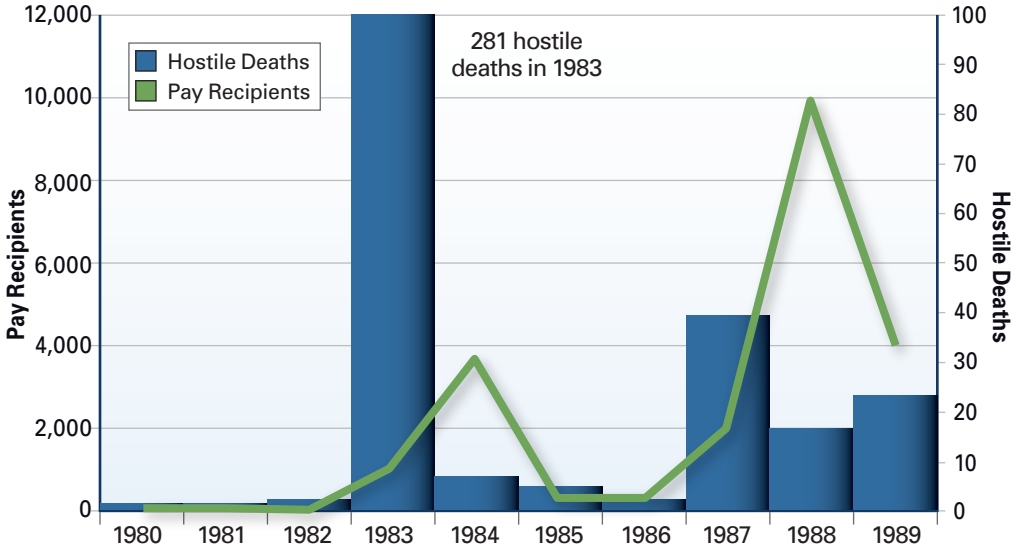


Figure 2. Pay Recipients and Hostile Deaths in the 1980s

absence of open warfare, the threat distribution devolved to lower-intensity conflicts where American forces lacked a defined enemy but were still exposed to hostile risks. From the perspective that risks—be they obvious or latent—deserved recognition, both circumstances merited recognition. The counterargument—that the extreme risks of wartime deserved greater recognition than the lesser hazards of peacetime—had already been rejected by the refusal to differentiate between risk experiences (either through "frontline" eligibility standards or multi-tiered HFP) within designated combat zones. IDP applied this logic of undifferentiated recognition *within* combat zones to a designation policy for recognition of risks *between* combat zones. If the risk of hostile fire, not its degree or its incidence, merited recognition, all hazardous deployments, from outright war to domestic instability, deserved eligibility for combat compensation.

IDP was intended to remedy the difficulties faced by HFP in dealing with the low-intensity hazardous deployments of the post-Vietnam era. The HFP standard for zonal designation—"duty in an area in which he was in imminent danger of being exposed to hostile fire…and in which, during the period he was on duty in that area, other members of the uniformed services were subject to hostile fire"—was effective in recognizing open war but less capable in responding to latent risks. Prior to 1983, the Department attempted to cope with the policy void through retroactive recognition of potential hazards. Retroactive designation typically followed combat casualties in the 1960s and 1970s. The deaths of 15 soldiers in the "brushfire conflict" of 1967 and 1968 led to the designation of a 75 square mile area surrounding the Korean Demilitarized Zone. Hostile fire on American aviators over Laos precipitated another designation in 1964.[101] Finally, the capture of the American Embassy in Tehran brought HFP eligibility to Iran in 1979.[102] In each of these episodes, the retroactive recognition of unacknowledged combat risks was a direct consequence of adapting the HFP policy to ostensibly peacetime deployments. The trend continued when potentially hazardous military deployments in Lebanon and El Salvador went undesignated prior to the outbreak of anti-American violence.

Changes in the threat environment from outright war to low-intensity deployments demanded a change in the eligibility standard for combat pay. Accommodating the new risk context, the Congress authorized IDP to resolve the inadequacy of HFP in recognizing hostile risks outside of war zones. The new authorization replaced the anachronistic wartime standard ("imminent danger of being exposed to hostile

101. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

102. DoD Financial Management Regulation, *Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 10 "Special Pay-Duty Subject to Hostile Fire or Imminent Danger,"* Volume 7A, Chapter 10, May 2009.

fire…[while] other members of the uniformed services were subject to hostile fire")[103] with criteria that were more relevant to the risks of peacetime operations. Under IDP, soldiers would be eligible while "on duty in a foreign area in which he was subject to the threat of physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions."[104] No longer was open war a prerequisite for risk recognition. By supplanting the outdated standard of warfare with "the threat of physical harm or imminent danger," the new authorization reemphasized the fundamental purpose of combat pay: "recognition for risk." As such, IDP embraced, rather than rejected, the consensus surrounding the prevailing policy and perspective on combat pay.

The absence of political resistance to IDP indicated its consistency with the prevailing perspective on risk recognition. When introduced as an amendment to the Defense Authorization Act of 1984, the proposal escaped criticism in the Congressional Record. With Chairman of the House Armed Services Subcommittee on Military Personnel, Les Aspin (D-WI) recommending immediate approval, the measure passed under unanimous consent by voice vote.[105] Neither the Department nor the Services commented on the proposal, indicating tacit approval of the new authorization. Unlike previous changes to HFP, all of the Services stood to benefit from the broader entitlement, and none made significant sacrifices to achieve the change. Because the new pay amounted to an adaptation of existing policy to new combat circumstances, it aroused little political controversy and carried less historical importance than previous revisions to combat pay.

B. The Fifth QRMC's Challenge to Combat Pay

The only credible challenge to HFP/IDP during the post-Vietnam era originated from the 5th QRMC of 1984. The 5th QRMC, like the 2nd QRMC of 1971, was tasked with reviewing all military special and incentive pays.[106] With respect to HFP, the 5th QRMC, unlike its predecessor, questioned whether the expansion in zonal eligibility had gone too far. Hostile risks, the QRMC agreed, still deserved

103. Uniformed Services Pay Act of 1963, Pub. L. No. 88-132, 77 Stat. 210, 216 (1963).

104. S. Rep. No. 88-352 (1963).

105. 129th Cong. Rec. 20,971 (1983).

106. Although the review included HFP/IDP, its most influential recommendations concerned other hazardous duty incentive pays. Here, the QRMC broke with the precedent of the Gates and Hook Commissions and abandoned the purpose of manpower incentives as justification for special pay. Rather, the QRMC suggested that those assigned to dangerous duties should be compensated for the hazards they experience. Accordingly, the QRMC recommended that officer-enlisted pay differentials for various hazardous duty pays be eliminated, and the monthly rate for pays like parachute duty pay and flight deck duty pay be raised to $110. Officer-enlisted special pay differentials were eliminated in the Department of Defense Authorization Act for 1986.This had an immediate impact on HFP/IDP when another QRMC proposal—linking HFP with the "lowest rate for hazardous duty incentive pay"—was enacted in the same bill.

recognition, but the distribution of such risks within and across designated combat zones was far too wide. Echoing the Army's historical reasoning, when minimal risks received the same recognition as "the heat of battle," combat pay's impact on military morale was diminished. To reverse the deterioration of combat pay effectiveness while upholding the purpose of risk recognition, tighter eligibility criteria were needed to distinguish between individuals with high and low risk exposures.[107] Due to the timing of the 5th QRMC, its report made no reference to the newly authorized IDP, which established an even lower risk threshold for combat pay eligibility.[108]

The QRMC considered several policy alternatives to better align pay eligibility with risk exposure. All of the alternatives were firmly planted within the prevailing perspective of recognition for risk; none proposed reversion to historical criteria such as occupational eligibility or the dual standard of "hazards and hardships" of combat. The majority of the QRMC's recommendations represented tweaks to the existing policy of zonal eligibility in which the Secretary of Defense would issue distinct and independent designations for high and low risk Hostile Fire Areas within and among combat zones. High risk designations would cover "territories and/or water and air space where individuals are directly engaged with the enemy on a continuing basis." Low risk areas would consist of "territories and/or waters and air space where individuals are subject to a greater than normal risk on a continuing basis but are not regularly exposed to danger." To reflect risk differentials, either eligibility criteria or HFP levels would vary between high and low risk areas. In one alternative, the six-day eligibility criterion was reinstated for low risk areas but not for high risk areas. In another, a two-tiered pay of $165 for high risk areas and $110 for low risk areas was proposed.

When reviewing the QRMC's alternatives, the Services' policy evaluations corresponded to the expected costs and benefits from proposed policy changes. The Army strongly preferred the more restrictive alternatives, including differential eligibility standards and pay rates for high and low risk areas.[109] All of the other Services stood to gain little from high risk designations and unsurprisingly opposed the more restrictive proposals. The Navy, Air Force, and Joint Chiefs of Staff favored retaining the current system, fearing that more restrictive eligibility criteria would introduce undue complexity in administering eligibility for HFP.[110]

---

107. Office of the Secretary of Defense, *Fifth Quadrennial Review of Military Compensation: Special and Incentive Pays*, Volume 3, November 1983.

108. Although its report was released in November 1983, the deliberations behind the 5th QRMC occurred prior to the authorization of IDP in October 1983. Because of this timing issue, IDP was not examined in the report.

109. Strangely enough, the Coast Guard, which was not surveyed in 1971, was the only Service to back the Army in support of two-tiered designations, eligibility standards, and pay levels.

110. *Fifth Quadrennial Review of Military Compensation: Special and Incentive Pays*, Volume 3, November 1983.

The QRMC ultimately recommended only modest changes to HFP. More restrictive proposals featuring two-tiered pay levels or differential eligibility standards were rejected. In place of more sweeping changes, the QRMC recommended the Department tighten its own system for designating combat zones. Zonal eligibility should be "limited to only those territories and/or waters and air space where individuals are directly engaged with the enemy on a continuing basis." "Boundaries of the area," the QRMC advised, "should be drawn to exclude, to the maximum extent practicable, those fringe or support areas in which individuals will not be regularly exposed to danger on a daily basis, i.e. areas in which there is not a strong likelihood of direct, daily confrontation with the enemy." To further restrict eligibility to those facing extreme risks, "efforts should be made…to strictly enforce the requirements of direct engagement with the enemy in conjunction with the six-day rule."[111]

Because proposals for a two-tiered pay were abandoned, no legislative changes were recommended to tighten eligibility criteria. Implementation of the QRMC's recommendations was left to the DoD. There is little evidence to suggest that the Department seriously considered restructuring their designation practices or restricting pay eligibility within already-designated areas. Indeed, the Department's tacit embrace of IDP implies the opposite. The proposal to revive the six-day eligibility criteria was also abandoned. Ultimately, the QRMC only succeeded in raising the level of HFP to "the lowest rate for hazardous duty incentive pay" when the Congress passed a raise to $110 per month in the following year.[112] With the failure of the 5th QRMC's attempt to tighten eligibility criteria, the last significant challenge to HFP/IDP had passed. Official policy on HFP/IDP has remained largely unchanged ever since.

C. Changes to the Administration of Hostile Fire Pay/Imminent Danger Pay

Following the relatively minor legislative changes of the mid-1980s, the administration of HFP/IDP continued without noticeable difference from the late 1970s. In 1985–86, the number of pay recipients dropped to around 300, as the number of hostile deaths retreated to single digits. In 1988, however, unanticipated casualties in Peru, Colombia, Panama, and Afghanistan led to new Imminent Danger Area designations, increasing the number of recipients to a high of nearly 10,000 in 1988. The increase was only temporary, and the number of recipients fell back to around 4,000 in the following year.

111. Ibid.

112. *Military Compensation Background Papers: Hostile Fire Pay.*

With military action in the Persian Gulf, eligibility for HFP/IDP reached levels not seen since the late days of the Vietnam War. In 1991, the number of HFP/IDP recipients soared from 33,000 to 327,333 as the Secretary designated Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, the Gulf of Aden, the Gulf of Oman, and the Arabian Sea for special pay.[113] Unlike in Vietnam, where combat pay rolls emptied following the end of hostilities, the sustained deployments in the Middle East established a new baseline level of combat pay recipients.[114] Despite the undesignation of Oman, Bahrain, Qatar, the United Arab Emirates, the Red Sea, and the Gulfs of Oman and Aden in August 1993, the number of HFP/IDP recipients averaged over 55,000 through the year 2000, boosted by a deployment of over 15,000 troops to Operation Joint Endeavor in the former Yugoslavia (see Figure 3).[115]

Behind this growth in the number of pay recipients was an explosion in the number and length of designations for HFP/IDP in the 1990s. Starting in 1990, the number of designated countries and bodies of water soared from 13 to 24, eventually peaking at 45 active designations in 1999. A significant number of these designations corresponded to major combat or peacekeeping operations in the Middle East

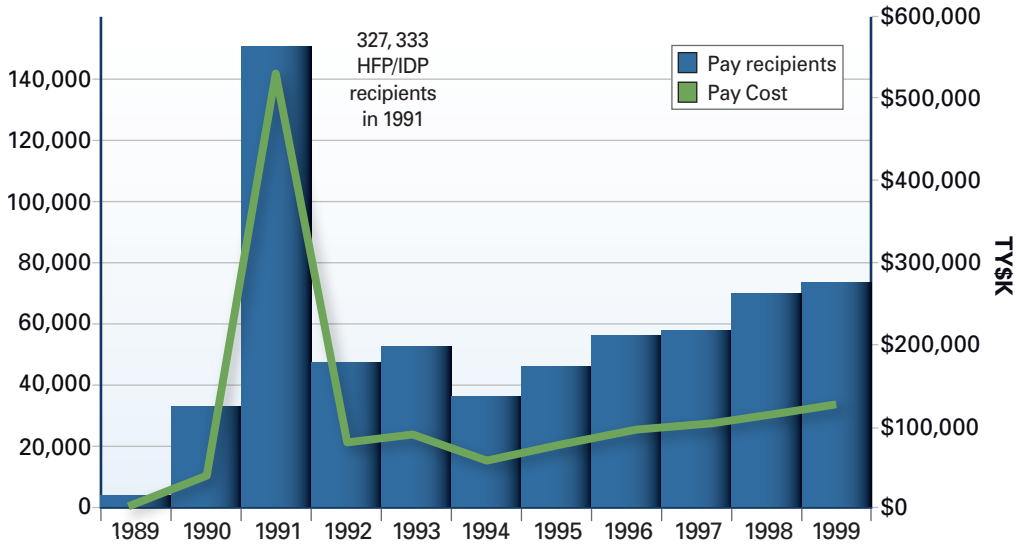


Figure 3. HFP/IDP Recipients in the 1990s

113. *Summary of Major Changes to DoD 7000.14-R.*

114. Statistical Information Analysis Division, *Military Personnel Historical Report 1992–1999*, Department of Defense, 2011. Following the conclusion of Operation Desert Storm, an average of 7,465 troops remained in designated areas throughout the remainder of the decade.

115. *Military Compensation Background Papers: Military Compensation Statistics Tables.*

(7 designations) and the Balkans (7 designations). However, designations for smaller military deployments proliferated in the 1990s as well (see Figure 4), including Liberia in 1990, parts of Turkey in 1991, Chad, Mozambique, and Somalia in 1992, Sudan and Haiti in 1993–94, and an additional 16 areas in the latter half of the decade.[116]

In addition to the increase in the number of designations, the length of those designations grew as well. From 1960 to 1980, only five nations—Vietnam, Laos, Cambodia, Korea, and Iran—received designations. In all of these locations except Korea, designations remained active long past combat operations, to either sustain benefits to Prisoner of War/Missing in Action (POW/MIA) soldiers (Southeast Asia) or reflect ongoing hostility towards the United States (Iran). As such, the average length of these designations was nearly 25 years, with three still active in the late 1990s.[117] In the 1980s, the average length of the twelve designations stood at 10.14 years, with three active today.[118] In the 1990s, with more than quadruple (51) the total number of designations, average designation length grew to 11.14 years, with more than half (26) remaining active today.[119] The trend can be expected to continue, as 15 of the 16 designations in the past decade remain active today (see Figure 5).[120] The increase in the frequency and length of designations greatly magnified the cost of HFP/IDP. When a temporary raise in the level of payment to $150 in 1991 was made permanent in 1992, the cost of combat pay doubled from $43.6 million (1990, 33,000 recipients) to $85 million (1992, 47,241 recipients). Total pay costs broke the $100 million barrier in 1996 and have remained above ever since.

The proliferation and elongation of designations in the 1990s is understandable from the perspective of recognition for risk. Through IDP, risk recognition could be applied more generously to the latent, unpredictable hazards of low-intensity conflicts in addition to the overt risks of open war. Once designated, eligibility should remain intact if the potential for risk still existed. Only if hazards were retired would designations cease, as in the Balkans where designations were lifted in 2007. At the turn of the 21st century, HFP was provided for service in 45 designated areas, had 73,573 recipients, and cost $124.5 million (see Figure 6).

116. *Summary of Major Changes to DoD 7000.14-R.*

117. The average is composed of the following four designations: Vietnam (32.12 years), Korea (5.42 years), Cambodia (30.83 years), and Iran (31.42 years, still active). The length of the designation for Laos could not be accurately determined and, if added to the sample, would lower the average designation length.

118. Designations from the 1980s for Lebanon, Colombia, and Afghanistan remain active today.

119. Active designations from the 1990s: Arabian Sea; Bahrain; Kuwait; Saudi Arabia; Liberia; Iraq; parts of Turkey; Chad; Kosovo; Montenegro; Somalia; Sudan; Haiti; Azerbaijan; Pakistan; Burundi; Democratic Republic of Congo; Egypt; Athens, Greece; Jordan; Tajikistan; Qatar; Rwanda; Yemen; Ethiopia; and East Timor.

120. Active designations from the 2000s: Uganda, Kyrgyzstan, Oman, United Arab Emirates, Uzbekistan, Indonesia, Malaysia, Philippines, Israel, Djibouti, Eritrea, Kenya, Cote d'Ivoire, Syria, and Cuba (Guantanamo).

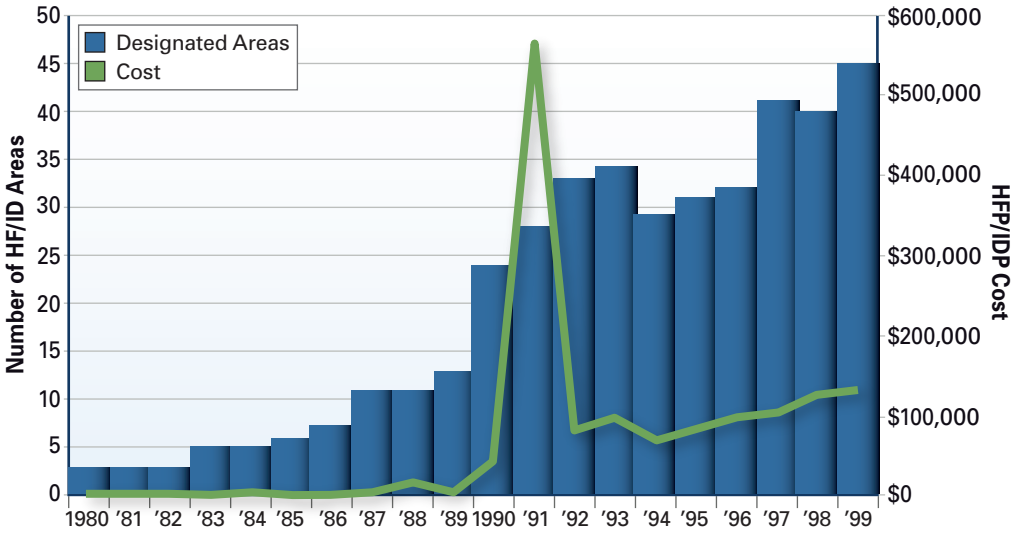


Figure 4. Number of Designated Hostile Fire/Imminent Danger Areas

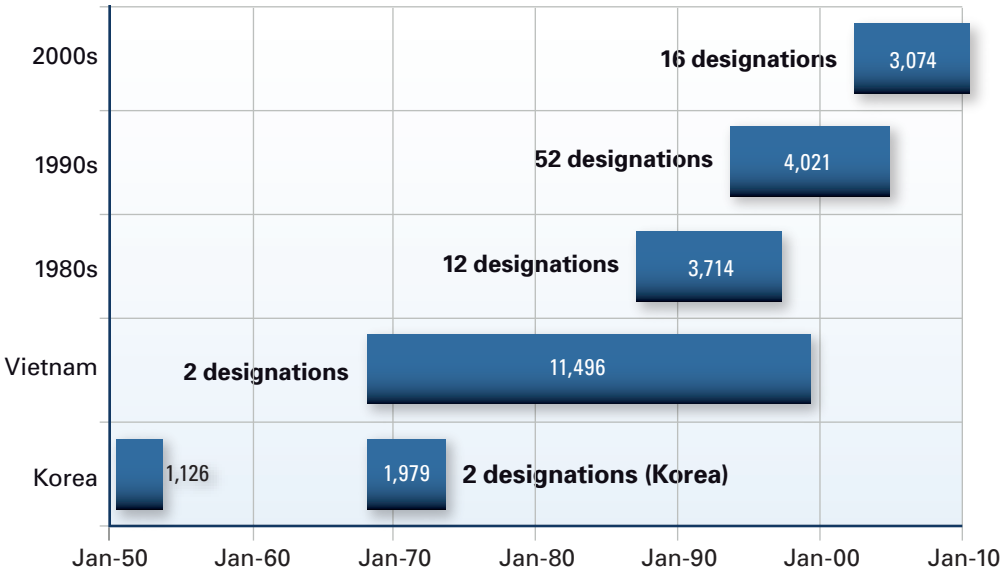


Figure 5. Average HFP/IDP Designation Length Across Time

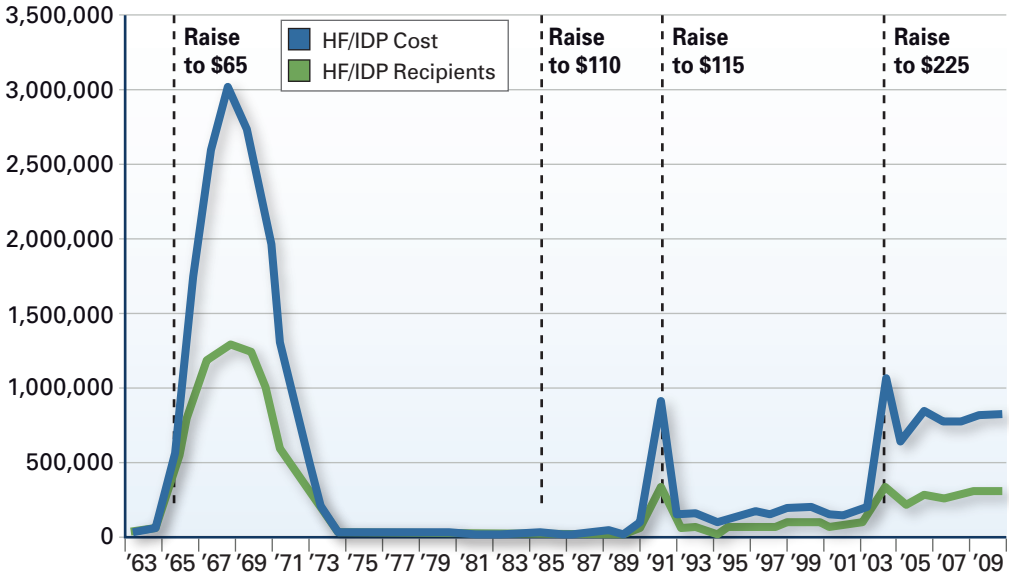


Figure 6. Normalized Historical Cost of HFP

D. Recognition for Risk in Iraq and Afghanistan

Although HFP/IDP has become highly relevant to the diverse hazards of modern military deployments, combat pay has lost touch with an important element of its historical justification: recognition for the frontline soldier. In the absence of open war in the 1980s and 1990s, this deficiency went unnoticed. Military casualties from hostile actions were minimal, and IDP equitably recognized the sustained presence of low-level risks across various foreign deployments. However, the onset of prolonged wars in Iraq and Afghanistan shattered this low-level homogeneity in risks and broadened the distribution of hazards among combat pay recipients. In 2003, hostile deaths jumped from 18 to 339, doubled again in the following year, and remain elevated to the present day. Designations for the Middle East and Central Asia immediately accompanied combat operations, but the advent of war posed an age-old problem. Clearly, hostile risks in Iraq and Afghanistan were far greater than the low-level hazards of the Balkans or sub-Saharan Africa, yet each deployment received equal recognition under HFP/IDP. The wide disparity in conditions between war zones, support areas, and low-intensity deployments almost certainly eroded the value of HFP to the morale of American forces in Iraq and Afghanistan.

Never before has combat pay recognized such a wide distribution of risk among designated areas and pay recipients. During the 1960s and 1970s, zonal eligibility recognized shared risks of counterinsurgency in Vietnam. During the 1980s and

1990s, IDP accommodated the latent hazards of low-intensity deployments in the absence of open war. After the invasions of Iraq and Afghanistan, however, the wartime risks of HFP coexisted with the low-intensity hazards of IDP. Two policies that had evolved from the same perspective to address different circumstances were, for the first time, applied simultaneously.

Superimposed across a wider distribution of risks, the equal eligibility criteria and monetary compensation of HFP and IDP failed to equitably recognize the dire risks of war zones in Iraq and Afghanistan relative to substantially less hazardous deployments elsewhere. In 2003, the Bush Administration recognized this disparity. In the Emergency Wartime Supplementary Appropriations Act for 2003, the Administration proposed a temporary increase to HFP/IDP to $225 per month "to reward military personnel participating in Operation Enduring Freedom…and Operation Iraqi Freedom."[121] Putting aside the imprecise language of "reward,"[122] the Administration may have judged that the greater hazards in Iraq and Afghanistan required a pay increase to recognize the new risk environment. This interpretation is supported by the Administration's actions when the pay raise was set to expire in the following year.

Instead of allowing the raise to expire or extending the increase for all servicemembers, the Bush Administration proposed continuing the higher rates only for servicemembers in Iraq and Afghanistan. "If members in other areas received the same [raise]," the Administration argued, "an across-the-board increase in HFP had no meaning as a reward for service in Afghanistan and Iraq." Although couched in the imprecise language of "rewarding" wartime service, the Administration's proposal could be interpreted as an attempt to create two tiers of combat pay: one for the extreme wartime hazards and the other for sustained, low-level risks. If correct, this interpretation suggests that the perceived dissonance between HFP and IDP during a time of open warfare may have future policy consequences. That the policy originated from the President and was not opposed by the DoD indicates the potential for a political coalition behind risk differentiation in combat pays.

Like the more aggressive recommendations of the 5th QRMC, the Administration's proposal for a "two-tier" form of combat pay with higher rates for Iraq and Afghanistan met opposition in the Congress. The House argued that failure to extend the new rates for all members would "constitute a pay cut for United States occupation forces at many locations in the world," and the Senate

121. *Military Compensation Background Papers: Hostile Fire Pay.*

122. The concept of "rewards" for participants in OEF/OIF could be interpreted as an incentive for service in Iraq or Afghanistan. Because the purpose of combat pay is divorced from manpower incentives, it is assumed that incentives were not the intent of the raise.

devised a compromise in which the raise would be extended for one additional year to all members in a designated Hostile Fire or Imminent Danger Area. Ultimately, the compromise passed, and in the following year, the $225 monthly rate was made permanent. Since the confrontation in 2003, no legislative or administrative changes have been proposed regarding HFP/IDP to date.

At present, the historical evolution of HFP/IDP is characterized by continuity, rather than change from the prevailing perspective and policy on risk recognition over the decades following the Vietnam War. When applied to the post-Vietnam hazard environment of low-intensity deployments with latent hostile risks, the perspective demanding recognition for risk produced the new policy of IDP. Sustained hazardous deployments, now recognized by IDP, led to growth in the number and length of designations and the overall cost of combat pay. However, the pre-Vietnam embrace of zonal eligibility and post-Vietnam lowering of risk thresholds abandoned specific recognition for the hazards and hardships of frontline service and diminished combat pay's impact on military morale in a time of war. Over the past four decades, HFP/IDP has become more relevant and responsive to the missions of the modern military, but, at the same time, less efficient and effective in achieving its original goal of recognizing the worst hazards and hardships of war.

6. Conclusion

Combat pay has been used in the United States to recognize the disproportionate sacrifices of servicemembers exposed to hostile risk. Historical debates over the intent of recognition, which is unique among all U.S. military special and incentive pays, has driven the evolution of modern perspectives and policies on combat pay. During World War II and the Korean War, combat pay narrowly focused on the morale of frontline soldiers who endured the most severe hazards and hardships of combat. Badge Pay in World War II singled out the infantry for special recognition to remedy perceived deficits in morale, pay, and service conditions. Combat Pay in the Korean War recognized frontline soldiers based upon the dual standard of the "hazards and hardships" of combat. The shift from occupational eligibility for the infantry to conditions-based recognition activated a potent political coalition within the Services that presaged pay expansion.

Drastic changes to the combat pay followed in the Vietnam War when a new perspective—"recognition for risk"—replaced the dual standard recognizing the "hazards and hardships" of frontline combat and eventually eliminated distinctions stemming from the degree of hazard within designated areas. Supported by the Services, broad zonal eligibility replaced unit-based administration of the newly-authorized HFP in a dynamic and unpredictable counterinsurgency risk environment.

Since Vietnam, these changes to combat pay have persisted and expanded through the authorization of IDP despite the absence of open war. With the expansion in the number and length of combat zone designations, all potential hostile risks now receive special recognition. However, as HFP/IDP became more relevant and responsive to the diverse hazards of modern military deployments, combat pay also lost touch with aspects of its historical intent. Prolonged conflicts in Iraq and Afghanistan have the potential to revive the historical focus on recognizing the hazards and hardships of wartime service while maintaining the relevance and flexibility of HFP/IDP to modern contexts.

Appendix A. Statutes

Combat Duty Pay Act of 1952

SEC. 701. This title may cited as the "Combat Duty Pay Act of 1952".

SEC. 702. As used in this title—
(a) The terms "uniformed services", "member", "officer", and "secretary" (except as hereinafter specifically provided) shall have the meaning prescribed for such terms by section 1-2 of the Career Compensation Act of 1949, and the terms "incentive pay" and "special pay" shall mean the pay authorized by section 203, 204, or 205 of such Act.
(b) The term "member", when used in relation to any combat unit, means any member of the uniformed services serving and present with, or on board, such unit under competent orders.
(c) The term "combat unit" means

(1) any military unit, not larger than a regiment, while such unit is engaged in actual combat on land; or

(2) any element of, or detail of personnel from, any military unit not larger than a regiment, while such element or detail is subjected to hostile ground fire in the course of rendering aid or assistance (A) directly to a military unit, not larger than a battalion, which is engaged in actual combat on land, or (B) by fire to any military unit engaged in actual combat on land; or

(3) any military unit (not larger than a regiment) engaged in any amphibious or airborne operation, while subjected to hostile ground fire in the course of rendering aid or assistance, to a military unit which is engaged in actual combat on land by the performance of duties which require its employment at or near a beach or airhead; or

(4) any vessel while subjected to hostile fire or explosion in the course of any operation; or

(5) any aircraft while subjected to hostile fire in the course of any operation.
(d) the term "actual combat on land" means direct contact with and opposition to a hostile force by any military unit while such unit is subjected to hostile ground fire.
(e) the term "military unit" means any unit of any of the uniformed services other than a vessel or aircraft.
(f) the term "Korea" shall mean the geographical area specified for income tax exemption purposes by Executive Order 10195, approved December 20, 1950.

SEC. 703. Each member and former member of the uniformed services shall be entitled to receive combat pay in the amount of $45 per month for each month beginning after May 31, 1950, for which such member was entitled to receive basic pay and during which he was a member of a combat unit in Korea on—

(a) not less than six days of such month; or

(b) one or more day of such month included within a period of not less than six consecutive days on which he was a member of a combat unit in Korea, if such period began in the next preceding month and he is not entitled to receive combat pay under this title for such preceding month.

SEC 704. Each member and former member of the uniformed services shall be entitled to receive combat pay in the amount of $45 per month for each month beginning after May 31, 1950, for which he was entitled to receive basic pay and in which—

(a) he was killed in action, injured in action, or wounded in action while serving as a member of a combat unit in Korea, and for not more than three months thereafter during which he was hospitalized for the treatment of an injury or wound received in action while so serving; or

(b) he was captured or entered a missing-in-action status while serving as a member of a combat unit in Korea, and for not more than three months thereafter during which he occupied such status.

SEC. 705. No person shall be entitled to receive for any month—

(a) more than one combat pay authorized by this title; or

(b) combat pay under this title in addition to any incentive or special pay.

SEC. 706 (a) The Secretaries of the services concerned are authorized and directed to promulgate regulations for the administration of this title, which regulations shall be as uniform as practicable and in the case of the military departments shall be subject to the approval of the Secretary of Defense.

(b) Such regulations may include appropriate provisions for the withholding of combat pay under section 703 of this title from any member or former member of the

uniformed services (or any class of such persons) for any period during which such persons or class of persons was not placed in substantial peril by the action of any hostile force, as determined in conformity with such regulations.

SEC. 707. (a) The Secretary of the Service concerned, or such subordinate as he may specify, may make such determination of fact as may be required for the administration of this Act, and any such determination shall be final.

(b) Appropriations currently available for pay and allowances of members of the uniformed services shall be available for the payment of combat pay under this title for any month prior to the date of the enactment of this title.

Special Pay for Duty Subject To Hostile Fire

SEC. 310. Special pay: duty subject to hostile fire

(a) Except in a time of war declared by Congress, and under regulations prescribed by the Secretary of Defense, a member of a uniformed service may be paid special pay at the rate of $55 a month for any month in which he was entitled to basic pay and in which he—

(1) was subject to hostile fire or explosion of hostile mines;

(2) was on duty in an area in which he was in imminent danger of being exposed to hostile fire or explosion of hostile mines and in which, during the period he was on duty in that area, other members of the uniformed services were subject to hostile fire or explosion of hostile mines; or

(3) was killed, injured, or wounded by hostile fire, explosion of a hostile mine, or any other hostile action. A member covered by clause (3) who is hospitalized for the treatment of his injury or wound may be paid special pay under this section for not more than three additional months during which he is so hospitalized.

(b) A member may not be paid more than one special pay under this section for any month. A member may be paid special pay under this section in addition to any other pay and allowances to which he may be entitled.

(c) Any determination of fact that is made in administering this section is conclusive. Such a determination may not be reviewed by any other officer or agency of the United States unless there has been fraud or gross negligence. However the determination may be changed on the basis of new evidence or for other good cause.

(d) The Secretary of Defense shall report to Congress by March 1 of each year on the administration of this section during the preceding calendar year

(b) The Combat Duty Pay Act of 1952 (50 App. USC 2351 et seq.) is repealed.

References

90th Cong. Rec. 6,570 (daily ed. June 5, 1944).

98th Cong. Rec. 3,106 (1952).

98th Cong. Rec. 3,107 (1952).

98th Cong. Rec. 9,434 (1952).

99th Cong. Rec. Appendix A466 (daily ed. February 6, 1953).

109th Cong. Rec. 8,080 (1963).

117th Cong. Rec. 59,581 (daily ed. June 21, 1971).

129th Cong. Rec. 20,971 (1983).

Combat Duty Pay Act of 1952. Pub. L. No. 82-488, 66 Stat. 517, 538-539 (1952).

Commission on Incentive-Hazardous Duty and Special Pays. *Differential Pays for the Armed Services of the United States*. Volume 1. March 1953.

Department of Defense. *Directive 1340.6*. August 1, 1968.

Department of Defense. *Instruction 1340.6.* November 21, 1963.

Department of the Air Force. *Memorandum for the Assistant Secretary of Defense for Manpower: Revision of Hostile Fire Pay Directive*. October 8, 1965.

Deputy Assistant Secretary of Defense for Military Personnel Policy. *Memorandum for the Assistant Surgeon General for Personnel, U.S. Public Health Service: Special Pay for Duty Subject to Hostile Fire.* August 20, 1964.

DoD Financial Management Regulation. *Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 10 Special Pay-Duty Subject to Hostile Fire or Imminent Danger."* Volume 7A, Chapter 10. May 2009.

H.R. Rep. No. 78-1700 (1944).

H.R. Rep. No. 88-208 (1963).

Hearings on S. 579, Before the Senate Committee on Armed Services (June 16, 1951).

Hearings on S. 579, Before the Senate Committee on Armed Services (April 5, 1951).

Military Pay Increase: Hearings on H.R. 5555, Before the Senate Committee on Armed Services (August 5, 1963).

Military Pay Increase: Hearings on H.R. 5555, Before the Senate Committee on Armed Services (July 16–18, 1963).

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs. *Report of the 1971 Quadrennial Review of Military Compensation: Hostile Fire Pay,* Second Edition. December 1971.

Office of the Assistant Secretary of Defense for Manpower, *Revised Recommendations Relating to Pay and Allowances of Members of the Uniformed Services.* Volume 7. December 31, 1962.

Office of the Secretary of Defense, *Fifth Quadrennial Review of Military Compensation: Special and Incentive Pays*. Volume 3. November 1983.

Pay of Expert and Combat Infantrymen: Hearing on S. 1973 and S. 1787, Before the Senate Committee on Military Affairs. 78th Cong. (1944).

President's Commission on an All-Volunteer Armed Force. *Report of the President's Commission on an All-Volunteer Armed Force*. February 1970.

S. Rep. No. 88-352 (1963).

S. Rep. No. 88-387 (1963).

Secretary of the Navy, Memorandum to Secretary of Defense. *Proposed Amendment to the Career Compensation Act to Provide Special Pay for Combat Duty.* November 22, 1950.

Statistical Information Analysis Division. *Military Personnel Historical Report 1953*. Department of Defense. 2011.

Statistical Information Analysis Division. *Military Personnel Historical Report 1968–74*. Department of Defense. 2011.

Statistical Information Analysis Division. *Military Personnel Historical Report 1979*. Department of Defense. 2011.

Statistical Information Analysis Division. *Military Personnel Historical Report 1992–1999*. Department of Defense. 2011.

Statistical Information Analysis Division. *Military Casualty Information: Active Duty Military Deaths 1980-2010*. Department of Defense. 2011.

Under Secretary of Defense for Personnel and Readiness. *Military Compensation Background Papers: Hardship Duty Pay,* Sixth Edition. 2005.

Under Secretary of Defense for Personnel and Readiness. *Military Compensation Background Papers: Hostile Fire Pay,* Sixth Edition. 2005.

Under Secretary of Defense for Personnel and Readiness. *Military Compensation Background Papers: Military Compensation Statistics Tables*, Sixth Edition. 2005.

Uniformed Services Pay Act of 1963. Pub. L. No. 88-132, 77 Stat. 210, 216 (1963).

Chapter 7

History of the Combat Zone Tax Exclusion

Brandon R. Gould

Stanley A. Horowitz

Executive Summary

Exclusion of military pay from federal income taxes has been a longstanding element of U.S. policy on war finance, combat compensation, and revenue collection in combat zones. The Combat Zone Tax Exclusion (CZTE) was originally established to alleviate the burden of war finance from those who fought in the nation's conflicts. During World War (WW)II, combat tax benefits were separated from war finance policy and became a permanent component of combat compensation. Over time, administrative policies and changes to the tax code have eroded the tax exclusion's traditional purpose, while generating an unintended distribution of benefits. At present, the CZTE neither serves its original purpose nor its later historical role of selectively rewarding those who face a high level of combat risk.

The CZTE was originally created to exempt servicemembers from income tax increases required to finance WWI and WWII. The first income tax exclusion, established in the Revenue Act of 1918, fully offset across-the-board cuts in the personal income tax deduction with a $3,500 tax exclusion for active military personnel. The policy was reprised in the Revenue Act of 1942 through a $250 ($300 for married members) exemption that precisely offset a contemporaneous cut in the personal deduction. Unlike its WWI predecessor, the 1942 exclusion was not available to commissioned officers. Legislative history indicates that the Congress's purpose for both exclusions was clear: those who fought the nation's wars should not bear the "double burden" of financing the conflict. The Congress's intention in 1942 was to rescind its exclusion when prewar tax rates were restored after the conflict, as it did following WWI.

In addition to exempting servicemembers from the burden of war finance, WWI and WWII saw the development of a set of additional military tax benefits, such as suspension on time limits for tax activities and forgiveness of unpaid income and estate taxes for deceased members. These benefits, intended to operate independently

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

of the income tax exclusion, were seen as instrumental to the functioning of a fair tax system for members of the armed services.

Despite its historical ties to wartime finance, the income tax exclusion quickly became a component of combat compensation. One year after the Revenue Act of 1942, Congress replaced the $250/$300 enlisted exclusion with a flat rate $1,500 exclusion available to all personnel, including officers. Motivated by the precedent of the larger WWI exclusion, the new benefit level was established without reference to broader changes in income tax policy, permanently separating the tax exclusion from issues of wartime finance A modification in 1945 retroactively introduced the modern structure of the tax exclusion, which allowed enlisted members to exclude all military compensation from income tax while limiting officer exclusions to a fixed amount. This new standard established a parity between the level of exclusion for senior enlisted (E-9, >10 Years of Service (YOS)) and commissioned officers, which has only recently been discarded.

Despite the restoration of lower tax rates following the cessation of hostilities, wartime military tax benefits continued until 1949, to induce retention and recruitment in the absence of overall military pay raises. Although the WWII benefits were suspended in 1949, the Revenue Act of 1950, which preserved the structure and distribution of previous benefits (all income excluded for enlisted members and $200 per month for officers), ratified income tax exclusions as a permanent component of combat compensation independent of the demands of war finance.

The income tax exclusions of the latter half of the twentieth century were justified as compensation for members exposed to wartime risks. In the absence of a global military mobilization, the Revenue Act of 1950 conditioned benefits on an individual's presence in a "combat zone" as designated by the president. Unlike in WWI and WWII, the physical location also determined eligibility for preexisting "instrumental" tax benefits such as time suspension provisions and tax forgiveness for deceased, captured, or missing members. Presidential designation of combat zones was intended to enhance the flexibility of administering combat tax benefits with regard to Cold War conflicts. In the Korean War, these goals were achieved with a timely extension and termination of the combat designation. However, in future conflicts, reliance on designations by the president hindered the timely modification of combat tax benefits and diluted their alignment with combat risks.

During the Vietnam War, the structure and distribution of the tax exclusion remained largely in place. A raise in the maximum officer exclusion to $500 per month restored the former level of parity between senior enlisted and commissioned officers.

Although the structure remained intact, the administration of combat tax benefits came into question. Over the course of the conflict, pressure mounted to extend the Vietnam designation to areas with varying levels of risk outside of the formal combat zone. The Air Force, backed by the Department of Defense (DoD), repeatedly endeavored to extend combat designations to low-risk, support areas in Thailand. Though thwarted by the Treasury Department, the proposal set the precedent for designation of low-risk areas in addition to actively contested zones.

The entanglement of "instrumental" benefits with designations for income tax exclusions yielded unintended administrative inefficiencies and inequities during Vietnam. Servicemembers killed, captured, or missing in Cambodia, though eligible for income tax exclusions by virtue of their formal deployment location, were ineligible for "instrumental" benefits despite enduring comparable risks to those in Vietnam. This inequity persisted until Cambodia was effectively designated in 1968. Unlike in Korea, American withdrawal from Vietnam did not result in the termination of combat tax benefits for Southeast Asia. To maintain tax benefits for servicemembers in POW/MIA status, the combat zone remained active until the United States normalized relations with Vietnam in 1996. These two administrative issues—extension of combat zone designations past the end of hostilities and the difficulty administering "instrumental" tax benefits—persist to the present day.

During the 1990s, the relationship between risk and reward in the tax treatment of military compensation weakened. For the first time, designations were issued to support areas with lesser combat risks. Although the Vietnam combat zone did not include areas such as Thailand and Guam, the Persian Gulf combat zone extended beyond actual combat areas like Iraq and Kuwait to encompass low-risk support areas including Qatar, Bahrain, and the United Arab Emirates. Just as dependence on the designation of combat zones changed the original justification for tax exemption, the inclusion of combat support areas was inconsistent with its revised objective, reward for wartime risks. Once designated, servicemembers deployed to both high- and low-risk areas of the Persian Gulf continued to receive tax benefits until the present day, despite the absence of combat operations for much of the 1990s.

The lowered risk threshold and delayed withdrawal of benefits characteristic of the Persian Gulf combat zone was reprised in the congressionally initiated "Qualified Hazardous Duty Area" (QHDA) designation for Bosnian peacekeeping operations. Although there were fewer than 20 military deaths (and only one recorded hostile fatality), tax benefits for the Balkans persisted from 1996 to 2007. Because the QHDA designation remains in effect, tax benefits for the entire area could be revived through an isolated, event-based restoration of Hostile Fire Pay/Imminent Danger Pay.

Even with lengthier designations and lower risk thresholds, the dependence of "instrumental" benefits on combat zone designations remained problematic throughout the 1990s. The absence of a designation for combat operations in Somalia, while arguably defensible from the perspective of the income tax exclusion, resulted in the denial of posthumous tax benefits to soldiers killed in Operation Restore Hope. The 1990s also witnessed a change in the distribution of combat zone tax benefits. As discussed above, previous revisions of the CZTE in 1945, 1950, and 1966 had established a standard of parity in the level of benefits between senior enlisted (specifically, an E-9 with more than 10 YOS) and commissioned officers. Historically, enlisted members were able to exclude all military compensation from the income tax while commissioned officers could only exclude pay up to a specified level. In 1990, the Congress attempted to preserve the former level of parity by updating the officer exclusion to $2,000 per month, but the legislation was preempted by Executive Order 12744, which established the Persian Gulf combat zone. In 1996 the authorization of the Balkans QHDA included an increase to the officer exclusion to the "maximum enlisted amount." The "maximum enlisted amount" was interpreted as the pay of the Senior Enlisted Advisor—equaling $4,104.90 per month. Basing all officer exclusions on the pay of the six most senior enlisted servicemembers resulted in an exclusion amount over 55 percent higher than the historical standard of parity (which would have yielded a maximum exclusion of $2,623.20 per month). Later in that same year, the distributional shift in benefits toward officers was exacerbated by a significant expansion in the Earned Income Tax Credit, for which many officers in designated combat zones were now eligible (because a large part of their earnings was not counted as taxable income).

1. Introduction

Exclusion of military pay from federal income taxes has been a longstanding element of how the nation finances wars, collects revenue, and compensates members of the Armed Services deployed abroad in areas of combat risk. For nearly as long as the federal government has taxed its citizens' income, soldiers fighting the nation's wars have been exempted from taxation on some or all of their income arising from wartime service. Taxes forgiven by the combat zone tax exclusion (CZTE) result in a direct monetary benefit to individual servicemembers and constitute an integral part of overall combat compensation. In addition to the CZTE, the Congress has historically authorized a series of more narrowly-focused tax benefits that correspond to particular circumstances of combat service. Posthumous exemption from estate and unpaid income taxes fit this category, as do income tax exclusions for missing and captive servicemembers. Similarly, servicemembers are exempted from time

provisions, tax withholding, and interest accrual due to the difficulties inherent in fulfilling routine tax obligations in a combat zone. Such benefits, separate from the CZTE, have been viewed as "instrumental" to the functioning of a fair tax system. The CZTE and other "instrumental" benefits have greatly reduced the financial and administrative burden of federal taxation upon members of the Armed Forces serving in major foreign conflicts over the past century.

The purpose of this paper is to detail the historical development and administration of combat tax benefits, with particular emphasis on the federal income tax exclusion. In each of the following chapters, the paper discusses the major legislative and administrative changes to tax benefits for a specific time period and highlights the influence of changing combat environments, conflicting benefit justifications, and evolving policy on military pay and federal tax policy on the CZTE. Chapter 2 details the origins of the first tax exclusions as the nation's response to the proper allocation of the burdens of war finance in World War (WW)I and II. Early tax exclusions served a specific and limited purpose, namely to ensure those who fought did not bear a double burden of paying for war. Chapter 3 covers the exclusions for the latter half of WWII and Korea. At the end of WWII, wartime tax exclusion became a permanent part of the tax code. In Korea the benefit became linked to combat and risk for the first time. During this period, tax exclusions were justified primarily for their incentive value in the absence of higher levels of military compensation. Chapter 4 details debates over the applicability of combat benefits to circumstances of varying risk in the Vietnam conflict environment. The bureaucratic debates over Vietnam-era benefits foreshadow the administrative and distributional issues surrounding combat tax benefits in modern settings, which are discussed in Chapter 5.

2. Bearing the Fiscal Burdens of War

For much of its history, the United States has been characterized by a limited federal government with a small standing army. Historically, the advent of war required both the muster of a military and the raising of revenues. The need for both soldiers and dollars to fight wars placed two burdens on the nation's citizenry. The principal burden was placed upon the soldiers called to fight. The second, required of the nation's taxpayers, was smaller and spread more evenly across the citizenry. In conflicts since the Civil War, the nation judged that those who shouldered the greater sacrifice should not be doubly charged with the lesser. Such was the policy behind the early tax exclusions in WWI and II, where compensation for members of the armed services was specifically excluded from the increased rates of taxation required to finance war.

A. World War I

The history of the CZTE began with the enactment of the first federal income tax. Prior to the Sixteenth Amendment[1] and subsequent Tariff Act of 1913, the government raised revenue through import duties, fees, and excise taxes, rather than levies on earned income. For a brief period during the Civil War, the Confederacy authorized an income tax containing exemptions for military compensation, but the Union did not follow suit with its wartime income tax in 1862.[2] The 1913 Tariff Act allowed single persons to exempt the first $3,000 of earned income from taxation through the personal exemption. Married persons could exclude the first $4,000. With the median income in 1913 at $733, only two percent of the labor force was subject to taxation.[3] Entry into WWI demanded substantial revenue increases, and, in response, the Revenue Act of 1918 reduced personal exemptions to $1,000 for single and $2,000 for married persons, quintupling the number of prospective taxpayers. Accompanying the tax hike was a provision excluding active military compensation earned during the war up to a cumulative total of $3,500 per year from the income tax.[4]

Although the Congress did not hold hearings on the military exclusion, the legislative history makes clear its intended purpose and scope. The provision's presence in a bill lowering personal exemptions by $2,000 suggests a desire to maintain servicemembers' tax liabilities at roughly prewar levels. This benefit was not intended to supplement overall military compensation. Notably, proposals to exclude all military income from taxation (including income above $3,500 per year), offered by the Senate, were rejected in the Conference Committee.[5] Service in war absolved a soldier from paying for the conflict, but not from the broader obligations of citizenship. Later congressional testimony expressly stated the existence of a consensus surrounding the "[belief] that members of the armed service [should not] be required to bear this increased burden" of taxation for financing war.[6]

---

1. The Sixteenth Amendment to the U.S. Constitution, ratified in 1913, allowed the federal government to directly tax earned income, which had been ruled unconstitutional by the U.S. Supreme Court in *Pollock v. Farmers' Loan & Trust Company*.
2. Patrick Kusiak, *Exclusion from Gross Income during War or in Combat Zones*. Report for Military Personnel Policy (Compensation), 1996.
3. Thomas Piketty and Emmanuel Zaez, *Income Inequality in the United States, 1913–2002*, November 2004. Table A0, Appendix.
4. S. Rep. No. 65-617, 3rd Sess. (daily ed. December 6, 1918). The $3,500 exclusion was inclusive of an individual's personal exemption. Therefore, for single persons, the benefit would amount to an additional $2,500 exclusion; for married individuals, the additional exclusion would be $1,500.
5. H.R. Rep. No. 65-1037, 3rd Sess. (1919).
6. H.R. Rep. No. 77-2333 (daily ed. July 14, 1942).

During the bill's progress through the Congress, several amendments reflected the desire to limit the exclusion to those serving at war. From the start, pensioners and disabled members were excluded from the tax benefits, and the initial House bill further limited eligibility to "services [performed] abroad or at sea." Fearing the administrative difficulties involved in determining deployment status, the Senate instead constrained benefits to "active service" in "the period of the present war," allowing the exclusion to expire upon cessation of hostilities.[7] Eligibility for benefits based upon geography, a hallmark of later exemptions, may have been unnecessary during a time of full military mobilization when the entire force faced reasonable expectations of combat deployment in Europe. Following the end of the war, tax benefits were automatically curtailed on July 2, 1921, and the statutory authority for tax benefits was repealed by the Congress shortly thereafter.[8]

Accompanying the WWI tax exclusion were two other "instrumental" tax benefits for military service: a provision excluding taxes on entertainment admissions (intended to exempt soldiers from taxes on United Service Organizations events) and, more importantly, forgiveness of inheritance tax for soldiers dying during the war or from injuries up to one year thereafter. The latter provision, like the broader income tax exclusion, offset a substantial increase in the inheritance tax rate.[9] While the income tax exemption was capped at $3,500, the inheritance tax exemption had no upper limit, suggesting that the Congress felt that those dying from hostile action should receive stronger consideration than those serving in conflicts. From the start, such "instrumental" benefits were intended to operate separately from broader income tax exclusions.

The WWI tax exclusion affected relatively few members of the armed services; despite substantial income tax increases, only a small fraction of soldiers would have paid income tax in the absence of the exclusion. Maximum enlisted pay during WWI was roughly $1,200 per year, slightly above the $1,000 personal exclusion for single individuals. As a result, only the most experienced (single) enlistees benefited from the exclusion, and their overall benefit was minimal.[10] Officers received the majority of the benefits. Officers of the rank of Major (O-4) and above received the full benefit

7. S. Rep. No. 65-617, 3rd Sess. (daily ed. December 6, 1918).
8. Revenue Act of 1921, Chapter 136, 42 Stat. 227 (1921).
9. S. Rep. No. 65-617, 3rd Sess. (daily ed. December 6, 1918).
10. A single senior enlisted member with $1,200 in annual income would receive a $12 benefit from the tax exclusion.

of the exclusion, valued at $240.[11] Lower-ranking officers received partial exclusions, with O-1 exclusions comparable to that of the maximum enlisted exclusion. The legislative history suggests that the officer-oriented distribution of benefits was an artifact of the then-sizeable personal exclusion, rather than a conscious effort to benefit officers.[12] After tax brackets crept downward in the interwar period, the Congress's resolve to exclude servicemen from the fiscal burdens of war remained intact, prompting the reenactment of tax benefits at the beginning of WWII.

B. World War II (1941–1942)

Initially, WWII benefits followed the WWI precedent. Entrance into the war immediately required substantial revenues, which were furnished through reductions in the personal exemption from $750 to $500 for single individuals and from $1,500 to $1,200 for married couples. The precedent of the WWI tax exclusion held sway over the debate of whether soldiers and sailors should be subjected to the tax increase:

> Your committee is of the opinion that a special allowance should be made for the relief of soldiers and sailors in active service. During the last World War, the revenue law contained a special exclusion from gross income to take care of this situation. In lowering the exemptions for taxpayers generally, your committee does not believe that members of the armed service should be required to bear this increased burden.[13]

As in the WWI bill, the House of Representatives proposed annual exclusions of $250 for single and $300 for married individuals to completely offset proposed tax increases in the Revenue Act of 1942. Again, the fundamental fairness of exempting military personnel from bearing the financial burdens of war was cited as justification for the tax exclusion. The Senate agreed on the level of exclusion, but "[limited the] exclusion to personnel below the grade of commissioned officer."[14] This provision marked the first instance of differential tax treatment between commissioned officers and enlisted personnel, a distinction that has been maintained until the present day. The absence of an exclusion for commissioned officers suggests that the Congress intended to provide greater benefits to enlisted members than commissioned officers.

---

11. Tax Foundation, *Tax Data: U.S. Federal Income Tax Rates History, 1913–2011*. January 2011. Assumes a single O-6 with $5,000 annual income (the maximum) and tax brackets of 12 percent above $4,000 and 6 percent below $4,000 who would otherwise receive a $1,000 personal exemption. Officers with pay below $5,000 but above $3,500 would receive slightly lower exemptions due to less income excluded under the above $4,000 tax bracket.
12. H.R. Rep. No. 77-2333 (daily ed. June 14, 1942).
13. H.R. Rep. No. 77-2333 (daily ed. June 14, 1942).
14. H.R. Rep. No. 77-2586 (daily ed. October 19, 1942).

In addition to the enlisted tax exclusion, WWII saw the development of a broader set of "instrumental" tax benefits, which continue today. The Soldiers' and Sailors' Civil Relief Act of 1940[15] introduced the first of these benefits by deferring income tax collection (and interest accrual) from members of the Armed Services deployed at war. The act also postponed foreclosure proceedings on servicemember-owned properties stemming from unpaid property tax.[16] That arduous physical deployments and low military salaries impaired soldiers' ability to meet tax obligations justified these benefits. Complete suspension of time limitations on all federal taxes for personnel deployed abroad followed in the Revenue Act of 1942, which also eliminated income tax withholding from military paychecks. Unlike the income tax exclusion at the time, these benefits were available to officers and enlisted personnel alike.[17] To the Congress, these benefits were instrumental in easing the administrative burden "for men who go overseas" and encounter "the difficulty of having access to their books and records and papers."[18] As such, "instrumental" benefits comprised a separate, but also important, goal of wartime tax policy.

The Revenue Act of 1943 restored tax benefits upon the death of a servicemember. In addition to an inheritance tax exclusion, the Act exempted deceased officers and enlisted personnel from payment of other outstanding federal tax liabilities, including unpaid income tax and accrued interest on both military and non-military compensation.[19] The greater generosity of tax benefits to soldiers dying in uniform corresponded to their greater sacrifice in service of their country. Under complete military mobilization during WWII, the newly developed set of "instrumental" tax benefits could remain independent of the more widely available tax exclusion.

15. The Soldiers and Sailors Civil Relief Act of 1940 authorized a number of protections for members of the Armed Services. Most important of these benefits was the protection of servicemembers from civil suit during their period of active service. The act prevented soldiers from being subject to foreclosures, garnishments, attachments, evictions, and judgments so that active duty members could focus on fighting the war. The provisions of the act have been updated periodically and most recently reauthorized in the Servicemembers Civil Relief Act of 2003.
16. H.R. Rep. No. 76-3030 (daily ed. October 7, 1940).
17. H.R. Rep. No. 77-2333 (daily ed. June 14, 1942).
18. *Current Payments Tax Act of 1943, Hearings on H.R. 2570, Before the Senate Finance Committee*, 78th Cong. (1943).
19. Ibid.

3. Development of the Modern Tax Exclusion as a Part of Combat Compensation

A. World War II (1943–1949)

The initial tax exclusion for WWII did not last long. Within a year, the Congress debated and passed far more generous provisions that divorced tax benefits from wartime finance. Eventually, benefits were employed to compensate servicemembers for the risks of combat deployment and counteract low military—especially enlisted—pay levels. The separation of tax exclusions from war finance allowed tax benefits to become a permanent component of tax law and combat compensation. The structure of modern tax benefits has its roots in the policy decisions made during this period.

Almost immediately after the passage of the 1942 income tax exclusion, the Congress began debating its replacement. While the concept of military tax exclusion received almost unanimous support, some in the Congress believed that the existing exclusion of between $250 and $300 was insufficient. Legislative debate focused on the $3,500 exclusion for military personnel in WWI, despite the fact that falling income tax brackets and rising pay levels had made existing benefits more generous than their 1918 predecessors. In its first attempted revision, the House of Representatives revisited the WWI $3,500 total exemption for both single and married members.[20] Unlike the 1942 law, officers would also be eligible for the revised tax exclusion.[21] Despite the move away from matching tax benefits to wartime revenue collection, the Congress maintained that the purpose of tax benefits as an expression of national solidarity remained the same, as the exchange below illustrates.

> Sen. BARKLEY: Is [the exclusion] supposed to be in the bill based upon the service of the man in the armed services as such or based upon his comparative need for the exclusion?
>
> Mr. SURREY (Treasury Dept.): No it is based upon his service as such.[22]

The $3,500 exclusion passed the House, but the bill stalled in the Senate. Technical issues of eligibility for soldiers serving stateside, differentials between married and single benefits, and the cumulative nature of the exclusion were resolved

20. The House proposal was for a $3,500 exclusion that combined the military exclusion and the personal exemption, as in WWI. A single individual would receive a $500 personal exclusion and a $3,000 military exclusion. Corresponding married exclusions would be $1,200 and $2,300, respectively.

21. *Current Payments Tax Act of 1943, Hearings on H.R. 2570.*

22. Ibid.

by a simplifying compromise.[23] All servicemembers, whether officers or enlisted, serving domestically or abroad, could exclude up to $1,500 of military compensation from income tax, in addition to any other exclusions. The Senate version passed Conference Committee and was signed into law.[24]

Enactment of this provision marked a departure from previous tax exclusions. Both the 1918 and 1942 laws linked the generosity of tax exclusions to changes in taxation required to finance wars.[25] With the 1943 bill, this connection was permanently removed.

The $1,500 annual exclusion, when combined with a personal exemption of between $500 (single) and $1,200 (married), meant that almost all enlisted personnel (excepting single E-7s with extended years of service) would have no tax liability. Assuming marriage, most low-ranking officers (below O-3) would be completely exempt, and all higher-ranking officers (O-4 and above) would receive the maximum income exclusion but pay some amount of income tax, regardless of experience. As a result of this exemption, 90 percent of all servicemen had no federal tax liability prior to 1945.[26] The bill also set a precedent for parity between officer and enlisted exclusions. At $1,500, the maximum officer exclusion was comparable to the $1,656 minimum pay for senior enlisted members (E-7) (see Figure 1, which does not consider personal exemptions). This standard of parity would be upheld in subsequent revisions of tax benefits until revised by recent legislative changes.

LEGEND

- Pays no tax (1943)
- Pays no tax (1945)
- Receives full $1,500 exclusion

Enlisted Rank	Min	Max	Officer Rank	Min	Max
SFC (E7)	**$1,656**	$2,484	Col (O6)	$4,000	$6,000
SSgt (E6)	$1,368	$2,052	LtCol (O5)	$3,500	$6,000
Sgt (E5)	$1,152	$1,728	Maj (O4)	$3,000	$5,250
Corp (E4)	$936	$1,404	Capt (O3)	$2,400	$4,500
PFC (E3)	$792	$1,188	1st Lt (O2)	$2,000	$3,600
Pvt (E2)	$648	$972	2nd Lt (O1)	$1,500	$3,000

Source: Defense Finance and Accounting Service (DFAS), Military Pay Tables, 1943 and 1945.

Note: Minimum and maximum pay values vary within grades due to a member's years of service (YOS). This applies to subsequent pay tables as well.

Figure 1. Military Annual Pay—Combat Income Exclusions and Pay Grades in 1943 and 1945

23. Ibid.

24. H.R. Rep. No. 78-510 (1943).

25. Ibid. The legislative language of the 1942 exclusion makes the purpose clear: "If the taxpayer is in active service in the military or naval forces of the U.S. or any of the other United Nations at any time during the taxable year 1942 or 1943, the increase in the tax for the taxable year 1943…shall be reduced by an amount equal to the amount by which the tax for the taxable year 1942…is increased."

26. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

Severing the connection between tax exclusions and war finance altered the fundamental purpose of the military tax exclusion. Without reference to offsetting tax increases, the exclusion supplemented other forms of military compensation. Changes to the tax exclusion in the immediate postwar period reflect this shift from allocating the burdens of war to increasing overall levels of military compensation. The Revenue Act of 1945, which passed after Japan's surrender, lowered marginal tax rates and exempted all enlisted compensation from federal income tax, retroactive to January 1941. The exemption for commissioned officers remained at $1,500 per year, and although the Congress extended payment deadlines, the officer exemption was not made retroactive.[27] Full enlisted exclusion had little practical effect for the period from 1943 to 1945, as very few enlisted members paid taxes under the 1943 law. However, retroactivity resulted in a substantial windfall tax refund to enlisted personnel serving in 1941 (even prior to Pearl Harbor) and 1942 (when the smaller tax exclusion was in place). Although the 1945 exclusion did not receive significant congressional debate, an unpublished study by Patrick Kusiak suggests that the post-1945 tax refunds served to "[increase] the competitiveness of otherwise modest pay levels," for enlisted recruits.[28]

In addition to retroactively exempting all enlisted compensation from federal income tax, the Congress, the Military Departments, and the Truman administration extended eligibility for tax benefits past the end of WWII. As with the new enlisted exemption, the purpose of continued tax benefits was to address broader manpower goals. Although Japan surrendered in August of 1945, hostilities were not officially terminated until December 31, 1946. Following the official termination of hostilities, the House introduced a bill curtailing all wartime tax benefits at the end of 1947. As noted by Kusiak, this proposal met with strong opposition from the military:

> Exemption from income tax had become an important element of military compensation. It played a prominent role in efforts of the Military Departments to recruit volunteers….In the event the exclusion for the military could not be continued, the War and Navy Departments urged a delay in the termination of the wartime exclusion to permit an offsetting increase in military pay.[29]

Sympathetic to these concerns, the Senate proposed extending the window of benefits eligibility for enlisted personnel to the end of 1948. A one-year delay

27. S. Rep. 79-655 (1945).

28. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

29. Ibid.

in the phase-out of enlisted benefits allowed time for offsetting pay increases. In Conference, the House concurred on extending the enlisted benefits deadline, but also desired continuation of officer exclusions, and the final bill extended wartime tax exclusions for all members until January 1, 1949.[30]

B. Korea

Termination of tax benefits would last only until the outbreak of the Korean War. While many of the statutory provisions of the WWII tax benefits were reinstituted, the new reality of fighting a geographically limited "policing" operation, as opposed to full military mobilization, prompted changes in the administration of the tax benefits. These new mechanisms formed the foundation of the administration of current tax benefits based upon presence in a geographically designated combat zone, and established the relationship between risk and reward that would characterize the administration of tax benefits over the coming decades.

The Revenue Act of 1950 authorized tax benefits for service in Korea. Originally intending to reduce tax rates following post-WWII military demobilization, the Congress instead increased taxes in response to the North Korean invasion. As in the 1918 and 1942 revenue bills, the Congress proposed a military tax exclusion for service in the conflict. Many provisions of the 1943 exclusion remained intact. All enlisted military compensation earned in Korea would be excluded from federal income tax, most of the "instrumental" benefits were reauthorized, and up to $200 per month of commissioned officer pay earned in Korea was exempted from income tax.[31] The geographic limitation of a combat zone reflected the intent to provide benefits as a compensation for risk. The raise to a $200 per month benefit ($2,400 annually) maintained the parity between the maximum exclusions for officers and senior enlisted personnel that prevailed in WWII. The quote below from a Senate Finance Committee Report suggests the Congress's desire to maintain officer/enlisted benefits at this standard of parity (see Figure 2):

> The WWII exclusion for commissioned officers was a maximum of $1,500 annually as compared with a maximum of $2,400 under this bill. It is believed that this increase is advisable to achieve a greater degree of equality in treatment as between enlisted men and officers.[32]

30. Ibid.

31. S. Rep. No. 81-2375 (daily ed. July 20, 1950).

32. S. Rep. No. 81-2375.

By the time of the Korean War, pay raises had reduced the need for a wartime tax benefit as a general increase in compensation. The Korean policy modified the justification for the tax exclusion, from retention and recruitment incentives to compensation for combat risk. Inclusion of the combat zone income tax exclusion in Section 112 of the 1954 Internal Revenue Code reinforced the exclusion's new and permanent status as an element of combat compensation.[33]

During the Korean War, important changes were also made to the administration of tax benefits. Whereas previous income tax exclusions and "instrumental" benefits were available to all servicemembers regardless of deployment location, eligibility for postwar benefits was determined by presence within a defined combat zone. This change aptly reflected the geographically limited nature of the then-current conflicts and the Congress's desire to relate risk to reward, but the new administrative arrangements posed issues of their own. While presence in a combat zone may have been appropriate for monthly income tax exclusions, it arguably proved a less efficient and flexible standard for administering time suspension provisions, posthumous tax forgiveness, and other "instrumental" tax benefits.

Linkage between geographic combat zones and "instrumental" benefits was not inevitable; indeed, such benefits were originally intended to operate separately from the income tax exclusion. When restricted by geography, the administration of "instrumental" benefits would encounter difficulties dealing with soldiers captured or killed outside defined combat zones or prisoners remaining in designated areas after the cessation of combat operations in the Vietnam War and beyond. Because the DoD resisted congressional attempts to provide tax benefits to prisoners of war in

LEGEND

Pays no income tax

Receives full $200 exclusion

Enlisted Rank	Min	Max	Officer Rank	Min	Max
SFC (E7)	**$198**	$294	Col (O6)	$570	$698
SSgt (E6)	$169	$250	LtCol (O5)	$456	$584
Sgt (E5)	$140	$228	Maj (O4)	$385	$513
Corp (E4)	$118	$191	Capt (O3)	$314	$442
PFC (E3)	$96	$147	1st Lt (O2)	$249	$349
Pvt (E2)	$83	$120	2nd Lt (O1)	$214	$314

Source: DFAS, Military Pay Tables, 1949.

Figure 2. Military Monthly Pay—Combat Income Exclusions and Pay Grades in 1950

33. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

1954,[34] the reliance on designated combat zones for both tax exclusions and certain "instrumental" tax benefits did not give rise to the aforementioned equity concerns in Korea as it would in later conflicts.

The Revenue Act of 1950 not only extended benefits to soldiers deployed to the Korean Peninsula, but authorized the president to designate (and undesignate) future combat zones by Executive Order.[35] Executive discretion arguably would preclude the need for congressional intervention and introduce a greater degree of flexibility and responsiveness to the administration of tax benefits in response to changing risk circumstances. For the Korean War, this presidential power went unused, as the Congress twice extended the window of benefits beyond the original deadline of January 1, 1952.[36] However, as discussed in Chapter 4, the Congress's delegation of authority to the executive branch unintentionally invited future inter-agency debates over the purpose of and eligibility for tax benefits. In future conflicts, the DoD favored broader application of benefits to increase the attractiveness of combat compensation without penalty to military budgets, while the Department of the Treasury preferred narrow application and questioned the fundamental purpose of the CZTE. Tasked with mediating this debate, future administrations often proved *less*, not *more* flexible than the legislature, frustrating congressional advocates for combat tax relief. By conferring benefits on the basis of geography and delegating "combat zone" designation to the executive branch, the Korean War benefits set the stage for the administrative debates concerning military tax benefits in Vietnam and beyond.

4. Conflict over the Meaning and Administration of Vietnam Tax Benefits

The authorization of combat tax benefits to Vietnam lagged behind the advent of combat operations. Although deployments of military advisors and subsequent casualties began as early as 1959, Vietnam was not designated as a combat zone under Section 112 of the Internal Revenue Code until the war escalated in 1965. Prior to 1965, there was some debate on granting benefits; however, neither legislation nor a presidential designation was forthcoming. Following the Gulf of Tonkin Resolution, Executive Order (E.O.) 11216 authorized benefits retroactive only to

34. Ibid.

35. S. Rep. No. 81-2375.

36. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

January 1, 1964.[37] Whereas the WWII and Korean designations were retroactive to the onset of combat operations, the Vietnam combat zone designation excluded a three-year period in which over 15,000 soldiers were deployed and 200 were killed.[38]

The only legislative change to combat tax benefits occurred relatively early in the official conflict. In November 1966, the Congress, at the urging of the administration and the DoD, raised the maximum officer income exclusion from $200 to $500 per month. The Committee on Ways and Means supported the bill unanimously and it passed without difficulty. The legislative history suggests that the Congress intended to restore the traditional standard of parity between officer and enlisted exemptions (see Figure 3):

> When these exemptions were last revised—during the Korean conflict—it was intended that the exemption would benefit commissioned and senior noncommissioned officers on an approximately equal basis. However, the seven military pay raises which have been enacted since the exemptions were last revised have upset the intended balance. Currently, some senior noncommissioned officers receive approximately $500 completely exempt from tax…Your committee believes that this increase [to $500] would restore the traditional balance between the combat pay exclusion for commissioned officers and enlisted men.[39]

LEGEND

- Pays no income tax
- Receives full $500 exclusion

Enlisted Rank	Min	Max	Officer Rank	Min	Max
SgtMaj (E9)	**$511**	$657	Col (O6)	$704	$1,217
MstrSgt (E8)	$428	$587	LtCol (O5)	$563	$992
SFC (E7)	$269	$529	Maj (O4)	$475	$830
SSgt (E6)	$232	$388	Capt (O3)	$442	$718
Sgt (E5)	$200	$329	1st Lt (O2)	$354	$533
Corp (E4)	$169	$253	2nd Lt (O1)	$304	$420

Source: DFAS, Military Pay Tables, 1966.

Figure 3. Military Monthly Pay—Combat Income Exclusions and Pay Grades in 1966

37. Exec. Order No. 11216, 3 C.F.R. 301 (1964-65). *Designation of Vietnam and Waters Adjacent Thereto as a Combat Zone for the Purposes of Section 112 of the Internal Revenue Code of 1954.*

38. DoD Statistical Information Analysis Division, *Military Personnel Statistics: Active Duty Military Personnel by Service by Region/Country*, Historical Reports, 2011; National Archives, *Vietnam Conflict Extract Data File: Record Group 330*, April 29, 2008, http://aad.archives.gov/aad/fielded-search.jsp?dt=2354&cat=WR28&tf=F&bc=,sl.

39. H.R. Rep. No. 89-2270 (daily ed. October 13, 1966).

Officer incentives also motivated this change. Without restoration of the historical balance, the Congress feared the existence of a "possible tax impediment to the acceptance of battlefield commissions by eligible enlisted personnel."[40] This concern demonstrated the importance of the CZTE as part of the overall compensation package for wartime service, and was echoed in future debates over extending combat benefits outside the combat zone. References to wartime revenue demands, which supplied the original justification for military tax exclusions, were absent from debate over combat tax benefits in Vietnam.

The shift toward viewing the tax exclusion as an element of overall military wartime compensation had consequences in the debate over extending tax benefits to areas outside Vietnam. As the conflict broadened in scope, combat operations expanded beyond Vietnam into Laos and Cambodia. Combat support operations spread even farther, with substantial deployments in Thailand, Okinawa, and Guam. At the time, the official combat zone designation authorized benefits only to servicemembers deployed to Vietnam. However, although attempts to expand the CZTE to low risk areas were unsuccessful, they presaged future eligibility for soldiers performing support operations in areas of limited combat risks. Furthermore, a slow-moving bureaucratic process delayed benefits to some deserving personnel outside of the formal combat zone.

Delayed eligibility for Laos and Cambodia marked the most clear-cut case of the difficulties administering combat tax benefits, even with widespread political support. Unarguably, soldiers operating on the perimeter of Vietnam manned the frontlines of the conflict. Servicemembers temporarily present in Laos and Cambodia continued to receive federal income tax exclusions because their official deployments remained within the combat zone. However, presence outside Vietnam stripped eligibility for "instrumental" benefits servicemembers could receive should they be injured, killed, or captured.[41] For example, a member deployed to Vietnam but dying in Cambodia would receive an income tax exclusion, but would not receive posthumous exemption for any inheritance and unpaid income taxes. Likewise, the compensation of members injured or captured beyond the borders may have been subject to federal income taxation. This geographic asymmetry ran counter to the original intent that "instrumental" benefits be available regardless of location. Such unintended inequities were direct consequences of the link between eligibility and presence within a designated combat zone.

40. Ibid.

41. Kusiak, *Exclusion from Gross Income During War or In Combat Zones.*

The subtlety of these differences in eligibility may have delayed correction of these inequities. Over 400 soldiers were killed in Cambodia and Laos before the asymmetry in "instrumental" benefits was corrected in November of 1970.[42] Once the problem was identified, the political system moved rapidly. First, the Congress introduced a bill designating Cambodia and Laos as combat zones. The president countered with a proposal to include a ten-mile radius around Vietnam in the existing combat zone. The forthcoming Executive Order was again preempted by new rules from the Treasury Department (Treasury Directive (T.D.) 7066) that granted full combat zone status to those directly supporting combat operations while outside Vietnam who were eligible for Hostile Fire Pay (HFP).[43] By establishing a durable, risk-based standard for adjudicating future claims, T.D. 7066 was an improvement over both the legislative and executive efforts. However, by the time the rules came into force, the conflict had been underway for the better portion of a decade, and soldiers were not granted retroactive eligibility. The delayed designation of Cambodia and Laos demonstrated that, even with unanimous political support, the administration of combat tax benefits could be difficult and potentially inequitable.

The competing perspectives on extending tax benefits to comparatively safe outlying support areas resulted in a series of inter-agency debates over the meaning of, and eligibility for, military tax benefits. A 1967 Air Force proposal to extend CZTE benefits to ground crews based in Thailand initiated these debates. At the root of the Air Force's proposal was the fact that offshore support personnel in the Navy received income tax exclusions (while inside the designated combat zone), yet air crews in Thailand, whose duties entailed greater everyday risks, did not. Benefits were necessary "to counteract adverse morale problems" caused by this perceived inequity. In a memorandum to the State and Treasury Departments, the DoD backed the Air Force position and recommended extension of the tax exclusion to Thailand.[44]

The Treasury Department, however, held a different perspective. Risks, not incentives, justified the military tax exclusion. In a strongly worded memo, excerpted below, the Tax Legislative Counsel for the Office of the Secretary of the Treasury argued that, due to the lack of combat risk in Thailand, the extension of tax benefits was not justified:

---

42. Prior to November 10, 1970, 432 servicemembers were killed in Cambodia. Including those wounded, total casualties in Cambodia numbered 2,848, National Archives, *Records of Military Personnel Who Died, Were Missing in Action or Prisoners of War as a Result of the Vietnam War*, Access to Archival Databases, January 21, 1998, http://aad.archives.gov/aad/fielded-search.jsp?dt=197&cat=WR28&tf=F&bc=,sl.

43. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

44. Ibid.

> there appears to be no need to extend that exclusion to personnel who are not directly engaged in combat operations.…The fact that some personnel stationed in Vietnam are entitled to combat pay exclusion even though they may not actually engage in combat does not justify extension of the combat pay exclusion to noncombatant personnel stationed in Thailand.… Thailand [presents a] situation in which administrative convenience no longer justifies undue generosity.[45]

If benefits were conferred upon noncombatants serving in Thailand, the Under Secretary feared the setting of a precedent for future extensions:

> Extension of the combat pay exclusion to Thailand would be likely to lead to pressure for the designation of additional areas as "combat zones," even though hostile activities in such areas do not constitute open warfare. The Congo and the Dominican Republic were offered as examples of areas in which American forces had recently engaged in combat types activities falling short of open warfare. It did not appear wise to establish a precedent which could result in designating such areas as "combat zones" in the event that limited hostilities were to occur or reoccur in such areas.[46]

From a risk perspective, combat support operations in Thailand, the Treasury argued, deserved no more recognition than similar deployments in Japan, Okinawa, and Guam during the Korean War. The Department of State added that designating such nations as combat zones might imply either a deterioration of diplomatic relations or escalation of internal hazards in the host country.[47] The warning that inclusion of support operations in Thailand would result in pressure to add other areas proved correct. More recent combat zone designations in the Persian Gulf and Balkans, which included combat support areas, can be traced back to the debate over eligibility for Thailand.

A subsequent memo by the Under Secretary of the Treasury expanded the critique beyond the Thai case at hand, to question the historical justifications of the CZTE itself.

> We believe that it is important to remember that the combat pay exclusion provided by Section 112 of the Internal Revenue Code is designed mainly as a substitute for more generous appropriations for hostile fire pay, and as a means of eliminating the need to file tax returns when operating under combat conditions. Neither of these justifications for

45. Jerome Kurtz, *Letter from Tax Legislative Counsel Jerome Kurtz to Deputy Under Secretary of the Air Force for International Affairs Philip F. Hilbert*, June 19, 1967.

46. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

47. Assistant Secretary for Congressional Relations, Department of State, *Letter to the Director of the Bureau of the Budget*, June 17, 1968.

> the combat pay exclusion applies in the case of Armed Forces personnel serving in Thailand.
>
> No definite information appears to be available as to the justifications for these income tax exclusions. The World War II exclusion may have been intended as a means of providing additional compensation for armed services personnel, since military pay during the opening years of WWII was quite low. The lack of any geographical limitation on the exclusion, and the delay in extending the exclusion to officer personnel tend to support this view… The justification for the WWI exclusion is less clear. That exclusion appears to have benefited only senior officers, because the high starting brackets under the WWI income tax relieved most enlisted men and junior officers from tax, even without the special exclusion for military personnel.[48]

After questioning the historical justifications for combat tax benefits, the Under Secretary criticized the administration of the tax exclusion in Vietnam. Treasury's objection, summarized by the Kusiak study below, marked the most comprehensive critique of the CZTE to date. It merits mentioning that each of the Under Secretary's criticisms remains relevant to this day.

> As a substitute for more adequate compensation…the existing combat zone exclusion was undesirable because:
>
> 1. Given the progressive nature of the income tax rates, the exclusion confers its greatest benefits on senior officers and its smallest benefits on the lowest enlisted grades.
> 2. The existing exclusion confers its benefits indiscriminately whether or not an individual is in a unit that undergoes substantial risks or hardship during its period of service in a combat zone.
> 3. The exclusion obscures the actual pay costs incurred by the Department of Defense.
> 4. The existence of the exclusion has led to pressure from other Government agencies for similar privileges for their employees, and the employees of their contractors.[49]

Facing opposition from the Treasury, the Pentagon dropped the Air Force proposal. Unable to extend benefits via Executive Order, the DoD supported congressional efforts, led by Senator John Tower (R-TX) of the Armed Services Committee, to designate Thailand as a combat zone.[50] When Tower's efforts stalled, advocates attempted to include Thailand under new Treasury regulations

48. Under Secretary of the Treasury, *Letter to the Under Secretary of the Air Force*, September 18, 1967.

49. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

50. Ibid.

(T.D. 7066) that extended CZTE eligibility to those serving in "direct support" of combat operations based upon receipt of HFP. In *Joe Lassiter v. United States*, the U.S. Supreme Court blocked this interpretation, ruling the plaintiff's service in Thailand did not meet the eligibility criteria for HFP.[51] Having exhausted efforts across all three branches of government, attempts to extend the income tax exclusion to combat support operations in Thailand were abandoned. Future attempts to include support areas in combat zone designations in the Persian Gulf and the Balkans would prove more successful.

Eligibility for combat tax benefits in Southeast Asia did not conclude with American withdrawal from South Vietnam. Following the ceasefire, there were a substantial number of missing soldiers and American prisoners of war. These soldiers would continue to collect military salaries and accrue federal tax liabilities until they were returned home or declared dead. In contrast to policy in the Korean War, the Congress determined that missing soldiers and prisoners of war should not bear the burden of accumulated tax liabilities, and passed House of Representatives (H.R.) 9900 in 1972, which exempted all Prisoner of War/Missing in Action (POW/MIA) servicemembers from federal income taxation.[52] As with other "instrumental" tax benefits such as estate tax forgiveness and time provision suspensions, fairness was central to the concept of tax relief for POW/MIA soldiers.

However, for the POW/MIA tax exclusion to be operative, the law required the continued existence of the Vietnam combat zone. It was not until 1996, once the United States normalized relations with Vietnam and resolved all outstanding POW/MIA cases, that the Vietnam combat zone designation was terminated.[53] The additional two-plus decades of the designation did not confer tax exclusions upon anyone undeserving of benefits, but the delayed undesignation of Vietnam set a precedent, which was followed by the more costly continuation of combat zones in the Balkans and the Persian Gulf. In the decade following Vietnam, subsequent congressional authorizations for income tax exclusion approved specifically for military and civilian prisoners from the USS Pueblo and the American Embassy in Tehran highlighted the lack of a comprehensive tax policy for prisoners of war that operated without reference to combat zone designation.[54] Such a policy remains absent to this day.

---

51. Ibid.
52. H.R. Rep. No. 92-825 (daily ed. February 7, 1972).
53. Exec. Order No. 13,002, 61 Fed Reg. 24665 (May 13, 1996), *Termination of Combat Zone Designation in Vietnam and Waters Adjacent Thereto.*
54. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

Vietnam era struggles over benefits eligibility exposed cracks in the administrative structure established in the Korean War. Existing administrative arrangements resulted in delays in granting benefits to Vietnam and surrounding combat areas. Advocacy for broader combat zones raised the issue of extending tax exclusions to combat support areas. Reliance on a combat zone for "instrumental" benefits caused difficulties in accommodating severe risks outside designated areas and prevented the retirement of the Vietnam designation until long after combat risks had dissipated.

5. Current Tax Exclusion: Revising the Relationship between Risk and Reward

Recent changes to the administration of combat tax benefits have their roots in the restructuring of HFP in the 1980s. Although the HFP changes did not specifically address tax benefits themselves, the establishment of Imminent Danger Pay (IDP) in 1983 lowered the threshold for rewarding combat risks. Previously, HFP of $65 per month was authorized to those exposed to the threat of enemy fire in designated Hostile Fire areas. In response to the changing threat environment characterized by prolonged, low-intensity conflicts, the Congress proposed the creation of IDP to accompany preexisting Hostile Fire benefits. Whereas HFP covered areas of active combat, IDP extended an identical level of compensation on the basis of "the threat of physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions."[55] This change, intended to benefit soldiers deployed in Lebanon, El Salvador, and Grenada, lowered the threshold for monetary benefits from *actual* hostile fire (HFP) to *the threat of* hostile fire (IDP).

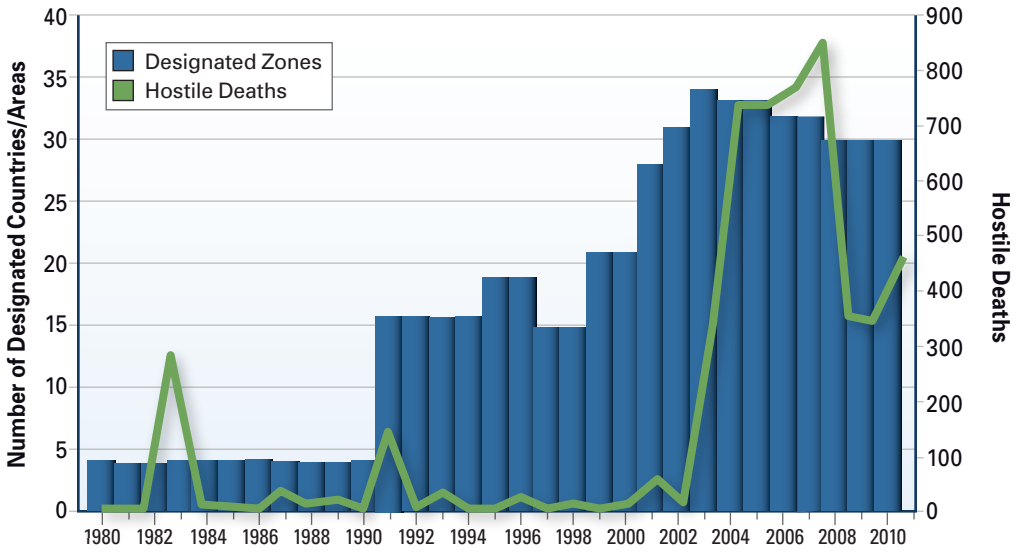
Changes made to HFP were eventually incorporated into the designation criteria for combat zones. Dating back to Vietnam, the link between HFP and eligibility for combat tax benefits had already been established by T.D. 7066, enacted to benefit soldiers in Cambodia and Laos. T.D. 7066 awarded benefits to soldiers outside designated combat zones who were serving in "direct support" of combat operations and eligible for HFP. In 1991, T.D. 8489 proposed application of this preexisting standard to IDP as well.[56] For those serving in "direct support" outside combat zones, the "threat of physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions" was sufficient for the same benefits as those serving within an active combat zone. The harmonization of combat tax benefits and HFP/IDP presaged lower eligibility thresholds for risk compensation in the 1990s.

55. Under Secretary of Defense for Personnel and Readiness, *Military Compensation Background Papers: Special Pay for Hostile Fire or Imminent Danger,* Sixth Edition, May 2005.

56. Supplementary Information, Notice of Proposed Rulemaking, 56 Fed. Reg. 10211 (1991).

At the same time, the very definition of what constituted a combat zone was changing as well. In previous conflicts, tax benefits had either been restricted to the specific area of combat operations (Vietnam and Korea) or administered without geographic limitation during complete national mobilizations (WWI and WWII). The combat zones of the 1990s broke with these precedents by designating combat support areas with limited risk potential.

The Persian Gulf combat zone epitomized this trend. Following the passage of United Nations Resolution 678 authorizing military response to the Iraqi invasion of Kuwait, the Congress introduced legislation designating almost the entire Persian Gulf region as a combat zone under Section 112 of the Internal Revenue Code. Before passage, the legislation was preempted by E.O. 12744 to the same effect.[57] Without immediate intervention, many feared Iraqi forces would proceed beyond Kuwait into Saudi Arabia; accordingly, all three nations were designated in the Executive Order. However, E.O. 12744 did not stop there. Although few expected combat in Qatar, Bahrain, Oman, and the United Arab Emirates, all were included in the designation, as well as the waters of the Persian Gulf, the Gulf of Aden, the Gulf of Oman, the Red Sea, and parts of the Arabian Sea[58] (see Figure 4). During



Sources: DoD Statistical Information Analysis Division (SAID), Military Casualty Information, 2010; DoD Financial Management Regulation, Volume 7A, Chapter 44, August 2011.

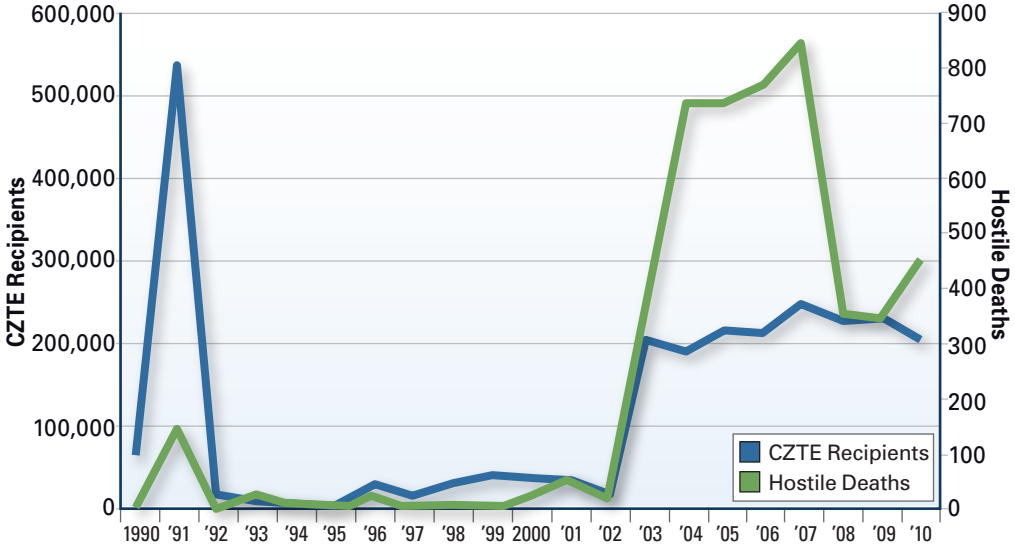
Figure 4. Active Combat Zone Designations and Hostile Deaths (1980–2010)

57. Technically, E.O. No. 12744 designated the Persian Gulf states and waters as a "dangerous foreign area" not a "combat zone." The reason for this distinction was unclear, but the use of this linguistic standard echoed the authorization of IDP and its subsequent linkage to combat tax benefits through T.D. 8489. Either way, the effect of the order authorized the same benefits under Section 112 of the Internal Revenue Code.

58. Exec. Order No. 12744 (1991), *Designation of Arabian Peninsula Areas, Airspace, and Adjacent Waters as a Combat Zone.*

Desert Shield and Desert Storm, these areas hosted coalition troops preparing for deployment to Iraq or Kuwait and performing combat support operations that never experienced actual combat operations or meaningful combat risks. All the same, the tax benefits authorized for such areas were identical to those received by soldiers on the frontlines in Iraq and Kuwait. The existence of both high (Iraq, Kuwait) and very low (Qatar, Bahrain, United Arab Emirates, etc.) risk areas within the Persian Gulf combat zone diluted the correlation between risks and benefits and eroded one of the core justifications of military tax exclusions (see Figure 5). The weak relationship between risk and reward within designated combat zones continues into the 21st century. In 2007, the year of highest military casualties since the Vietnam War, over 800 servicemembers were killed, almost entirely in Iraq and Afghanistan. During this time, over 200,000 personnel throughout the theater received benefits from the CZTE, many in much safer areas outside of Iraq and Afghanistan.

Once designated, the Persian Gulf combat zone (and the benefits therein) persisted long beyond the end of combat operations in Iraq. More than a decade later, the second Iraq War did not require a new designation because the original Persian Gulf designation remained in effect. In the period between the wars, one could argue that pilots enforcing the "No-Fly Zone," who were repeatedly targeted by Iraqi ground forces, were justified in receiving income tax exclusions. The continued designation

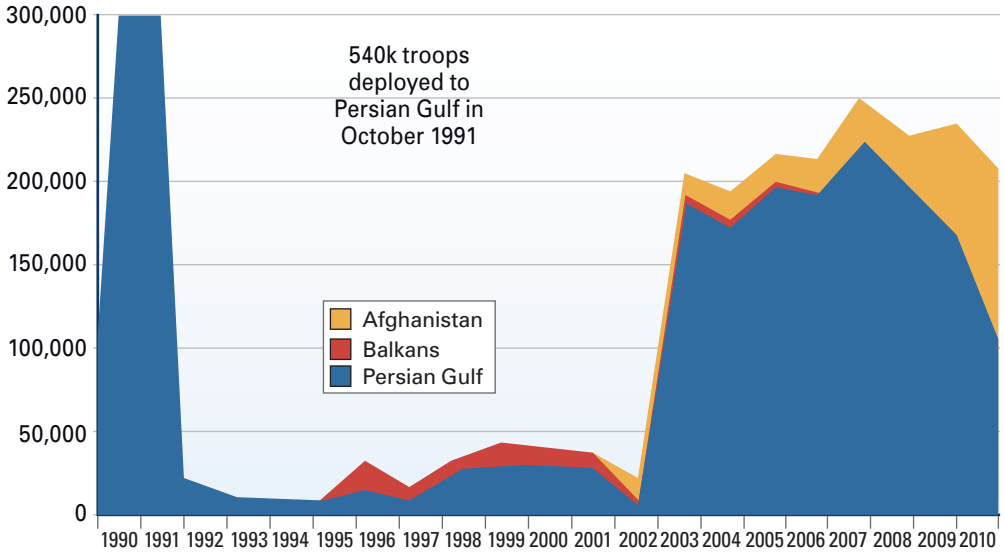


Sources: DoD SAID, Military Casualty Information, 2010; DoD SAID, Military Personnel Statistics, Historical Reports, 1953–1999, 2010; DoD SAID, Active Duty Military Personnel by Service by Region/Country, 2011.

Figure 5. Tax Exclusion Recipients and Hostile Deaths (1990–2010)

of Kuwait, Saudi Arabia, and the remaining land, sea, and airspace throughout the region was more tenuous from a risk perspective. In 1993, the Under Secretary of Defense for Personnel and Readiness rescinded eligibility for HFP/IDP for certain parts of the Gulf combat zone with minimal hostile risks.[59] However, in the absence of an Executive Order, members of the Armed Forces continued to receive combat zone tax benefits throughout the entire designated area, and still do today.

In Vietnam, undesignation was deferred to maintain "instrumental" benefits to those killed, captured, or missing after the war; in the Persian Gulf, no such action to preserve benefits for POW/MIA members was necessary. Regardless, undesignation was deferred—at a cost. From 1992 to 2001, an average of between 7,000 and 16,000 American troops were deployed to the combat zone, with forty-five dying from hostile actions, all unrelated to Iraqi forces (see Figure 6).[60] During this time, every deployed service member received full combat tax benefits under Section 112 of the Internal Revenue Code at cost of hundreds of millions of dollars.



Sources: DoD SAID, Military Personnel Statistics, Historical Reports, 1953–1999, 2010; DoD SAID, Active Duty Military Personnel by Service by Region/Country, 2011.

Figure 6. Deployments to Designated Combat Zones (1990–2010)

59. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

60. An annual average of 6,917 members were stationed in the designated land areas. Including members afloat in the "North Africa, Near East, and South Asia" region, not all of which was a designated combat zone, the average is 16,547. Twenty-six deaths were attributable to friendly fire downing two Blackhawk helicopters involved in Operation Provide Comfort. Nineteen were killed in Saudi Arabia by the Khobar Towers terrorist bombing. Department of Defense Statistical Information Analysis Division, *Military Personnel Statistics, Historical Reports 1953–1999*, 2010, http://siadapp.dmdc.osd.mil/personnel/MILITARY/history/309hist.htm; *Military Casualty Information*, 2010, http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm.

While administrative inaction prolonged combat designations in the Persian Gulf, inaction prevented the extension of certain tax benefits to areas of real risk. The absence of "instrumental" tax benefits for military peacekeepers in Somalia demonstrated the administrative inflexibility of tax benefits in response to fast-moving, low-intensity conflicts. Although initially opposed to Operation Restore Hope, the Senate backed extension of the CZTE to troops deployed to Somalia. Advanced by Senator Hank Brown, the chamber passed a "sense of the Senate" resolution favoring tax benefits "to recognize the men and women who serve our country in this troubled part of the world."[61] Echoing Senate sentiment, Secretary of Defense Les Aspin and Joint Chiefs of Staff Chairman John Shalikashvili urged designation of Somalia under Section 112 of the Internal Revenue Code.[62] Despite widespread support, neither the House nor President Clinton took the necessary steps to extend benefits, and the issue dropped following U.S. withdrawal. If not for the example of the Persian Gulf combat zone, the absence of a designation for Somalia may have been understandable. In the past, the Treasury Department had been skeptical of eligibility for "combat-type activities falling short of open warfare," as in Somalia.[63] However, given eligibility for low-risk combat support areas such as Qatar and Bahrain the denial of benefits in Somalia seems an error of omission. That the 1,154 soldiers in Bahrain and Saudi Arabia received tax exclusions in 1994—yet the 933 troops in Somalia did not—demonstrates that the administrative process produced inconsistent results.[64] Even if the omission were a conscious decision on behalf of the White House, the need for a designated combat zone to extend "instrumental" benefits prevented posthumous income tax forgiveness to the 43 soldiers dying in Operation Restore Hope—a clear inequity.

Following Somalia, the Congress was determined not to cede the initiative on tax benefits to the Clinton administration. When U.S. troops were deployed to the former Yugoslavia to enforce the Dayton Accords, the Internal Revenue Service granted automatic time extensions for income tax filing to soldiers in the Balkans, but an Executive Order was not forthcoming from the president.[65] With the specter of Somalia hovering in the background, the House introduced H.R. 2776, Tax Benefits for Individuals Performing Services in Certain Hazardous Duty Areas, an action which Representative Jim Bunning (R-KY) justified by saying:

61. 139th Cong. Rec. S13588 (daily ed. October 18, 1993).

62. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

63. *Under Secretary of the Treasury, Letter to the Under Secretary of the Air Force,* September 18, 1967.

64. DoD Statistical Information Analysis Division, *Military Personnel Statistics: Active Duty Military Personnel by Service by Region/Country,* Historical Reports, 2011.

65. Kusiak, *Exclusion from Gross Income during War or in Combat Zones.*

> Quite frankly, we must act to insure [*sic*] that we do not have a repeat of what happened in Somalia. In Somalia, the families of the soldiers who lost their lives could not receive the benefits that should have gone to them under the Tax Code because the President never declared it a combat zone…Unfortunately, the peacekeeping operations in the former Yugoslavia have not been designated by the President as being in a combat zone…our service personnel are in a combat zone type situation even if the President has not declared it a combat zone.[66]

H.R. 2776 designated the land and airspace of Bosnia and Herzegovina, Croatia, and Macedonia as a Qualified Hazardous Duty Area (QHDA). Section 112 of the Internal Revenue Code provided the same tax benefits for servicemembers present within the QHDA as for those deployed to a designated combat zone. These benefits would continue as long as servicemembers within the QHDA were eligible to receive HFP or IDP, but terminate thereafter. The Congress also took care to ensure that all "instrumental" tax benefits, excerpted from a House Report below, would be extended to members serving in the former Yugoslavia:

(1) Section 2(a)(3) (relating to special rule where deceased spouse was in missing status).

(2) Section 112 (relating to the exclusion of certain combat pay of members of the Armed Forces).

(3) Section 692 (relating to income taxes of members of Armed Forces on death).

(4) Section 2201 (relating to members of the Armed Forces dying in combat zone or by reason of combat-zone incurred wounds, etc.).

(5) Section 340(a)(1) (defining wages relating to combat pay for members of the Armed Forces).

(6) Section 4253(d) (relating to the taxation of phone service originating from a combat zone from members of the Armed Forces).

(7) Section 6013(f)(1) (relating to joint return where individual is in missing status).

(8) Section 7508 (relating to time performing certain acts postponed by reason of service in combat zone).[67]

Linkage between tax benefits and HFP/IDP added the potential for greater flexibility for the administration of tax benefits under the QHDA. Historically, HFP/

66. 142nd Cong. Rec. H1670 (daily ed. Mar. 5, 1996).

67. Ibid.

IDP has proved easier to manipulate in response to changing risk environments than combat zone designations. It was thought that linkage to HFP/IDP would remedy difficulties in withdrawing income exclusions when circumstances no longer justified tax benefits, but this flexibility was not realized. Rather than HFP/IDP contributing to the flexibility of the CZTE, the reverse has occurred: the existence of combat tax benefits has made it more difficult to withdraw HFP/IDP in the Balkans. Although the Congress had feared military peacekeepers would be placed in the line of fire, combat risks in the Balkans never materialized. Between 1994 and 2004, twenty servicemembers died in Operation Joint Endeavor with only a single combat fatality. Notwithstanding the absence of anticipated risks, both HFP/IDP and combat tax benefits remained available until November 2007, when Bosnia, Serbia, and Macedonia lost Imminent Danger Area status.[68] However, even the termination of HFP/IDP for Balkan nations may not prove sufficient to curtail tax benefits for soldiers deployed to the QHDA. Due to a statutory quirk, eligibility for HFP/IDP arising from isolated hostile incidents may reactivate combat tax benefits for the entire QHDA.[69] Thus far, the language of the QHDA authorization has not been tested in this respect.

As the distribution of risk within designated combat zones has widened, the distribution of tax benefits has shifted. As a result, the monetary value of today's tax benefits is highly concentrated among higher income earners, including field grade officers. Changes to the distribution of benefits are not without historical precedent. In addition to legislative revisions—such as the 1945, 1950, and 1966 updates—external changes in overall military pay and the federal tax code alter the distribution of benefits. Sometimes external changes, such as the enlisted pay raises of the late 1940s, have benefited lower ranking members; in other instances, like the Reagan income tax cuts of the 1980s, officers have received greater benefits.

In contrast to these routine disturbances, a legislative change in 1996 created permanent, and perhaps unintended, shift in the officer-enlisted distribution of tax benefits. Since 1945, all combat zone compensation for enlisted members and a portion of officer pay has been excluded from federal income tax. Prior to 1996, the officer exclusion was set by law at a fixed amount, which required periodic revision to keep pace with inflation—$1,500 per year from 1943 to 1950, $200 per

68. HFP/IDP and combat tax benefits remain available under the QHDA within the breakaway state of Kosovo.

69. Kusiak, *Exclusion from Gross Income during War or in Combat Zones*. Entitlement to HFP is achieved through meeting one of two criteria: (1) presence within a designated Hostile Fire Area or (2) unit exposure to injury or death from hostile fire outside a designated area. As of November 2007, the QHDA (excepting Kosovo) is ineligible for the first of these two standards. However, members deployed in the QHDA may still receive HFP based upon the second of these criteria. Even if exposure to hostile fire is unrelated to the QHDA itself, the Kusiak study suggests that eligibility for HFP from isolated events within the QHDA may reinstate entitlement to combat zone tax benefits to all servicemembers in the QHDA.

month from 1950 to 1966, and $500 per month thereafter. These amounts were intended to correspond with a given level of pay for enlisted members. By the 1990s, a quarter century after the last update, the Congress determined that the time for revision was at hand. In 1990, Senator John Glenn (D-OH) introduced legislation (Senate Resolution 3025) to grant tax benefits to members serving in Operation Desert Shield. Included in S. 3025 was a raise to the maximum officer income tax exclusion to $2,000 per month under Section 112 of the Internal Revenue Code.[70] At this level, the traditional level of parity between senior enlisted and commissioned officer benefits would be restored (see Figure 7). The House scheduled hearings on a similar bill, but before a vote could be held, President Bush designated the Persian Gulf region, halting the legislative process. Throughout the Persian Gulf War, the Congress made no update to the officer tax exclusion.

In the Balkans, the Congress was far more proactive. Eager not to repeat the Somalia experience, the Congress quickly enacted H.R. 2778, designating the former Yugoslavia as a QHDA for federal tax purposes. An amendment to H.R. 2778 offered by Ways and Means Chairman Bill Archer (R-TX) and Ranking Member Sam Gibbons (D-FL) revised the maximum officer exclusion, not to $2,000 per month, as proposed in 1990–91, but to the "maximum enlisted amount."[71] This appeared to solve two problems: in theory, the revision restored the historical parity between senior enlisted and commissioned officer exclusions, and it prevented the need for future revisions to keep pace with military pay levels and inflation. In the Congressional Record, Representative Floyd Spence (R-SC) confirmed the intent of the change:

LEGEND

- Pays no income tax
- Receives full $2,000 exclusion

Enlisted Rank	Min	Max	Officer Rank	Min	Max
SgtMaj (E9)	**$2,171**	$2,796	Col (O6)	$2,925	$5,053
MstrSgt (E8)	$1,821	$2,497	LtCol (O5)	$2,339	$4,123
SFC (E7)	$1,271	$2,447	Maj (O4)	$1,972	$3,447
SSgt (E6)	$1,094	$1,640	Capt (O3)	$1,832	$2,981
Sgt (E5)	$960	$1,392	1st Lt (O2)	$1,598	$2,212
Corp (E4)	$896	$1,121	2nd Lt (O1)	$1,387	$1,745

Source: DFAS, Military Pay Tables, 1990.

Figure 7. Military Monthly Pay—Proposed Combat Income Exclusions and Pay Grades in 1990

70. S. Rep. No. 101-3025 (daily ed. September 11, 1990).

71. H.R. Rep. No. 104-465 (daily ed. Feb. 29, 1996).

> We on the Committee on National Security have been working since the Persian Gulf War to update the $500 cap on officer exemptions in current law. The $500 cap dates back to 1966 and has long since lost any relevance to officer income levels. HR 2778 not only restores the value of this benefit for officers, it precludes this problem from reoccurring by linking the cap to the maximum pay for an enlisted person.[72]

However, the phrase "maximum enlisted amount" more than restored officer exclusions to their previous levels. Updates in 1943, 1950, and 1966 had set officer exclusions roughly on par with basic pay for the highest ranking enlisted member (Sergeant Major, E-9)[73] with the minimum years of service for the grade (usually 10). The proposal for a $2,000 monthly exclusion in 1990 was consistent with this standard of parity (an E-9 with 10 years of service received $2,171.70 per month in 1990) (see Figure 7). If the tradition were to be continued in 1996, the officer exclusion would have been around $2,600 per month (E-9, 10 Years of Service (YOS) received $2,623.20). With maximal (over 26) years of service, an E-9 earned $3,377.10. However, because the six most senior enlisted personnel in the military earned $4,109.56 per month, that value determined the level of authorized exclusion for all officers. This is 56 percent higher than the previously accepted standard.

Under the historical standard of parity most officers higher than O-3 paid some income tax; under the new standard almost all officers below the grade of O-5 were exempted from paying income taxes (see Figure 8).[74] Those that did pay tax on some of their military compensation still received far more generous benefits than had been historically available.

Officers with higher military compensation benefited from the larger exclusion in other ways as well. Because combat zone compensation was not considered "earned income," many officers receiving the $4,104.90 exclusion paid lower marginal taxes on income above the exclusion. In many cases, if officers received a full exclusion but still had a small adjusted gross income for tax purposes, they could receive an Earned Income Tax Credit (EIC) intended as an antipoverty measure for the general

72. 142nd Cong. Rec. H1670 (daily ed. Mar. 5, 1996).

73. The highest rank for enlisted members in 1943, 1945, and 1950 was E-7 (Sergeant First Class).

74. O-4s, 18 YOS and O-6s, 3 YOS had liabilities less than $50 per month. O-5s with more than 14 YOS had slightly larger liabilities, but always under $1,000 per month. This assumes no other income exclusions. When other exclusions (personal, dependents, health insurance, retirement savings, mortgage interest, etc.) are taken into account, even fewer had tax liabilities. Additionally, O-5s with less than 16 YOS and O-6s with less than 14 YOS had no tax liability after the CZTE. There are very few officers at these levels with these YOS.

LEGEND

- Pays no income tax
- Receives full $4,104.90 exclusion

Enlisted Rank	Min	Max	Officer Rank	Min	Max
SgtMaj (E9)	**$2,623**	$3,377	Col (O6)	$3,533	$6,103
MstrSgt (E8)	$2,200	$3,016	LtCol (O5)	$2,825	$4,979
SFC (E7)	$1,536	$2,714	Maj (O4)	$2,381	$4,163
SSgt (E6)	$1,321	$1,981	Capt (O3)	$2,213	$3,601
Sgt (E5)	$1,160	$1,681	1st Lt (O2)	$1,930	$2,672
Corp (E4)	$1,081	$1,354	2nd Lt (O1)	$1,676	$2,108

Source: DFAS, Military Pay Tables, 1996.

Figure 8. Military Monthly Pay—Combat Income Exclusions and Pay Grades in 1996

populace.[75] In light of this reversal, it bears repeating that the purpose of capping officer exclusions in WWII and thereafter was to establish a level of parity between enlisted members and commissioned officers. The revision of officer exclusions to the "maximum enlisted amount" altered the distribution of benefits such that high-income officers received greater benefits per person relative to enlisted members from income tax exclusion than had previously been the case.

In summary, designated combat zones now include the full spectrum of risk from widespread mortal danger in Iraq or Afghanistan to everyday normality in Qatar, Bahrain, or (potentially) the Balkans. The administrative apparatus still struggles to designate combat zones and confer "instrumental" benefits where appropriate, as in Somalia, and has difficulty retracting designations when no longer justified (the Persian Gulf and the Balkans). At the same time, revision of the maximum officer exclusion to the "maximum enlisted amount" has shifted the benefits toward commissioned officers. Under today's exclusion, an O-6 deployed to Bahrain receives almost quadruple the tax benefits of an E-3 serving in Baghdad. Note also that a service member dying from hostile fire outside a designated combat zone receives no benefits and must pay tax on any outstanding income or estate liabilities.

75. At the time, enlisted members (and junior officers) were not eligible for EIC because they reported no earned income. Responding to complaints from the lower ranks, the Congress subsequently (in 2005) authorized all enlisted and junior officers in combat zones to receive an EIC benefit, rather than strip eligibility from more senior (and certainly not impoverished) officers.

References

139th Cong. Rec. S13588 (daily ed. October 18, 1993).

142nd Cong. Rec. H1670 (daily ed. Mar. 5, 1996).

Assistant Secretary for Congressional Relations, Department of State. *Letter to the Director of the Bureau of the Budget.* June 17, 1968.

Current Payments Tax Act of 1943, *Hearings on H.R. 2570, Before the Senate Finance Committee,* 78th Cong. (1943).

Defense Finance and Accounting Service. *Basic Pay Rates for 1996, Military Pay Prior Rates.* 2011.

DoD Statistical Information Analysis Division. *Military Casualty Information*. 2010. http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm

DoD Statistical Information Analysis Division. *Military Personnel Statistics: Active Duty Military Personnel by Service by Region/Country*. Historical Reports. 2011.

DoD Statistical Information Analysis Division. *Military Personnel Statistics, Historical Reports 1953–1999*. 2010. http://siadapp.dmdc.osd.mil/personnel/MILITARY/history/309hist.htm

Exec. Order No. 11216, 3 C.F.R. 301 (1964–65). *Designation of Vietnam and Waters Adjacent Thereto as a Combat Zone for the Purposes of Section 112 of the Internal Revenue Code of 1954*.

Exec. Order No. 12744 (1991), *Designation of Arabian Peninsula Areas, Airspace, and Adjacent Waters as a Combat Zone*.

Exec. Order No. 13002, 61 Fed Reg. 24665 (May 13, 1996), *Termination of Combat Zone Designation in Vietnam and Waters Adjacent Thereto*.

H.R. Rep. No. 65-1037, 3rd Sess. (1919).

H.R. Rep. No. 76-3030 (daily ed. October 7, 1940).

H.R. Rep. No. 77-2333 (daily ed. July 14, 1942).

H.R. Rep. No. 77-2586 (daily ed. October 19, 1942).

H.R. Rep. No. 78-510 (1943).

H.R. Rep. No. 89-2270 (daily ed. October 13, 1966).

H.R. Rep. No. 92-825 (daily ed. February 7, 1972).

H.R. Rep. No. 104-465 (daily ed. Feb. 29, 1996).

Kurtz, Jerome. *Letter from Tax Legislative Counsel Jerome Kurtz to Deputy Under Secretary of the Air Force for International Affairs Philip F. Hilbert.* June 19, 1967.

Kusiak, Patrick. *Exclusion from Gross Income during War or in Combat Zones.* Report for Military Personnel Policy (Compensation). 1996.

National Archives. *Records of Military Personnel Who Died, Were Missing in Action or Prisoners of War as a Result of the Vietnam War.* Access to Archival Databases, January 21, 1998. http://aad.archives.gov/aad/fielded-search.jsp?dt=197&cat=WR28&tf=F&bc=,sl.

National Archives. *Vietnam Conflict Extract Data File: Record Group 330.* April 29, 2008. http://aad.archives.gov/aad/fielded-search.jsp?dt=2354&cat=WR28&tf=F&bc=,sl.

Piketty, Thomas, and Emmanuel Zaez. *Income Inequality in the United States, 1913–2002.* November 2004. Table A0, Appendix.

Revenue Act of 1921, Chapter 136, 42 Stat. 227 (1921).

S. Rep. No. 65-617, 3rd Sess. (daily ed. December 6, 1918).

S. Rep. No. 79-655 (1945).

S. Rep. No. 81-2375 (daily ed. July 20, 1950).

S. Rep. No. 101-3025 (daily ed. September 11, 1990).

Supplementary Information, Notice of Proposed Rulemaking, 56 Fed. Reg. 10211 (1991).

Tax Foundation. *Tax Data: U.S. Federal Income Tax Rates History, 1913–2011.* January 2011.

Treasury Directive (T.D) 8489, 58 Fed. Reg. 47639 (1993).

Under Secretary of Defense for Personnel and Readiness. *Military Compensation Background Papers: Special Pay for Hostile Fire or Imminent Danger*, Sixth Edition. May 2005.

Under Secretary of the Treasury. Letter to the Under Secretary of the Air Force. September 18, 1967.

Chapter 8

Combat Compensation and Continuation in the Active and Reserve Components

Diana S. Lien
Molly F. McIntosh
with
Darlene E. Stafford

Executive Summary

Background

The 11th Quadrennial Review of Military Compensation (QRMC) was chartered to examine four areas of the military compensation system, including "compensation for service performed in a combat zone, combat operation, or hostile fire area, or while exposed to a hostile fire event" [1]. As part of CNA's support to the QRMC, we were asked to examine how active and reserve servicemembers' retention is affected by the receipt of combat compensation. Our analysis is one part of the 11th QRMC's overall analytical framework examining combat compensation.

The arduous nature of deployments is characterized by long hours, time away from family, and potentially harsh work conditions. When one deploys to a combat zone, there is the additional risk of harm to one's self. Combat pay compensates servicemembers for these negative aspects of combat service and can potentially influence retention, unit turnover, and overall readiness. In this paper, we focus on two pays tied to combat service—hostile fire pay (HFP) and combat zone tax exclusion (CZTE)—and examine the correlation between receipt of these combat pays and active and reserve continuation.[1] We also compare Global War on Terror (GWOT) and non-GWOT deployment experiences for the active component, which may differ based on levels of risk and living conditions while deployed.

1. When we reference hostile fire pay, we're referring to both hostile fire pay and imminent danger pay [2].

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

Our analysis provides a context in which to view differences in continuation rates by type of deployment experience.

Approach

Our analytical approach is to first briefly review recent pays and policies relating to combat and deployments. Next, we review the literature on the effect of hostile deployments and combat compensation on continuation. Finally, we conduct an empirical analysis using deployment, personnel, and pay data provided by the Defense Manpower Data Center (DMDC).

In our empirical analysis, we use a two-pronged approach. First, for the active component (AC) we analyze differences in continuation across hostile deployments (as defined by the receipt of HFP or CZTE), non-hostile deployments, and no deployments. Second, we compare continuation across GWOT deployments, non-GWOT hostile deployments, non-hostile deployments, and no deployments. For the reserve component (RC), we first compare continuation across hostile deployments and non-hostile deployments. Second, we compare continuation by mobilizations with a GWOT deployment, only mobilizations without deployment, and no mobilizations.

Ideally, we would isolate the continuation effects of combat compensation from the continuation effects of deploying to a combat zone, but the way pays are structured and awarded prevents us from separating the compensation effect from the combat effect at the individual level. Thus, in interpreting our results, one cannot be certain whether the observed relationship is the result of receipt of combat pay or underlying differences from non-compensation factors (viz., combat experience). Although we are unable in our empirical analysis to disentangle the effect of combat compensation from the effect of a hostile deployment, we do use aggregate-level casualty and CZTE data to put our empirical findings in context.

Findings

Active component

For the AC, we arrive at two main conclusions—one for servicemembers with less than 6 years of service (YOS) and another for servicemembers with 6 or more YOS.

First, for servicemembers (both enlisted and officer) with less than 6 YOS, the continuation effect of a hostile deployment is negative for the Army and Marine Corps and positive for the Air Force. Moreover, the negative continuation effect of hostile deployments for the Army and Marine Corps is driven by GWOT deployments. To be specific, when we separate GWOT and non-GWOT hostile deployments for

servicemembers with less than 6 YOS in the Army and Marine Corps, we find a negative continuation effect of GWOT deployments and a positive continuation effect of non-GWOT hostile deployments. In contrast, for servicemembers with less than 6 YOS in the Air Force, we find a positive continuation effect of any deployments (GWOT, non-GWOT hostile, and non-hostile). This might be explained by service-specific differences in risk or conditions faced while deployed in support of GWOT. Indeed, analysis of GWOT casualty data shows that casualty rates for the Air Force are much lower than for the Army and Marine Corps, both overall and when the data are restricted to the lower paygrades (a proxy for low YOS). Also, survey data show that deployments are associated with higher work and personal stress and lower reenlistment intentions among first-term servicemembers in the Army and Marine Corps than among first-term servicemembers in the Air Force [3].

Second, for servicemembers (both enlisted and officer) with 6 or more YOS, the continuation effect of deploying is unambiguously positive. This is true for GWOT, non-GWOT hostile, and non-hostile deployments and suggests that, while hostile deployments might contribute to lower continuation among servicemembers with fewer YOS, they might have the opposite effect for servicemembers with more YOS. We posit three potential explanations for this. First, servicemembers with fewer YOS face greater risk in a hostile deployment than servicemembers with more YOS, as demonstrated by the GWOT casualty data. Second, since taxable incomes tend to rise with YOS, the value of CZTE (in terms of its reduction in a servicemember's tax liability) is increasing in YOS, as demonstrated by the CZTE data. Third, we might be observing a selection effect since servicemembers with a greater tolerance for hostile deployments might themselves be more likely to stay in the military. Taken together, this might explain why the effect of hostile deployments is positive for more experienced servicemembers and negative for less experienced servicemembers.

Reserve component

For all RCs except the Marine Corps, we find that those who have received any HFP have higher continuation rates than those who have not received the pay. When we narrow our focus to completed mobilizations, we find that for most RCs those members who have mobilized with a deployment have higher continuation rates than those who have mobilized without a deployment. We offer as one possible explanation the fact that those who have deployed in support of GWOT earn combat pay, unlike their non-deploying counterparts. Other differences, such as a desire to support the mission, may also influence the decision to stay in the Selected Reserve (SELRES). This finding, however, does not hold across all components; the exceptions are Marine Corps enlisted SELRES and Army National Guard officers.

The differences in our findings by service may be associated with service-specific differences in risk, as shown by the GWOT casualty data.

Introduction[2]

As part of CNA's support to the 11th QRMC, we were asked to examine how continuation differed by different deployment experiences, for example, by deployments that do or don't involve receipt of HFP.[3] Our analytical approach to address this issue was to first briefly review the pays and policies that have been used since September 11, 2001, to compensate for combat and deployments. We then provide a brief literature review on the continuation effects of hostile deployments and compensation. For our statistical analysis, we use deployment, personnel, and pay data provided by the DMDC. In our empirical analysis, we focus on HFP and CZTE, two compensation elements that are directly tied to combat service, and we look separately at the AC and RC.

For the AC, we use deployment history over the past 24 months to separate servicemembers into those who (a) experienced hostile deployments (defined by receipt of HFP or CZTE), (b) experienced only non-hostile deployments, and (c) did not deploy. Then, we compare continuation rates across these three groups. Next, we separate hostile deployments into GWOT and non-GWOT deployments.

For the RC, we focus on continuation within the SELRES, first comparing continuation rates by receipt of HFP. Then we use data on whether mobilizations that included deployments in support of GWOT are associated with continuation rates that are different from mobilizations that didn't include deployments in support of GWOT.

In this paper, we present differences in continuation rates by different deployment experiences in the past 24 months. Ideally, we could isolate the continuation effects of combat compensation (HFP and CZTE) from the continuation effects of deploying to a combat zone. Unfortunately, given how combat compensation is structured and awarded and because of data limitations, we are unable to separate the pay effect from the combat effect. In general, when estimating the effect of compensation on continuation, researchers might exploit variation in differences in bonus amounts or in who is eligible for the bonuses. During the time period we examine in this paper, however, there is no variation in the amount of HFP received per month by servicemembers in combat, apart from a change in the benefit level in October

2. The authors thank David Gregory for data programming assistance and Michael Markowitz for mapping assistance. We also wish to thank Dinah Sunday and Michael Moskowitz for reviewing earlier drafts of the paper.

3. When we reference hostile fire pay, we're referring to both hostile fire pay and imminent danger pay [2].

2002. Therefore, everyone who is in a designated combat zone for the same number of months receives the same amount of HFP. CZTE does vary in amount since it is based on military income received while in combat, but we do not have individual-level data on the value of the CZTE or a servicemember's military income.[4]

Our findings rely instead on differences in continuation rates by type of deployment and HFP and CZTE eligibility. For example, we compare continuation rates among servicemembers who did not experience a hostile deployment in the past 24 months (and therefore are not eligible for HFP and CZTE) with continuation rates among those who did (and therefore are eligible for HFP and CZTE). The limitation of this analysis is that we are unable to separately model the effect of combat compensation and the effect of underlying differences from non-compensation factors—namely, combat experience.[5] Although we are unable in our empirical analysis to disentangle the effect of combat compensation from the effect of a hostile deployment, we do use aggregate-level casualty and CZTE data to put our empirical findings in context.

Deployment policies and deployment-related pays

Deployment policies

In a January 2007 memorandum, Secretary Gates addressed DoD-wide deployment policies for AC and RC servicemembers [4]. Among other issues, the memorandum focused on the length of deployments and dwell time. Here, we discuss the implications for deployments and dwell time for the AC and RC in turn.

Active component

According to the SECDEF's memorandum, the goal for the AC is to have a 1-year deployment followed by 2 years of dwell time. There are noticeable differences in the service-specific AC deployment and dwell policies, as we describe below.

Army

For the Army, GWOT has at times required soldiers to deploy for 15 months, followed by only 12 months of dwell time [5]. Since 2009, the Army has worked to bring extended deployments to an end and to increase dwell time. Indeed, in testimony

4. We discuss HFP and CZTE in more detail later in this document.

5. We did explore using casualty data in our individual-level empirical analysis. DMDC provided us with casualty data by country within GWOT-designated locations. Unfortunately, to tease out the separate effect of combat pay from combat deployments at the individual level, we need casualty data for non-GWOT countries, and those data were not available at the time of publication. However, we were able to use these data aggregated by service and YOS to aid in the interpretation of our results.

before the House Armed Services Committee, General George Casey, former Army Chief of Staff, emphasized that the Army's short-term goal is 2 years of dwell time following deployments for AC soldiers and the long-term goal is 3 years [6].

Marine Corps

For the Marine Corps, deployments are usually 6 or 7 months long. The deployment-to-dwell ratio is 1:2 for AC Marines [7]. The 1:2 deployment-to-dwell ratio is expected to remain an achievable goal for combat units in the current environment, but increases in OPTEMPO may result in shorter dwell times. Still, some Marines, such as those in infantry, intelligence, and linguistics occupations, currently have deployment-to-dwell ratios that exceed 1:2 because of operational demands [8].

Navy

For the AC Navy, deployment and dwell policies are governed by three principles:

- The maximum deployment length is 7 months for a single deployment within a ship employment cycle or 6 months for multiple deployments within a ship employment cycle.[6]
- The maximum deployment-to-dwell ratio is 1:1.
- At least 50 percent of time within a ship employment cycle should be spent in homeport.

A violation of any of these principles requires a waiver from the Chief of Naval Operations (CNO).[7] These principles apply to all AC Navy commands and other units that operate or deploy from their homeport or home station as a unit or as a detachment. For some mission or operating cycles, however, units are unable to abide by these principles [9].

Air Force

In an attempt to alleviate stress associated with high OPTEMPO, the Air Force developed the Expeditionary Aerospace Force, now called the Air and Space Expeditionary Force (AEF) [11]. Initially, the AEF prescribed 90-day deployments for combat air forces (CAF) and slightly longer deployments for mobility air forces and high-demand/ low-density (HD/LD) forces. In 2004, deployments increased

6. A ship's employment cycle begins at the end of a maintenance phase for that ship and ends at the end of that ship's next maintenance phase.
7. The Navy's 1:1 maximum deployment-to-dwell ratio applies to Individual Augmentees as well [9]. If there is no other choice but to exceed the maximum deployment-to-dwell ratio, the case is referred for waiver consideration [10].

to 120 days (or 180 days for HD/LD forces) and the deployment-to-dwell ratio was set at 1:4 [12].

In 2009, the Air Force began assigning different deployment lengths and deployment-to-dwell ratios by Tempo Bands, A through E. The first, Tempo Band A, is considered to be the baseline and is comprised predominantly of CAF forces. This band deploys for 120 days with a 1:4 deployment-to-dwell ratio. Tempo Bands B through E deploy for 180 days and have lower deployment-to-dwell ratios, 1:4, 1:3, 1:2, and 1:1, respectively [11]. In 2010, Air Force Chief of Staff General Norton Schwartz announced a change to the AEF deployment lengths from 120 to 179 days for most AC Airmen. As a result, Tempo Band A was combined with Tempo Band B, resulting in deployments of 180 days and a deployment-to-dwell ratio of 1:4 [13].

Reserve component

In addition to deployment lengths and dwell times for the AC, the 2007 Gates memorandum also addressed mobilization policy for the RC. As the memorandum describes, reservists can be involuntarily mobilized for up to 1 year. This excludes time spent in predeployment training and postdeployment leave. Following 1 year of involuntary mobilization, the goal is for reservists to not be subject to involuntary mobilization for 5 years [4].

But, as is the case for the AC, increases in operational demands have resulted in shorter dwell time than the policy described in the 2007 Gates memorandum. For example, in 2009 the Marine Corps goal for the reserve component was to maintain a 1:4 mobilization-to-dwell ratio [14]. The Army Guard and Reserve goal is to maintain a minimum dwell time of 4 years starting October 1, 2011 [15]. For the Navy Reserve, the overall goal is 1 year of involuntary mobilization and not subject to involuntary mobilization for 5 years; however, the goal for mission critical skills is to maintain a minimum of 4 years without involuntary mobilization [16].

Deployment-related pays

Servicemembers serving in combat are eligible for a number of pays, some of which are directly associated with combat service and some of which compensate for various types of deployments. Military pays, such as HFP, were designed to compensate servicemembers for the risk associated with serving in combat. In addition to military pays is CZTE, which was originally designed to keep the servicemembers who are fighting the war from also having to bear the tax burden of the war. In this subsection, we present some background on HFP and CZTE. We then briefly discuss other deployment related pays that may influence a servicemember's decision to stay in the military.

HFP

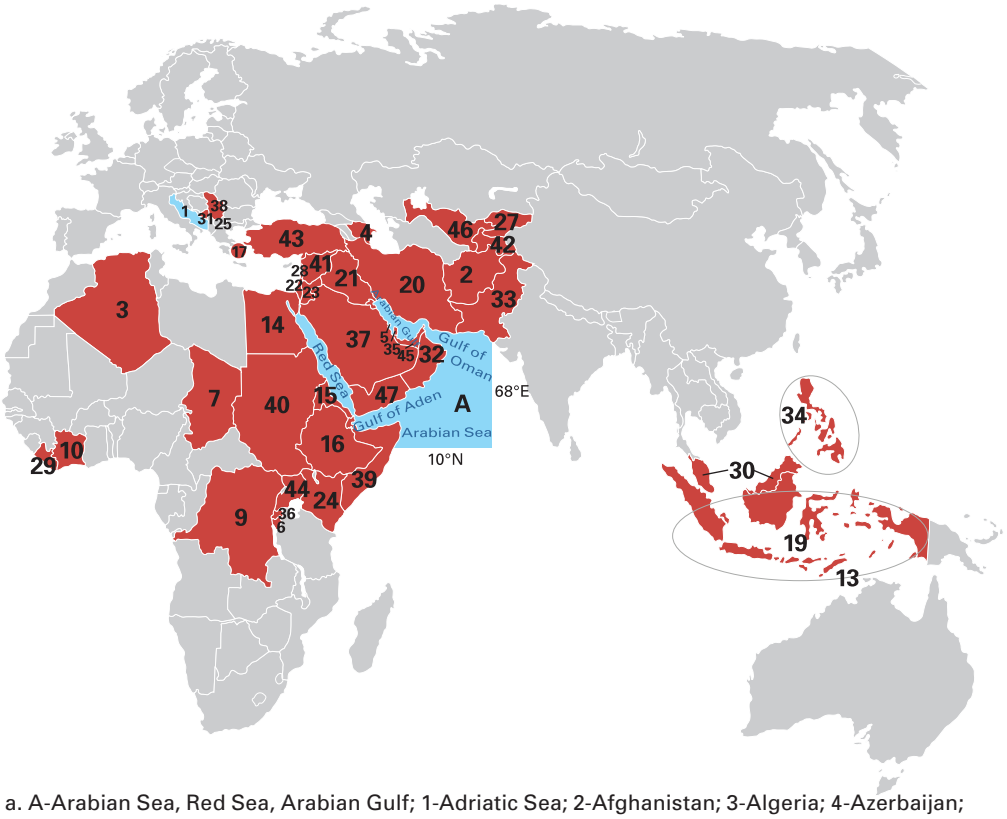
A servicemember is eligible for HFP if he or she is exposed to, is close to, is in possible danger of being exposed to, or is wounded from hostile fire or a hostile mine explosion. A servicemember can also receive HFP if he or she is on official duty in a designated Imminent Danger Pay area, either in the designated geographical land locale or in designated airspace [2]. Not all HFP locations are associated directly with GWOT. For example, because of the overall terrorism threat level, servicemembers serving in Athens, Greece, receive HFP "and ride to and from work in armored cars" according to [17]. Figure 1 shows eligible areas designated as HFP locations in the Eastern Hemisphere. Figure 16, in appendix A, illustrates that official military duty in Colombia, Cuba, Guantanamo, or Haiti also meets the criteria for HFP eligibility.

HFP is authorized under Title 37, Section 310, of the United States Code. It is paid monthly at the rate of $225 per month, and the payment is not prorated for partial months. For the years we consider in this analysis, HFP increased only once, from $150/month to $225/ month, in October 2002. HFP does not vary by combat intensity or risk of death or injury across different HFP designated areas. HFP also does not vary by differences in servicemembers' military characteristics, such as rank, YOS, or service component. Since HFP does not vary by rank or YOS, the amount of HFP earned as a share (or percentage) of total military compensation does vary by enlisted/officer, rank, and YOS.

CZTE

Servicemembers are eligible for CZTE when actively serving in a combat zone or providing direct support for personnel in those areas. Active service in a combat zone includes performing active duty assignment while under orders, hospitalization resulting from combat, and temporary leave from active duty in the combat zone [18]. Figure 2 identifies CZTE eligible areas in the Mideast. In appendix A, figure 17 shows which European countries are also included in CZTE through active service (namely, Albania, Montenegro, Serbia, and Kosovo).

In addition to active service in a combat zone, CZTE eligibility extends to servicemembers who are outside the combat zone but are on active duty providing direct support and receiving HFP. Figure 3 shows which countries are included in CZTE for providing direct support to the combat zone.



a. A-Arabian Sea, Red Sea, Arabian Gulf; 1-Adriatic Sea; 2-Afghanistan; 3-Algeria; 4-Azerbaijan; 5-Bahrain; 6-Burundi; 7-Chad; 8-Colombia (see HF West map); 9-Congo, Kinshasa; 10-Cote d'Ivoire; 11-Cuba (see HF West map); Guantanamo; 12-Djibouti; 13-East Timor; 14-Egypt; 15-Eritrea; 16-Ethiopia; 17-Greece (20 km Athens); 18-Haiti (see HF West map); 19-Indonesia; 20-Iran; 21-Iraq; 22-Israel; 23-Jordan; 24-Kenya; 25-Kosovo; 26-Kuwait; 27-Kyrgyzstan; 28-Lebanon; 29-Liberia; 30-Malaysia; 31-Montenegro; 32-Oman; 33-Pakistan; 34-Philippines; 35-Qatar; 36-Rwanda; 37-Saudi Arabia; 38-Serbia; 39-Somalia; 40-Sudan; 41-Syria; 42-Tajikistan; 43-Turkey; 44-Uganda; 45-United Arab Emirates; 46-Uzbekistan; 47-Yemen

Figure 1. HFP locations, Eastern Hemisphere[a]

Under CZTE, any pay and bonuses earned while eligible are exempt from federal income tax. Thus, the value of CZTE (in terms of its effect on a servicemember's tax liability) varies by paygrade and years of service, as well as whether a person is eligible for a bonus, such as the Selective Reenlistment Bonus (SRB), while in combat. Like HFP, CZTE is not directly linked to combat intensity or risk of death or injury across different CZTE designated areas.

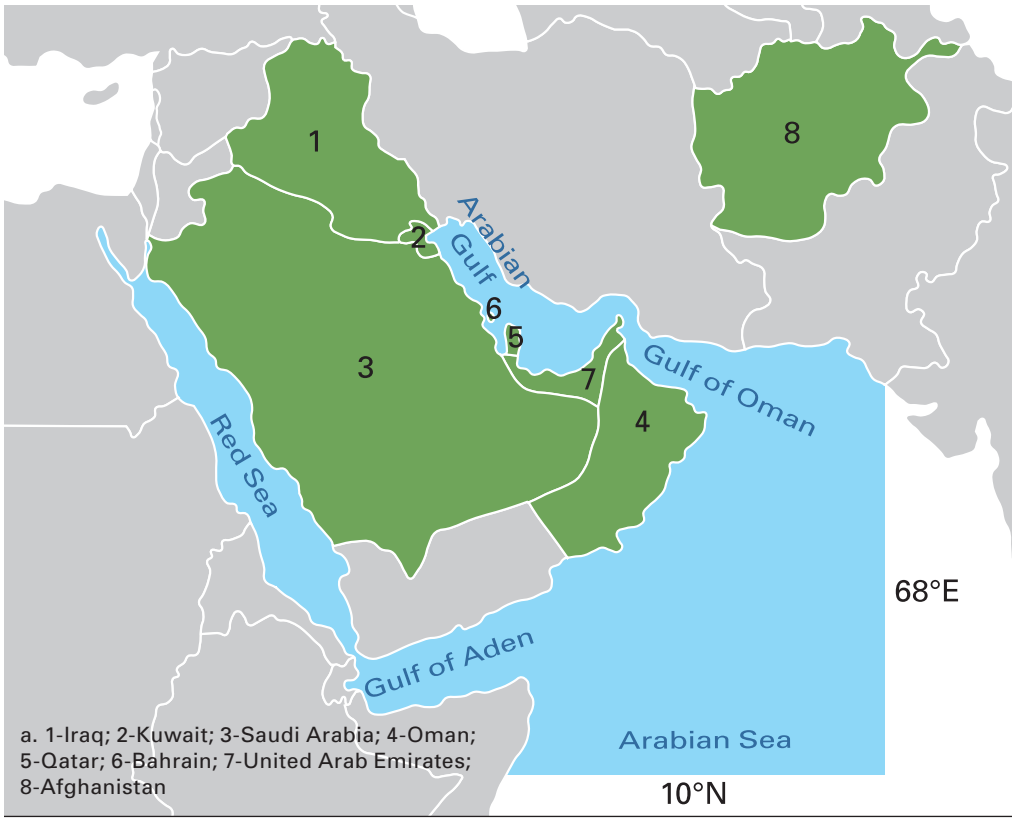


Figure 2. CZTE areas for personnel in direct support of a combat zone (Mideast)[a]

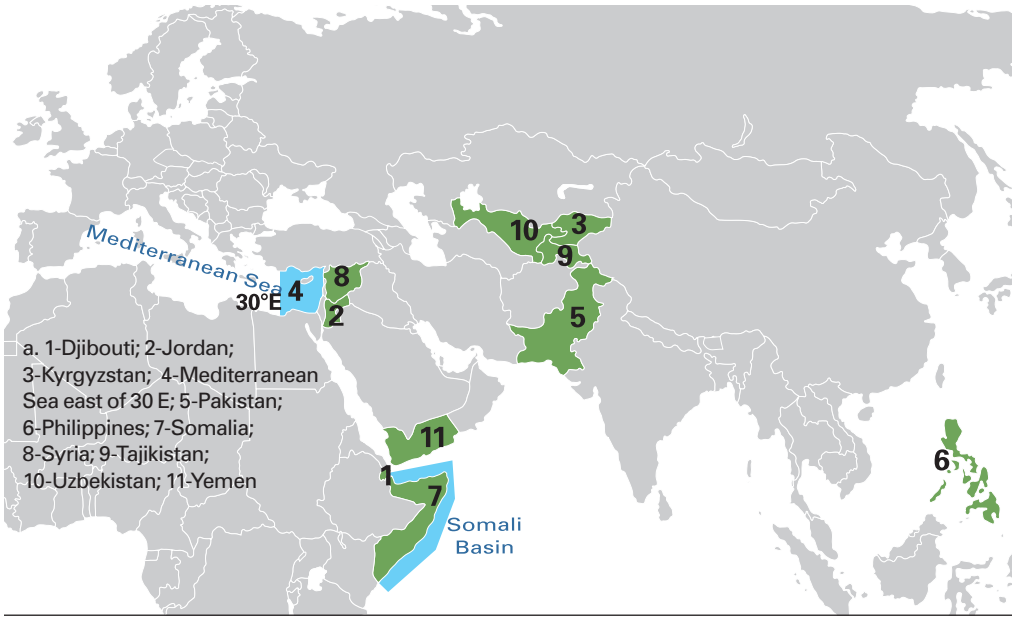


Figure 3. CZTE areas for active service in a combat zone[a]

Summary of other deployment-related pays

Table 1 lists six deployment-related pays and incentives that directly or indirectly compensate for combat service.

Here, we provide a short description of each:

- **Hardship Duty Pay for Location** (HDP-L) is a quality-of-life pay that compensates for being at a location that does not have the same amenities as the continental United States (CONUS). HDP was designed to compensate for the arduous nature of deployments based on location (HDP-L), mission (HDP-M), or involuntary extension. So, for example, duty in Japan to assist in the recovery from the March 11, 2011, earthquake, tsunami, and nuclear reactor problems qualifies for HDP-L [25], as does duty in Iraq/Afghanistan. HDP-L is limited to land areas and is a

Table 1. Deployment pays paid to all or some servicemembers serving in combat

Deployment pay	Pay/benefit amount	Brief description of incentive	Source
Hardship Duty Pay for Location	Maximum of $100/month when receiving HFP	Payable to servicemembers performing duty designated by the Secretary of Defense as hardship duty	[19]
Servicemembers Group Life Insurance Premiums	Maximum of $400,000 life insurance premiums paid/reimbursed	During all servicemembers' deployments in support of OIF/OEF	[20]
Savings Deposit Program	10% annual interest on up to $10,000 deposit	Provides servicemembers receiving HFP the opportunity to build their financial savings	[21]
Assignment Incentive Pay	Maximum of $3,000/month	Payable to designated servicemembers on assignment in designated areas	[22]
Hazardous Duty Incentive Pay, other than aerial flights	Up to $150/month except for high-altitude, low opening jump pay ($225/month)	Incentive pay for servicemembers performing specific hazardous duties under orders	[23]
Family Separation Allowance	$250/month	Payable to servicemembers who have dependents and are assigned away from their permanent duty station 30+ days without accompaniment by dependents	[24]

maximum of $100 for those receiving HFP. The highest HDP for location in 2010 was $150 per month [19].[8]

- **Servicemembers Group Life Insurance Premiums** (SGLI) for the maximum of $400,000 of life insurance are reimbursed to servicemembers who are deployed in support of Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF).
- The **Savings Deposit Program** (which is different from the Thrift Savings Plan) allows servicemembers to deposit up to $10,000 while serving in a designated combat zone and get a 10-percent annual return on their savings. Members must be getting HFP and serving a minimum of 30 days in the area.
- **Assignment Incentive Pay** (AIP) was implemented as part of the 2003 Bob Stump National Defense Authorization Act as a special pay designed to fill hard-to-fill billets. AIP is flexible enough that it has been used differently by the services. For example, while the Navy uses it to compensate for hard-to-fill shore billets, the Air Force and Army have used it to get volunteers for duty in Korea (Korea Assignment Incentive Pay). For service in a combat zone, the Marine Corps has used AIP as an incentive for servicemembers to extend their expiration of active service in order to complete a deployment (2007 MARADMIN 108/ 07). In addition, the Army and Marine Corps have used AIP to provide a monthly incentive to qualified deployed members who have been involuntarily extended past 12 months in Iraq/Afghanistan [26].
- **Hazardous Duty Incentive Pay** is for performing specific hazardous duties while under orders. Though this is not earned by all servicemembers in combat, those who have hazardous duties may be participating in combat. Hazardous duty incentive pay is up to $150/month except for high-altitude, low opening jump pay, which is $225/month.
- The **Family Separation Allowance** (FSA) is paid to all servicemembers with dependents when they are away from home, so servicemembers with dependents in combat areas get this pay.

8. By law, the maximum amount of all HDP may not exceed $1,500 per month (Title 37, Chapter 5, Subchapter I §305). The maximum HDP-L and HDP-M combined is currently $300/month.

Literature review: deployments, combat pay, and continuation

Active component

This paper fits into a broader literature that examines the link between deployment, combat pay, and continuation. A number of factors influence the continuation decision. The authors of [3] and [27] lay out the reenlistment decision within an expected utility framework, where utility is influenced by a number of different personal and military career factors. For example, it has been shown empirically that military retention is influenced by individual characteristics, such as dependent status [3] and race/ethnicity [28], military pay and reenlistment bonuses [29], and deployments.

Deployments can influence the reenlistment decision through actual experiences, expected future deployment experiences, and/or changes in compensation relating to the deployment. The effect of actual and expected deployments on retention is influenced by number, frequency, and type of deployments. For example, [30] and [31] find that servicemembers who have some deployment experience have higher retention than those with no deployment experience; however, lengthy deployments do negatively influence retention.

Retention behavior also differs by YOS. As servicemembers approach retirement eligibility, they are increasingly likely to remain in the military. Indeed, [32] finds different effects of hostile deployments on reenlistments across YOS zones among Explosive Ordnance Disposal Sailors. In particular, the authors estimate a negative correlation between hostile deployments and Zone A reenlistment, no effect on Zone B reenlistment, and a positive effect on Zone C reenlistment.[9]

In this case, it appears to some degree that the negative effect of hostile deployments wanes as YOS and the likelihood of reaching retirement grow.

In addition, the effect of deployments on retention has been found to differ by dependent status. Reference [33], focusing on enlisted Marines, analyzes how deployments influence reenlistment decisions of Marines who were recommended and eligible to reenlist from FY04 through FY07. The authors find that additional deployments to Iraq/Afghanistan have a negative effect on reenlistments among Zone A Marines. The authors also estimate that an additional 100 days deployed to a non-hostile region decreased reenlistment among Zone A Marines without

9. Zones A, B, and C include servicemembers with 17 months of service to 6 YOS, 6 to 10 YOS, and 10 to 14 YOS, respectively.

dependents but had a positive effect on Marines with dependents. This difference in reenlistment rates by dependent status may partially be correlated with receipt of FSA, as discussed earlier.

The authors of [3] used DMDC's Status of Forces survey data, which allowed them to analyze the retention effect of deployment characteristics not included in administrative data.[10] They find that servicemembers' reenlistment response to deployments is in part influenced by the number of longer than usual workdays associated with deployments. They also found that servicemembers are negatively influenced, in terms of stated reenlistment intentions, by deployments that differed in length from what was expected before the deployment. In addition to these deployment characteristics, the authors of [3] find that servicemembers who felt that they were well prepared for a deployment were more likely to indicate an intention to stay in the military.

Furthermore, [3] estimates the effect of hostile and non-hostile deployments on actual reenlistment decisions. The authors find differences over time and across services in how servicemembers respond to hostile and non-hostile deployments. They conclude that part of the reason for the differences across services, in addition to different deployment lengths, is how the services use bonuses to compensate for the arduous nature of deployments. The authors note that, since September 11, 2001, the use of reenlistment bonuses has mitigated negative effects of deployments. SRBs are targeted at the reenlistment decision point and can vary by military occupation, which can be correlated with different levels of deployment.[11]

In addition to reenlistment bonuses, in focus groups conducted by RAND (see [27]), servicemembers stated an awareness of the additional compensation associated with deployments. The focus group participants state that, in addition to increased military compensation, during deployments some of them have fewer opportunities to spend their money, leading to increased savings, reduction in debt or loans, and increased ability to purchase large ticket items. The authors of [27] note, however, that the financial benefits "are unlikely to completely eliminate the negative effects of deployment on personnel morale and attitudes" [27, p. 53].

As noted earlier, retention is influenced by a number of factors, not just deployment. An example of this is summarized in an analysis focusing on Army soldiers [36]. The authors examined why there was a significant decrease in the share of eligible Army soldiers signing up for reenlistment from FY03 through FY05. Controlling for a number

10. For a summary of the main findings of [3], see [34].

11. For example, see [35], which presents the variation in the amount of time deployed to Iraq/Afghanistan by primary military occupation.

of factors, the authors find that neither deployment history nor expected deployment could *fully* account for this decline. Along with deployment experience and expected deployment, the authors include a measure of risk—fatality rates—in their model and estimate that this has a large negative effect on reenlistment.

Reserve component

Irrespective of mobilization experience, across the services, researchers have found that reserve recruiting and retention increased with increases in military compensation [37, 38, 39, 40]. In addition to military compensation, YOS and family support have been found to have a positive effect on reserve retention [41].

The literature on the effect of mobilizing (versus not mobilizing) on reserve retention is mixed. In surveys, reservists are split between being more likely to stay, more likely to leave, and indifferent in response to their most recent activation or deployment. For example, [42] reported from the 2006 RAND Guard and Reserve Family Interviews that 38 percent of reservists say that their most recent activation or deployment had no influence on their interest in staying in the reserve, compared with 30 percent who say that it increased their interest in staying and 32 percent who say that it decreased their interest in staying. In addition, stated continuation intentions among reserve and guard members are sensitive to characteristics of the deployment. For example, perceptions of leaders' leadership skills have been associated with stated continuation intentions among Army National Guard soldiers recently returning from a mobilization [43].

In terms of changes in earnings while activated, page 118 of [44] states "that, on average, reservist earnings increase as a result of activation, and that those earnings grow as the number of days served increases." This finding, however, is not consistent across rank or service. For example, more junior reserve members are more likely to have income gains from activation compared with their more senior counterparts. By service component, the Marine Corps had the largest income gains from activation, while the Air Force had the smallest.

Previous research on actual continuation behavior has consistently shown that SELRES members who have been mobilized but not deployed have higher loss rates than those who have been mobilized and deployed. This finding holds true for both enlisted members, in terms of loss rates [45] and reenlistment rates [40], and officers [46]. In addition to the type of mobilization, the authors of [47] found that among non-prior-service Marine Corps SELRES, the likelihood of leaving the SELRES increased with the length of mobilization.

Expectations of future deployments have also been found to influence reserve continuation decisions. The author of [48] developed a forward-looking model of

reserve participation and estimates that both "accessions and continuation rates are sensitive to the frequency and duration of [expected] active duty"[48, p. 100].

Combat experience and continuation in the AC

In this section, we discuss our empirical analysis of the relationship between combat, combat pay, and continuation for the AC.

Data

For the AC analysis, we use a combination of individual and aggregate level data. Here, we discuss both.

The individual level data used for the AC analysis consist of administrative deployment, personnel, and pay data provided by DMDC. To capture deployments, we use two data sets. The first comes from the FY01–FY10 PERSTEMPO files. The PERSTEMPO files were established to track all time away from home in one of five categories:

1. Operations
2. Exercises
3. Unit training
4. Home station training
5. Mission support temporary duty.

In our analysis, we limit our focus to the operations category.

The second deployment data source is the GWOT Contingency Tracking System (CTS) database. According to [49]:

> a CTS "deployment" is for servicemembers who are and have been physically located within the OEF/OIF or specifically identified by his/her Service as "directly supporting" the OEF/OIF mission outside the designated combat zone.

For personnel data, we use SSN-level monthly snapshots that include information on military career (such as paygrade and occupation) and demographics (such as gender, race, ethnicity, marital status, and dependent status).

For pay data, we use data that DMDC receives from the Defense Finance and Accounting Service. These data include information on receipt of HFP and eligibility for CZTE. The pay files track all pay received by servicemembers, although there are gaps and irregularities in the pay data due to payment delays, overpayment, and so on.

To aid in the interpretation of our results, we also use data on GWOT casualties and the value of CZTE.[12] These data are being analyzed in detail for a separate analysis on the relationship between risk and combat compensation, also in support of the 11th QRMC [50].

The casualty data cover casualties (both killed in action and wounded) from 2005 through 2010 in GWOT-designated locations. These data are broken out separately for enlisted and officer, by service branch, and by paygrade. The casualty rates reported are total incidents over average members per day.

The data on the value of CZTE come from a comparison of servicemembers' actual tax liability with a counterfactual tax liability that adds back in income that was excluded from taxable income under CZTE. The difference in these tax liabilities represents the value of CZTE to the servicemember. These data are aggregated and provided for 2005 through 2010, broken out separately for enlisted and officer, by service branch, by paygrade bands, and by YOS.

Methodology

For our analysis of the AC, we use the individual level data just described to create a dataset of 12-month continuation decisions from June 2003 through June 2009. For each June snapshot, we looked out 12 months to see if a servicemember was still in the AC. So, for the June 2009 snapshot, for example, we looked to see whether the servicemember was still in the AC in June 2010. We restrict our analysis to servicemembers with at least 2 YOS since our measure of deployment experience covers the 24 months before the June snapshot.[13]

Along with presenting raw continuation rates by deployment categories, we report results from a logit regression model, in which the dependent variable is a binary 12-month continuation decision from one June to the next, and the independent variables of interest pertain to deployment experience during the 24 months before the continuation decision.[14] We use two different deployment specifications. The first is a comparison of hostile deployments, as defined by receipt of HFP or CZTE, versus non-hostile deployments and no deployments. The second

12. The authors thank Saul Pleeter of the Institute for Defense Analyses for graciously sharing the casualty and CZTE data, which were provided by DMDC and the Division of Tax Analysis at the Department of Treasury, respectively.

13. To continue our earlier example, for the June 2009 snapshot, we look back 24 months at deployment experiences from June 2007 through June 2009.

14. Appendix B contains figures that show, by the 2003–2009 June snapshots, the average number of hostile deployed days in the past 24 months for enlisted and officer servicemembers. Similarly, appendix C contains figures that show the share of enlisted and officer servicemembers receiving HFP or CZTE in the past 24 months.

specification separates hostile deployments by whether they were in support of GWOT. In our regression analysis, we control for a number of military service and demographic characteristics, including paygrade, 3-digit DoD occupation codes, gender, race, ethnicity, and marital and dependent status. As a proxy for civilian job opportunities, we control for state-level unemployment rates (from the Bureau of Labor Statistics) linked to the individual servicemember's mailing address.[15] We conducted the analysis separately by service, officer/enlisted, and YOS groupings because, as noted earlier, continuation rates vary widely across these dimensions. Furthermore, as noted earlier, combat compensation as a share of overall military compensation differs by a number of factors, including officer/enlisted status and paygrade category (which is correlated with YOS).[16]

Results for enlisted servicemembers

Differences across hostile, non-hostile, and no deployments

Figure 4 shows 12-month continuation rates by deployment category (any hostile, only non-hostile, or no deployments) for enlisted servicemembers across all services. We would expect continuation rates to vary by deployment experience for many reasons. On one hand, deploying might positively affect continuation rates if servicemembers have a strong desire to be "part of the mission" or if deploying increases the likelihood of promotion. On the other hand, the risk (especially for hostile deployments) or unpleasant conditions associated with deployments, including time away from family, might drive down continuation rates among servicemembers who deploy.

The data in figure 4 suggest that the relationship between deployments and continuation rates differs by YOS. For enlisted members with less than 6 YOS, continuation rates are highest among those who have only non-hostile deployments in the past 24 months. Those with hostile deployments in the past 24 months, in contrast, have the lowest continuation rates, while those with no deployments in the past 24 months have continuation rates in between the other two. For enlisted members with 6 or more YOS, however, the pattern is different. Those with only

15. Because the majority of deployments are unit based (as opposed to individual based, such as individual augmentees), the likelihood of deployment is highly correlated among members of the same unit. Since likelihood of being sent on a deployment is correlated with units, there is the potential for correlation of our error term across observations. In our regression analysis, we account for this intra-unit dynamic by using Huber-White adjusted standard errors clustered on the Unit Identification Code.

16. Additional factors that influence combat compensation as a share of overall military compensation include dependent status (which we control for in our models) and length of deployment. Futhermore, the amount of CZTE benefit received has been shown to be influenced by how a deployment falls across calendar years [50].

non-hostile deployments in the past 24 months continue to have the highest continuation rates. But, for these more senior servicemembers, those with any hostile deployments in the past 24 months have continuation rates that are higher than those with no deployments (and they are almost as high as continuation rates for those with only non-hostile deployments). Therefore, figure 4 suggests that hostile deployments have a larger negative effect on continuation rates among enlisted servicemembers with fewer YOS than among servicemembers with more YOS.

Figure 4 shows only a simple version of the story, however, because the data (a) are combined across all four services and (b) do not account for other factors, such as demographic characteristics, that are likely to affect both deployment history and continuation rates. Next we report our findings from service-specific regression analyses that also take these additional factors into consideration.

Figure 5 shows the marginal effect (measured in percentage points) of hostile and non-hostile deployments (relative to no deployments) on 12-month continuation rates, controlling for various military and demographic factors.[17] These estimates come from regression models estimated separately by service and by YOS group (less than 6 YOS and 6 or more YOS). All effects are statistically significant at the 5-percent or higher level with the exception of the striped bars.

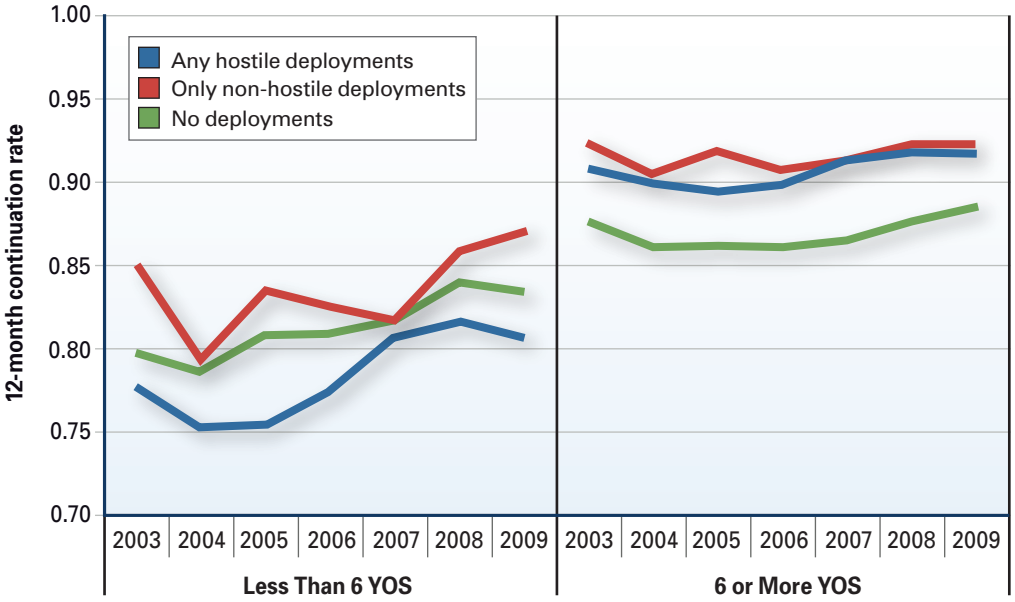
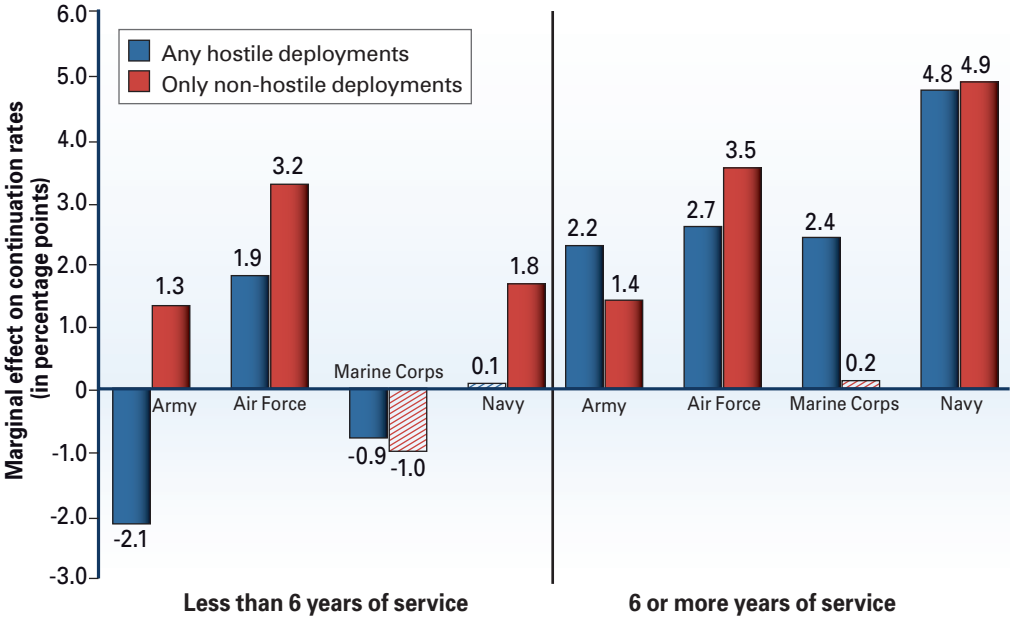


Figure 4. Enlisted, all services: 12-month continuation rates by deployment history in past 24 months

17. Full regression results are available on request.



a. These estimates represent the marginal effects of any hostile and only non-hostile deployments on 12-month continuation rates, where the comparison group is no deployments. Each pair of any hostile and only non-hostile deployment marginal effects comes from a separate regression by service and by YOS group.

Figure 5. Enlisted: Effect of hostile and non-hostile deployments on continuation rates[a]

For servicemembers with less than 6 YOS, figure 5 shows that the effect of deploying on continuation rates is mixed. With respect to hostile deployments, servicemembers in the Army and Marine Corps who have any hostile deployments in the past 24 months are 2.1 and 0.9 percentage points less likely, respectively, to stay in the force in the next 12 months relative to those with no deployments in the past 24 months. In contrast, servicemembers with less than 6 YOS in the Air Force who have any hostile deployments in the past 24 months are 1.9 percentage points more likely to stay in the force in the next 12 months relative to servicemembers with no deployments in the past 24 months. The results for the Navy are statistically insignificant.

Turning to the effect of non-hostile deployments in the past 24 months (red bars), servicemembers with less than 6 YOS in the Army, Air Force, and Navy are 1.3, 3.2, and 1.8 percentage points, respectively, more likely to stay in the force in the next 12 months relative to servicemembers with no deployments in the past 24 months. The results for the Marine Corps are statistically insignificant.[18]

18. The magnitudes of the marginal effects for any hostile and only non-hostile deployments, relative to no deployments, for enlisted servicemembers with less than 6 YOS in the Marine Corps are similar (-0.9 and -1.0, respectively), but the latter is not statistically different from zero.

Among servicemembers with 6 or more YOS, the continuation rate effect of a hostile or non-hostile deployment in the past 24 months, relative to no deployments in the past 24 months, is unambiguously positive. Servicemembers in the Army, Air Force, Marine Corps, and Navy who have any hostile deployments in the past 24 months are 2.2, 2.7, 2.4, and 4.8 percentage points, respectively, more likely to stay in the force in the next 12 months relative to servicemembers with no deployments in the past 24 months.

Similarly, servicemembers in the Army, Air Force, and Navy who have only non-hostile deployments in the past 24 months are 1.4, 3.5, and 4.9 percentage points, respectively, more likely to stay in the force in the next 12 months relative to servicemembers with no deployments in the past 24 months. The non-hostile deployment results for the Marine Corps are statistically insignificant.

As a robustness check, we also ran the model restricting the sample to servicemembers estimated to be within 12 months of the end of their contracts. Although the measure is imperfect, being within 12 months of the end of a contract is nonetheless the most useful predictor in our data of which servicemembers are coming up on a stay/leave decision. When we restrict the sample to these servicemembers, we find that the magnitudes of the effects are generally larger, but the overall results are robust except for two cases.

First, under the restricted sample, Marines with less than 6 YOS who have any hostile deployments in the past 24 months are 1.4 percentage points *more* likely to stay in the force over the next 12 months relative to their counterparts with no deployments in the past 24 months. In contrast, as reported above, in the full sample, we found that these Marines were 0.9 percentage point *less* likely to continue relative to their counterparts with no deployments in the past 24 months.

Second, under the restricted sample, Navy Sailors with less than 6 YOS who have any hostile deployments in the past 24 months are 4.1 percentage points *more* likely to stay in the force over the next 12 months relative to their counterparts with no deployments in the past 24 months. In contrast, as reported earlier, in the full sample, we found *no significant* results for these Sailors.

Differences across GWOT and non-GWOT deployments

The estimates presented in the previous subsection represent the combined effect of a hostile deployment and combat compensation. Because anyone who goes on a hostile deployment receives combat compensation, it is difficult to separate the effect of the hostile deployment on continuation rates from the effect of

combat compensation. By separating hostile deployments into GWOT and non-GWOT, however, we can gain some insight into how the two effects operate. In particular, we can compare continuation rates among personnel in four deployment categories as shown in the legend of figure 6: any GWOT deployments, only non-GWOT hostile deployments, and only non-hostile deployments (the omitted category is no deployments).

Servicemembers falling in either of the first two categories (any GWOT and only non-GWOT hostile deployments) receive combat compensation. However, servicemembers in these two groups arguably face different amounts of risk and different living conditions while deployed, where presumably the risk is greater and the conditions less desirable in the GWOT deployments than in the non-GWOT hostile deployments.

Indeed, figure 6 shows raw 12-month continuation rates for servicemembers across all services in the four categories. For those with less than 6 YOS, continuation rates for those with any GWOT deployments are considerably lower than for those in any of the other three categories. For personnel with 6 or more YOS, there is very little difference in 12-month continuation rates between those who had any GWOT deployments and those who had only non-GWOT combat deployments (or those with only non-hostile deployments).

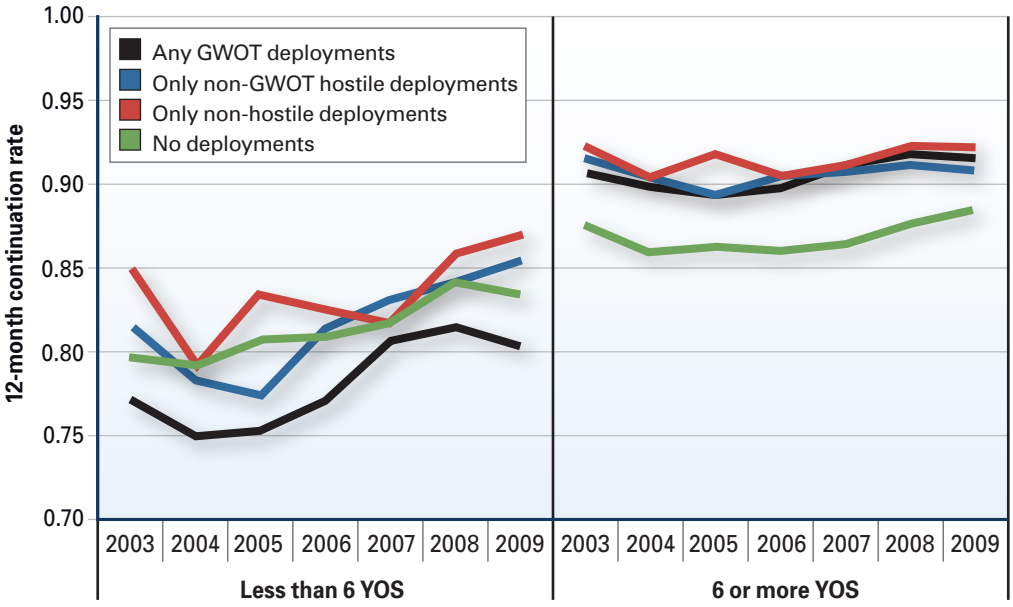


Figure 6. Enlisted, all services: 12-month continuation rates by GWOT and non-GWOT locations within HFP-designated areas

Figure 7 shows our findings from service-specific regression analyses that account for demographic and service-related characteristics in analyzing the effect of hostile deployments on continuation rates.

Figure 7 is similar to figure 5 except that the effect of any hostile deployments on continuation is estimated separately for GWOT and non-GWOT hostile deployments in figure 7.

For servicemembers with less than 6 YOS, we can see that the negative effect of any hostile deployments for the Army and the Marine Corps shown in figure 5 (-2.1 and -0.9 percentage points, respectively) is driven by GWOT deployments. Indeed, figure 7 shows that these servicemembers are 2.3 and 1.2 percentage points less likely, respectively, to stay in the force relative to their counterparts with no deployments. In contrast, only non-GWOT hostile deployments have a positive effect on continuation rates for servicemembers with less than 6 YOS in the Army and the Marine Corps (2.4 and 2.6 percentage points, respectively). For servicemembers with less than 6 YOS in the Air Force, both GWOT and non-GWOT hostile deployments have a positive effect on continuation, but the effect is larger for non-GWOT deployments (2.6 v. 1.6 percentage points). Finally, for the Navy, the results remain statistically insignificant for servicemembers with less than 6 YOS.

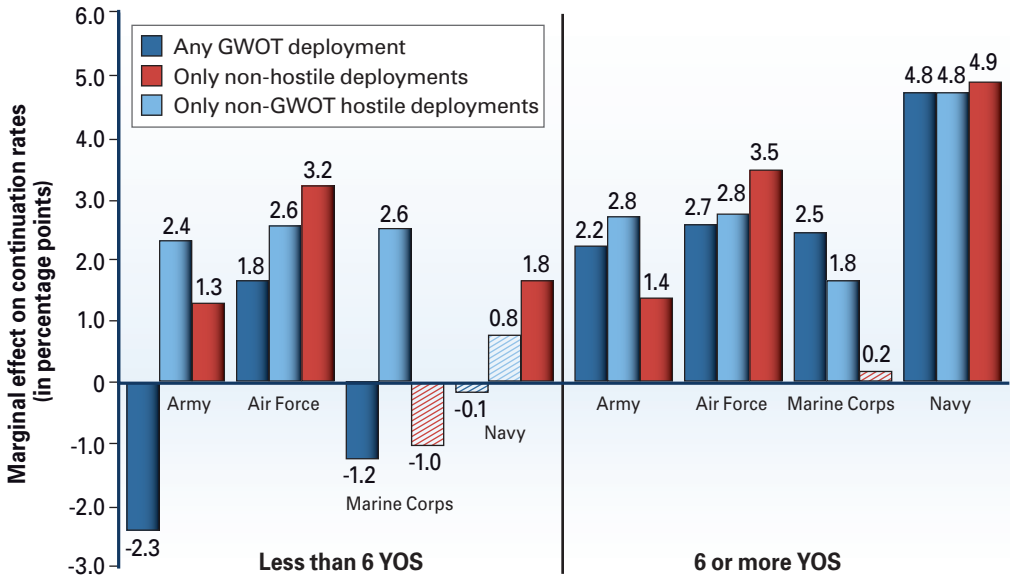


Figure 7. Enlisted: Effect of GWOT, non-GWOT hostile, and non-hostile deployments on continuation rates[a]

a. These estimates represent the marginal effects of any GWOT, any non-GWOT hostile, and only non-hostile deployments on 12-month continuation rates, where the comparison group is no deployments. Each trio of marginal effects comes from a separate regression by service and by YOS group.

For servicemembers with 6 or more YOS, the effect of hostile deployments, regardless of whether they are GWOT or non-GWOT, continues to be unambiguously positive. Among servicemembers with 6 or more YOS, any GWOT deployments in the past 24 months is associated with increases in 12-month continuation rates in the Army, Air Force, Marine Corps, and Navy by 2.2, 2.7, 2.5, and 4.8 percentage points, respectively, relative to servicemembers with no deployments in the past 24 months. Similarly, only non-GWOT hostile deployments in the past 24 months are associated with increases in 12-month continuation rates in the Army, Air Force, Marine Corps, and Navy by 2.8, 2.8, 1.8, and 4.8 percentage points, respectively, relative to servicemembers with no deployments in the past 24 months.

Results for officer servicemembers

Differences across hostile, non-hostile, and no deployments

Turning now to officers, figure 8 shows 12-month raw continuation rates for officers across all services by deployment category. The figure is quite similar to the one for enlisted members. In particular, as was the case with the enlisted force, the figure suggests that the relationship between hostile deployments and continuation rates varies by YOS. For officers with less than 6 YOS, continuation rates are highest among those who have only non-hostile deployments in the past 24 months and lowest for those with any hostile deployments in the past 24 months; those with no deployments in the past 24 months have continuation rates in the middle.

For officers with 6 or more YOS, however, the last two groups are reversed, such that those with only non-hostile deployments in the past 24 months continue to have the highest continuation rates, those with no deployments in the past 24 months have the lowest continuation rates, and those with any hostile deployments in the past 24 months have continuation rates in the middle. As was the case with the enlisted force, continuation rates for officers with 6 or more YOS with any hostile deployments in the past 24 months are nearly as high as the rates for those with only non-hostile deployments in the past 24 months. Therefore, like the enlisted force, figure 8 suggests that hostile deployments have a larger negative effect on continuation rates among officers with fewer YOS than among officers with more YOS.

Figure 9 shows the marginal effect (in percentage points) of hostile and non-hostile deployments (relative to no deployments) on 12-month continuation rates, controlling for the various military and demographic factors. Again, all effects are statistically significant at the 5-percent or higher level except for the striped bars. Overall, the results for officers are very similar to the results for the enlisted force.

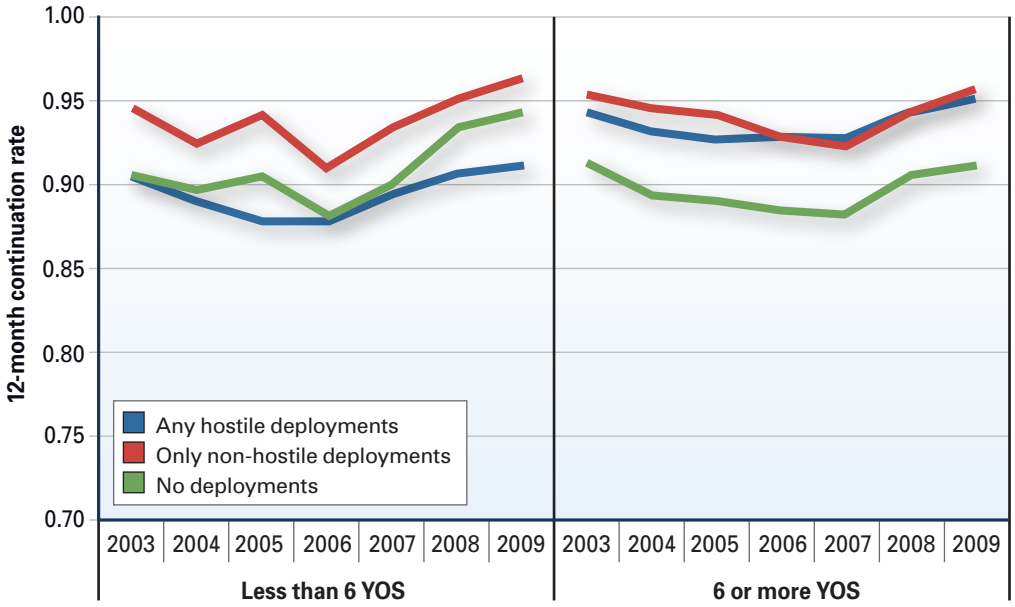


Figure 8. Officer, all services: 12-month continuation rates by deployment history in past 24 months

For officers with less than 6 YOS, the effect of deploying on continuation rates is mixed, as was the case for enlisted servicemembers with less than 6 YOS. The figure shows that the effect of a hostile deployment in the past 24 months on 12-month continuation rates (blue bars) is different across services. Those in the Army and Marine Corps who have any hostile deployments in the past 24 months are 2.2 percentage points and 4.0 percentage points less likely to stay in the force, respectively, in the next 12 months relative to officers with no deployments in the past 24 months. In contrast, servicemembers with less than 6 YOS in the Air Force who have any hostile deployments in the past 24 months are 1.4 percentage points more likely to stay in the force in the next 12 months relative to officers with no deployments in the past 24 months. The results for the Navy are statistically insignificant.

Turning to the effect of non-hostile deployments in the past 24 months (red bars), officers with less than 6 YOS in the Air Force are 3.4 percentage points more likely to stay in the force in the next 12 months relative to officers with no deployments in the past 24 months, whereas their Marine Corps counterparts are 3.4 percentage points less likely to stay in the force in the next 12 months. The results for the Army and Navy are statistically insignificant.[19]

19. Although the magnitudes of the marginal effects for any hostile and only non-hostile deployments, relative to no deployments, for officers with less than 6 YOS in the Army are similar (both approximately -2.2), the latter is not statistically different from zero.

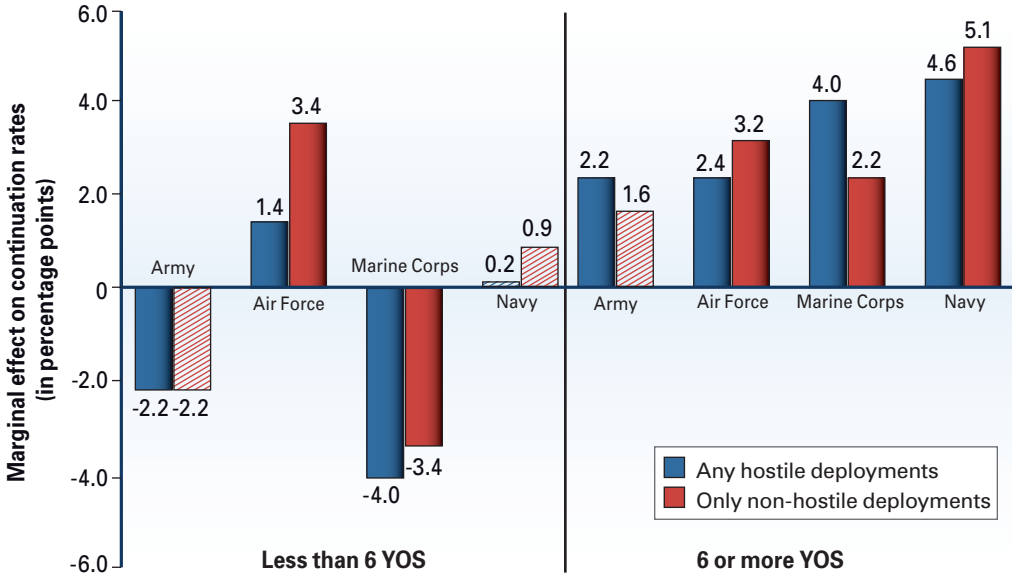


Figure 9. Officer: Effect of hostile/non-hostile deployments on continuation rates[a]

a. These estimates represent the marginal effects of any hostile and only non-hostile deployments on 12-month continuation rates, where the comparison group is no deployments. Each pair of any hostile and only non-hostile deployment marginal effects comes from a separate regression by service and by years of service group.

For officers with 6 or more YOS, the continuation rate effect of a hostile or non-hostile deployment in the past 24 months, relative to no deployments in the past 24 months, is unambiguously positive. Compared with officers with no deployments in the past 24 months, officers who have any hostile deployments in the past 24 months are more likely to stay in the force by 2.2 percentage points in the Army, 2.4 percentage points in the Air Force, 4.0 percentage points in the Marine Corps, and 4.6 percentage points in the Navy. Similarly, officers in the Air Force, Marine Corps, and Navy who have only non-hostile deployments in the past 24 months are, respectively, 3.2, 2.2, and 5.1 percentage points more likely to stay in the force in the next 12 months relative to officers with no deployments in the past 24 months. The non-hostile deployment results for the Army are statistically insignificant.

Differences across GWOT and non-GWOT deployments

The estimates presented in the previous subsection represent the combined effect of a hostile deployment and combat compensation. We also can compare continuation rates among servicemembers in the four deployment categories (any GWOT, only non-GWOT hostile, only non-hostile, and no deployments) to gain insights into how the pay and combat effects operate.

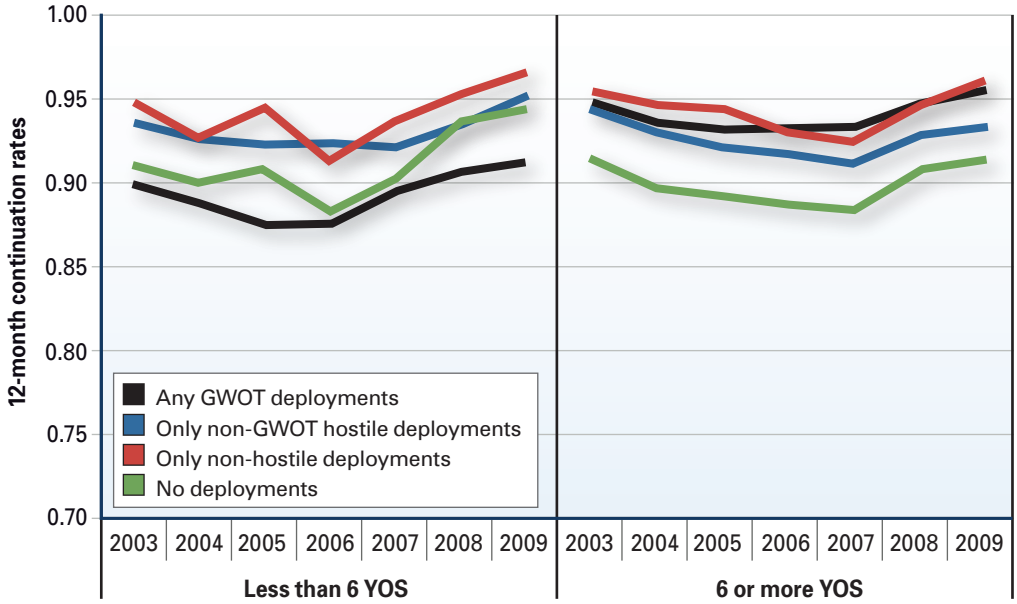


Figure 10. Officer, all services: 12-month continuation rates by GWOT and non-GWOT locations within HFP-designated areas

Figure 10 shows raw 12-month continuation rates in all deployment categories for officers in all services. As in the enlisted case, officers with less than 6 YOS and any GWOT deployments in the past 24 months exhibit lower continuation rates than their counterparts in the other categories. However, officers with 6 or more YOS and any GWOT deployments in the past 24 months have higher continuation rates than those with non-GWOT combat deployments in the past 24 months. This is in contrast to the result for enlisted with 6 or more YOS in which there appears to be little difference in continuation between those who had any GWOT deployments and those who had only non-GWOT combat deployments in the past 24 months.

In figure 11, we report our findings from service-specific regression analyses that control for differences in demographic and service-related characteristics. Again, figure 11 is similar to figure 9 except that the effect of any hostile deployments on continuation is estimated separately for GWOT and non-GWOT hostile deployments in figure 11.

The results for officers when we break the hostile deployments into GWOT and non-GWOT hostile deployments are similar to the results for enlisted. For officers with less than 6 YOS, the negative effect of any hostile deployments in the past 24 months for the Army and the Marine Corps (-2.2 and -4.0 percentage points, respectively, as shown in figure 9) is driven by GWOT deployments. Indeed, figure 11 shows that these officers are 2.5 and 4.3 percentage points less likely, respectively,

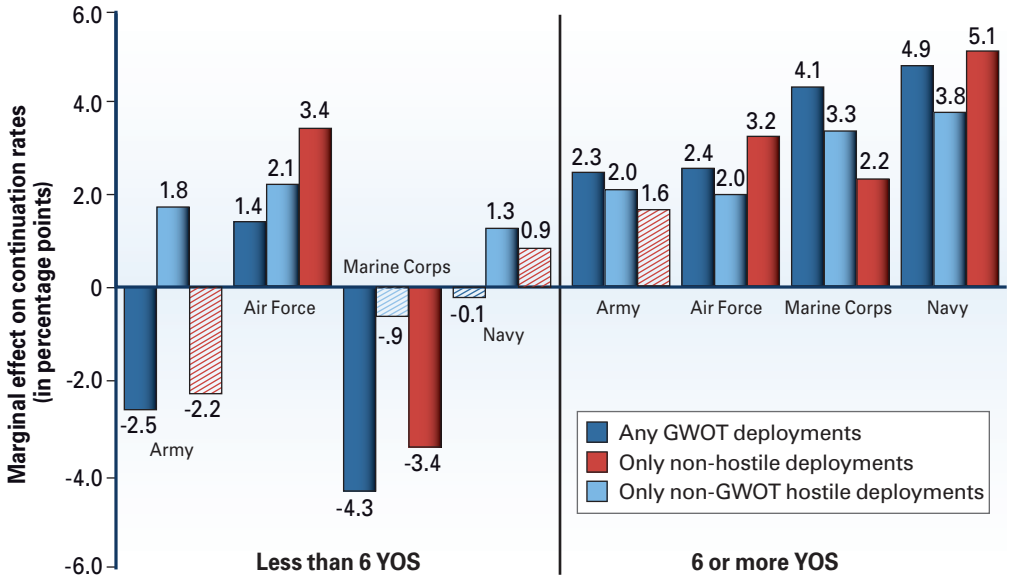


Figure 11. Officer: Effect of GWOT, non-GWOT hostile, and non-hostile deployments on continuation rates[a]

a. These estimates represent the marginal effects of any GWOT, any non-GWOT hostile, and only non-hostile deployments on 12-month continuation rates, where the comparison group is no deployments. Each trio of any GWOT, any non-GWOT hostile, and only non-hostile deployment marginal effects comes from a separate regression by service and by years of service group.

to stay in the force relative to their counterparts with no deployments in the past 24 months. In contrast, non-GWOT hostile deployments in the past 24 months have a positive effect on continuation rates for officers with less than 6 YOS in the Army (1.8 percentage points) and an insignificant effect for officers with less than 6 YOS in the Marine Corps. For officers with less than 6 YOS in the Air Force, both GWOT and non-GWOT hostile deployments in the past 24 months have a positive effect on continuation, and the effect is larger for non-GWOT deployments (2.1 v. 1.4 percentage points). Finally, for the Navy, the effect of GWOT deployments in the past 24 months is statistically insignificant, while the effect of non-GWOT hostile deployments in the past 24 months is positive (1.3 percentage points).

As was the case for enlisted servicemembers, for officers with 6 or more YOS, the effect of hostile deployments (GWOT and non-GWOT) in the past 24 months is unambiguously positive. Unlike the enlisted results, however, GWOT deployments in the past 24 months have a larger effect than non-GWOT hostile deployments in the past 24 months: 2.3 v. 2.0 percentage points for the Army, 2.5 v. 2.0 percentage points for the Air Force, 4.1 v. 3.3 percentage points for the Marine Corps, and 4.9 v. 3.8 percentage points for the Navy.

Conclusions from the active component analysis

Across the enlisted and officer analyses, two interesting conclusions arise. After taking into consideration the data on casualty rates and the value of CZTE, we can begin to gain a deeper understanding of what is driving these conclusions.

First, for both enlisted and officers with less than 6 YOS, the effect of a hostile deployment is negative for the Army and Marine Corps and positive for the Air Force. In addition, the negative effect of hostile deployments for the Army and Marine Corps is driven by GWOT deployments. Indeed, when we analyze GWOT and non-GWOT hostile deployments separately, for servicemembers with less than 6 YOS in the Army and Marine Corps, we find that the effect of GWOT deployments is negative, while the effect of non-GWOT hostile deployments is positive. In contrast, for servicemembers with less than 6 YOS in the Air Force, we find that any deployments (GWOT, non-GWOT hostile, and non-hostile) have positive continuation effects. This difference could be driven by service-specific differences in risk faced while deployed in support of GWOT. Consistent with this explanation, GWOT casualty data from FY05 through FY10 produce casualty rates that are 10 and 15 times higher for the Army and Marine Corps, respectively, than for the Air Force. In addition, the differences in the service-specific casualty rates are similar when the data are limited to the lower paygrades, where E1–E4 and O1–O3 are a rough proxy for enlisted and officers with less than 6 YOS. Therefore, the remarkably higher Army and Marine Corps GWOT casualty rates relative to the Air Force might explain why GWOT deployments have a negative effect on continuation for the Army and Marine Corps but not for the Air Force. This difference also could be driven by service-specific differences in living condition while deployed. Indeed, [3] finds that deployments are associated with higher work and personal stress and lower reenlistment intentions among first-term servicemembers in the Army and Marine Corps than among first-term servicemembers in the Air Force.[20]

Second, for both enlisted and officers with 6 or more YOS, the continuation effect of deploying is unambiguously positive. This is the case regardless of whether the deployment is hostile (GWOT or non-GWOT) or non-hostile. Therefore, while hostile deployments might contribute to lower continuation among servicemembers

20. While our analysis compares continuation effects by deployment type, [3] examines the additional effect of deployment duration, concluding that longer hostile deployments have larger negative effects on reenlistment than shorter deployments. Since servicemembers in the Army and Marine Corps have deployed for longer spells on average than servicemembers in the Air Force, this is consistent with our findings. In addition, [3] notes that the negative impact of hostile deployments on reenlistment would have been larger in the Army and the Marine Corps had it not been for the aggressive expansion of SRB eligibility and amounts in an attempt to meet endstrength goals.

with fewer YOS, they might instead produce higher continuation among servicemembers with more YOS. Part of this could be because servicemembers with fewer YOS face greater risk in a hostile deployment than servicemembers with more YOS. For instance, if we use E1–E4 and O1–O3 paygrades as a rough proxy for less than 6 YOS, we see that GWOT casualty rates are 4 and 5 times higher for enlisted and officers, respectively, with few YOS relative to those with more YOS. An alternative explanation could be differences in the value of combat compensation, namely CZTE, across the YOS distribution. In fact, data on the value of CZTE show that the value of the tax exclusion (in terms of the reduction in a servicemember's tax liability) is increasing in YOS since taxable incomes tend to rise with YOS. For example, the value of the tax exclusion for an E7 with 20 YOS is twice that of an E5 with 4 YOS. Yet another explanation might be a selection effect, that servicemembers with a greater tolerance for hostile deployments might themselves be more likely to stay in the military. These three pieces of evidence—the fact that casualty risk is decreasing in YOS, the fact that the value of CZTE is increasing in YOS, and the selection effect—might explain why the effect of hostile deployments is positive for more experienced servicemembers, while it is negative for less experienced servicemembers.

Combat experience and continuation in the RC

In this section, we discuss the data used and our statistical analysis of the relationship between receipt of HFP, GWOT mobilizations, and 12-month continuation rates for the reserve component.

Data

As with the AC analysis, the data we use for the RC analysis are a combination of administrative personnel, pay, deployment and casualty data provided by DMDC. For the personnel data, we use SSN-level monthly snapshots from DMDC (Reserve Components Common Personnel Data System). For the pay data, we use data that DMDC receives from the Defense Finance and Accounting Service. These data include information on receipt of HFP. To capture deployments, we again use the GWOT CTS database. The CTS data for SELRES differs from the active component in how it captures GWOT mobilizations and GWOT deployments during a mobilization. All the deployments captured on the CTS are GWOT deployments.

In addition, we use aggregate-level casualty data that cover casualties (both killed in action and wounded) from 2005 through 2010 in GWOT-designated locations.

The RC casualty data are broken out by service branch. The rates reported are total incidents over average members per day.[21]

Methodology

For our analysis of SELRES, we use DMDC data described earlier to create a 12-month continuation data set from June 2003 to June 2009. We analyzed enlisted and officers separately and, when noted, separately for the services. We restrict our analysis to SELRES members with at least 2 years of service, measured by pay entry base date. In this section, we focus on (1) hostile deployments using the pay data and then (2) GWOT mobilizations, with and without GWOT deployments. Our methodology for the SELRES focuses on the descriptive statistics by these different deployment experiences.[22]

Continuation rates for enlisted SELRES

Differences across hostile and no hostile deployments

Figure 12 shows the 12-month continuation rates, by June snapshots, for enlisted SELRES broken out by receipt of HFP. Those who received HFP for at least 1 month in the past 24 months have continuation rates that are 2.6 percentage points higher than those who did not receive HFP. This difference is statistically significant. Because there are potential differences across reserve components, we include this breakout by reserve component in appendix D (see figures 22 through 24). Those figures show that a similar pattern is consistent across most reserve components. Except for the Marine Corps, receipt of HFP in the past 24 months is associated with higher continuation rates.

We call attention to two caveats. First, those who have not received HFP in the past 24 months include SELRES members who are not mobilized along with those who are mobilized to a non-hostile area. For this reason, we next present continuation rates using CTS data on mobilizations that did or did not involve a GWOT deployment. Second, part of the reason for the higher continuation rates among HFP recipients could be that some of the SELRES members are currently receiving HFP and thus are still deployed and less likely to leave. For that reason, in the next subsection, we present continuation rates based on only those mobilizations that have been completed.

21. Unfortunately, the CZTE data are not aggregated in a way that is useful for interpreting the RC analysis.

22. Because of time limitations, we focused the RC analysis on descriptive statistics instead of presenting a regression model (as we did for the active component). For a discussion of the complexities involved in modeling reserve retention, see [45] and [46].

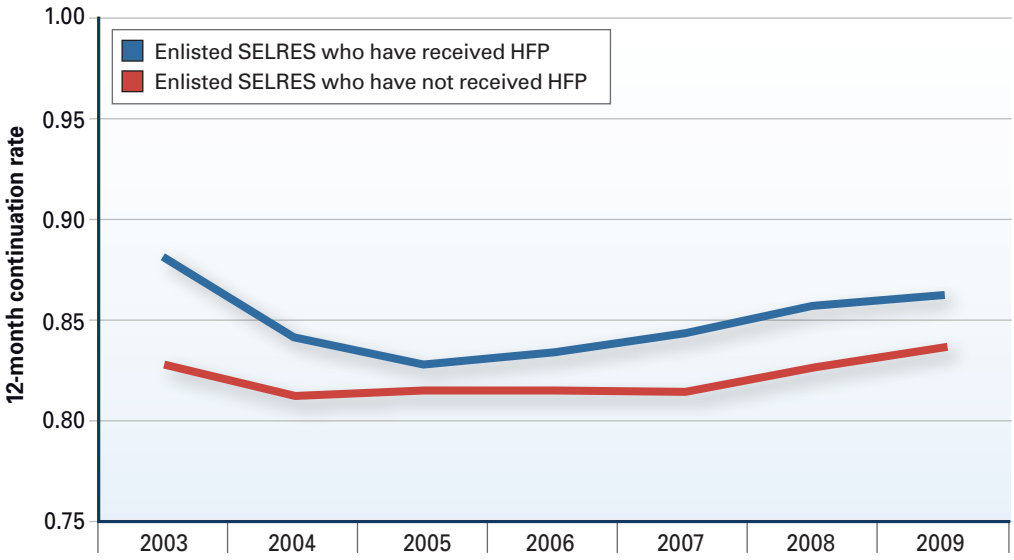


Figure 12. Enlisted SELRES, all services: 12-month continuation rates by receipt of HFP in past 24 months

Differences across mobilizations with and without GWOT deployments

To examine whether there is a difference by mobilization in addition to a difference by receipt of HFP, as discussed in the last section, we separate out all mobilizations by those with deployments in support of GWOT—as defined on the CTS—and those without deployments. An example of a mobilization without a deployment would be to fill CONUS support positions. A SELRES member falls in the "only mobilization without deployment" category if not one of the member's mobilization periods that ended in the past 24 months included a deployment. If, however, a SELRES member had any mobilizations that ended in the past 24 months that included a GWOT deployment, they belong to the "any mobilization with deployment" category. Our mutually exclusive third category is "no mobilization in the past 24 months." Because we focus our analysis on completed mobilizations, those without a completed mobilization who are currently mobilized would be in our "no mobilization" category.

The continuation rate among those with a GWOT deployment isn't consistently higher than the other two categories across all years (see figure 13). The continuation rate among those with any mobilizations with a deployment is higher than the

continuation rate of those who mobilized but didn't have a deployment in 2003, 2004, 2008, and 2009. That difference is statistically significant in those years. For the other years, there is no statistically significant difference in the continuation rates between mobilized reserve members by deployment experience.

Since the different reserve components mobilize with different frequencies, in appendix D (figures 25 through 27), we provide these estimates by reserve component. For all reserve components other than the Marine Corp Reserve, the continuation rate among those who have mobilized and deployed in support of GWOT is higher than for those who have mobilized but not deployed. This finding is consistent with previous findings (e.g., see [45]). Note that those who have deployed in support of GWOT earn combat pay; however, compensation may not be the only factor contributing to this difference.

While we don't find higher continuation rates among Marines who did deploy across all years, SELRES Marines in focus groups, documented in [51], did state that, if activated, they would prefer to deploy because they didn't want to mobilize outside CONUS and do nothing.

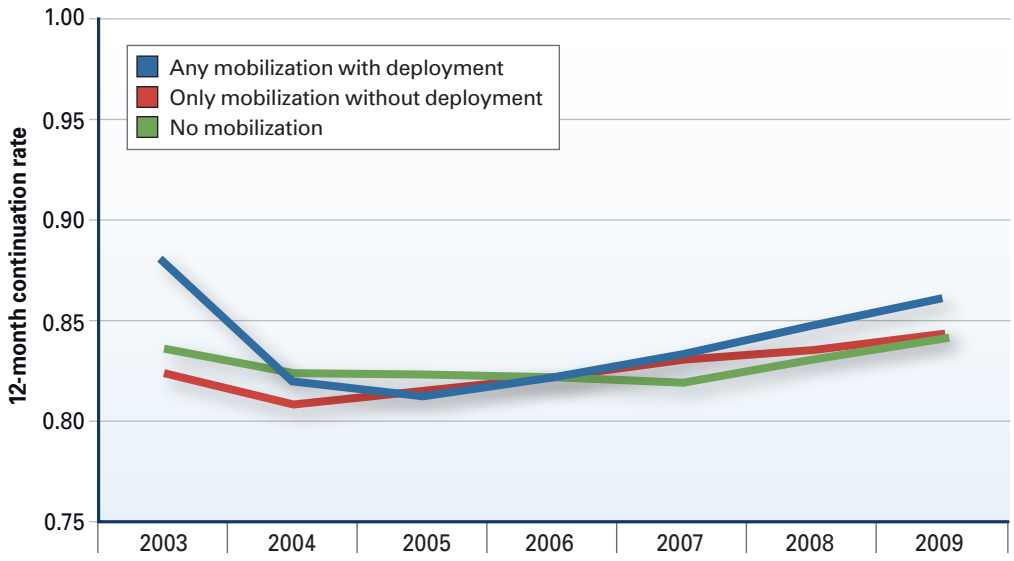


Figure 13. Enlisted SELRES, all services: 12-month continuation rates by mobilizations in past 24 months

Results for officer SELRES

Differences across hostile and no hostile deployments

Figure 14 shows the 12-month continuation rates by June snapshots for SELRES officers broken out by receipt of HFP in the previous 24 months.

Those who received HFP for at least 1 month in the past 24 months have, over this time period, a statistically significantly higher continuation rate by 1.5 percentage points. Because there are potential differences across reserve components, we include this breakout by reserve component in appendix E (see figures 28 through 30). In summary, for most reserve components, the continuation rate among officers who have received any HFP within the past 24 months is higher than the continuation rate among officers who have not received any HFP within the past 24 months. As was the case with enlisted SELRES, the Marine Corps is the only reserve component in which 12-month continuation rates of officers who received any HFP in the past 24 months are *not* consistently associated with higher continuation rates.

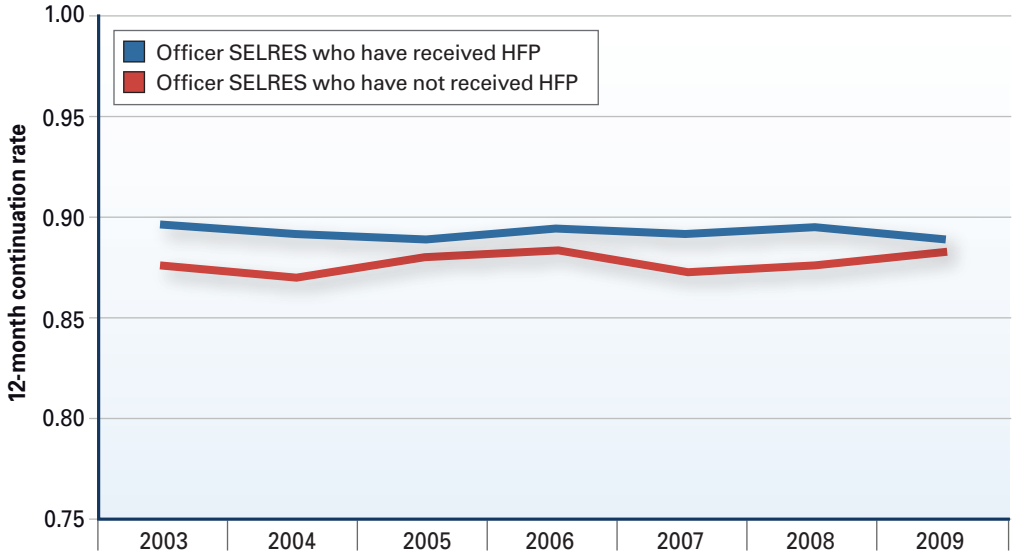


Figure 14. Officer SELRES, all services: 12-month continuation rates by receipt of HFP in past 24 months

Differences across mobilizations with and without GWOT deployments

To examine whether there is a difference by mobilization, we separate out all completed mobilizations in the past 24 months by those with deployments in support of GWOT and compare those with mobilizations without GWOT deployments and no mobilizations. Across all June snapshots, we see in figure 15 that the highest

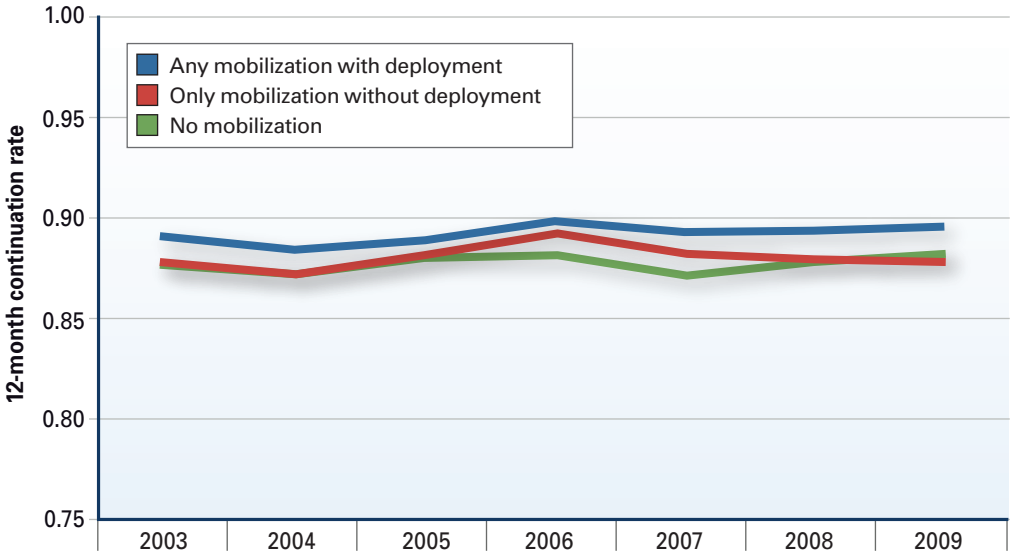


Figure 15. Officer SELRES, all services: 12-month continuation rates by mobilizations in past 24 months

continuation rate is among those who have had any completed mobilization in the past 24 months that involved a GWOT deployment. There isn't a clear ordering of continuation rates among those with only mobilizations without deployments versus those with no mobilizations. Indeed, the difference in continuation rates among those with only mobilizations without a deployment and among those with no mobilizations is statistically significant only in 2006 and 2007 where only mobilization without deployment is higher than no mobilization. We also include this breakout by RC in appendix E (see figures 31 through 33).

When we look at officers who have completed mobilizations within the past 24 months, we get less of a clear pattern across all the services by mobilization versus no mobilization. A better comparison, however, is among those who have deployed in support of GWOT with those who have mobilized but not deployed. Across the June 2003–2009 snapshots and across all reserve components, the continuation rate among officers who have mobilized and deployed in support of GWOT is generally equal to or higher than that for officers who have mobilized but not deployed. This pattern exists for all reserve components except the Army National Guard. The difference in continuation rates by deployment experience is consistent with previous findings [46]. Those who have deployed in support of GWOT earn combat pay, unlike their non-deploying counterparts, but there are other differences, such as a desire to support the mission, that may also influence the decision to stay in the SELRES.

Conclusions from the RC analysis

For most reserve components, we find that those who have received any HFP have higher continuation rates than those who have not received the pay. This finding holds across enlisted and officers and across all service components, with the exception of the Marine Corps SELRES.

When we narrow our focus to completed mobilizations, we find that for most reserve components those members who have mobilized with a deployment have higher continuation rates than those who have mobilized without a deployment. Exceptions are the Marine Corps enlisted SELRES and Army National Guard officers.

We offer two potential explanations for why continuation rates are higher among those who have mobilized and deployed versus those who have mobilized without a deployment. The first is the fact that those who have deployed in support of GWOT earn combat pay, unlike their non-deploying counterparts. Other differences, however, such as a desire to support the mission, may also influence the decision to stay in the SELRES.

The differences in our findings by service (specifically, the Marine Corps enlisted SELRES and Army National Guard officers) may be associated with service-specific differences in the types of deployment and in particular differences in levels of risk. GWOT FY05–FY10 casualty rates are higher among the Army and Marine Corps reserve and guard components than the other reserve/guard components.[23] In FY08 and FY09, the casualty rate was highest for the Army reserve/guard. In FY05, FY06, FY07, and FY10, the casualty rate was highest for the Marine Corps among all the reserve/guard components. In FY10, for example, the casualty rate for the Marine Corps reserve was 23 times higher than for the Navy reserve.

Summary and conclusions

Our analysis of the relationship between combat deployments and continuation produced some interesting and varied insights across the active and reserve components, the enlisted and officer corps, and the services.

AC analysis

For the AC, we come to two main conclusions pertaining to differences in continuation effects across services and across YOS.

First, for both enlisted and officers with less than 6 YOS, the effect of a hostile deployment is negative for the Army and Marine Corps and positive for the Air

23. DMDC casualty data were reported jointly for both the Army reserve and guard components.

Force. In addition, the negative effect of hostile deployments for the Army and Marine Corps is driven by GWOT deployments. More specifically, when we separate GWOT and non-GWOT hostile deployments for servicemembers with less than 6 YOS in the Army and Marine Corps, we find a negative continuation effect of GWOT deployments and a positive effect of non-GWOT hostile deployments. In contrast, for servicemembers with less than 6 YOS in the Air Force, we find a positive continuation effect of any deployments (GWOT, non-GWOT hostile, and non-hostile). This difference might be attributed to service-specific differences in risk or conditions faced while deployed in support of GWOT. Indeed, aggregate GWOT casualty data show that casualty rates are considerably higher for the Army and Marine Corps than for the Air Force, both overall and when the data are restricted to the lower paygrades (a proxy for low YOS). In addition, survey data show that deployments are associated with higher work and personal stress and lower reenlistment intentions among first-term servicemembers in the Army and Marine Corps than among first-term servicemembers in the Air Force.

Second, for both enlisted and officers with 6 or more YOS, the continuation effect of deploying is unambiguously positive. This is true for hostile (GWOT or non-GWOT) and non-hostile deployments. So, while hostile deployments might contribute to lower continuation among servicemembers with fewer YOS, they might produce higher continuation among servicemembers with more YOS. We offer three potential explanations: (1) servicemembers with fewer YOS face greater risk in a hostile deployment than servicemembers with more YOS, as demonstrated by the GWOT casualty data; (2) the value of CZTE (in terms of the reduction in a servicemember's tax liability) is increasing in YOS, since taxable incomes tend to rise with YOS, as demonstrated by the CZTE data; and (3) this might be the result of a selection effect since servicemembers with a greater tolerance for hostile deployments might themselves be more likely to stay in the military. These three pieces of evidence might explain why the effect of hostile deployments is positive for more experienced servicemembers, while it is negative for less experienced servicemembers.

RC analysis

For most reserve components, we find that those who have received any HFP have higher continuation rates than those who have not received the pay. This finding holds across enlisted and officers and across all service components, with the exception of the Marine Corps SELRES. When we narrow our focus to completed mobilizations, we find that for most RCs those members who have mobilized with a deployment have higher continuation rates than those who have mobilized without a deployment. We offer one possible explanation of this finding—the fact that those who have deployed in support of GWOT earn combat pay, unlike their non-deploying

counterparts. Other differences, such as a desire to support the mission, may also influence the decision to stay in the SELRES. This finding, however, does not hold across all components; the exceptions are the Marine Corps enlisted SELRES and Army National Guard officers. The differences in our findings by service may be associated with service-specific differences in the types of deployment and differences in levels of risk. GWOT FY05–FY10 casualty rates are higher among the Army reserve and guard and the Marine Corps than the other reserve and guard components.

Appendix A. Maps of additional HFP and CZTE areas

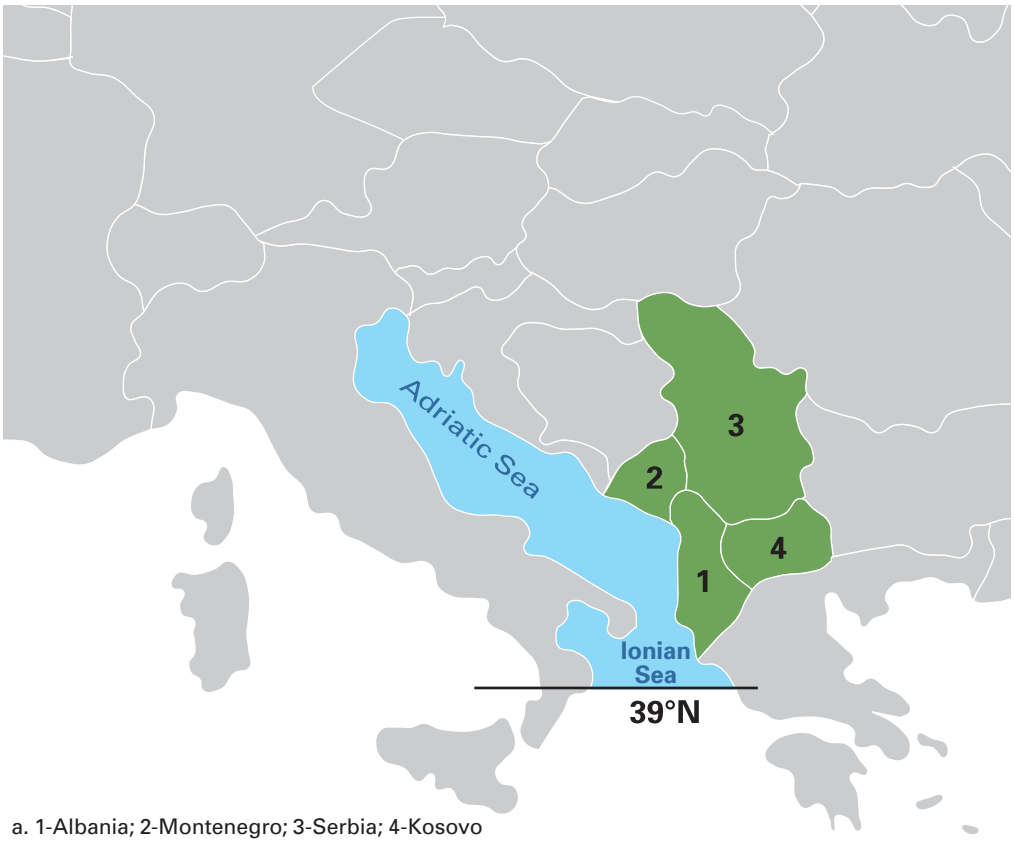
Additional HFP locations

In addition to the locations listed in the main text, figure 16 shows that official military duty in Colombia, Cuba, Guantanamo, or Haiti also meets the criteria for HFP eligibility.

Figure 16. Additional HFP locations[a]

Additional CZTE locations

In addition to the locations listed in the main text, figure 17 indicates which European countries are also CZTE designated.



a. 1-Albania; 2-Montenegro; 3-Serbia; 4-Kosovo

Figure 17. Additional CZTE areas for active service in a combat zone[a]

Appendix B. Average hostile deployed days

Figures 18 and 19 show by June snapshot the average number of hostile deployed days in the past 24 months for enlisted and officer in the active component.

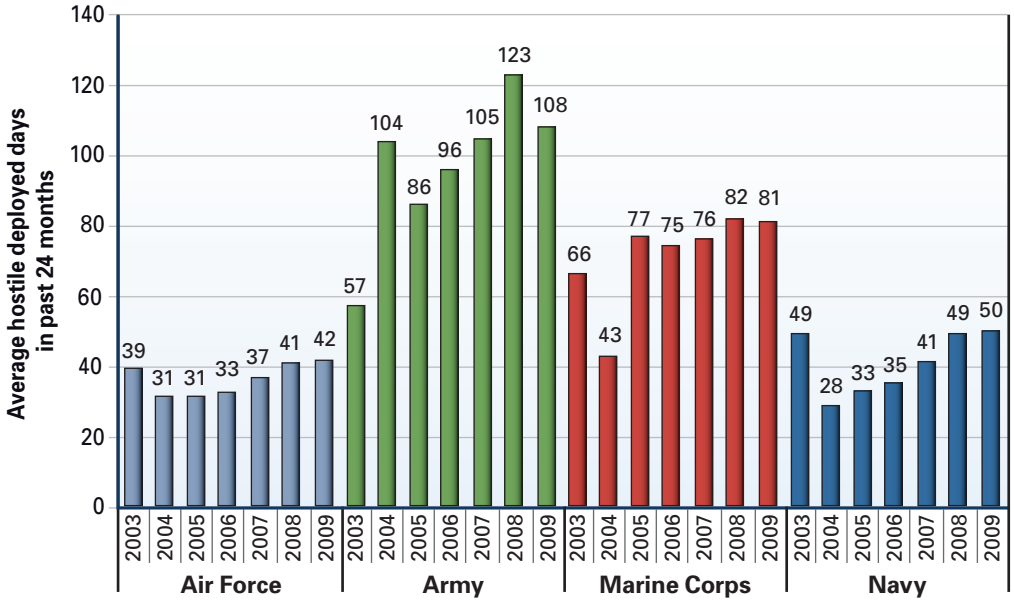


Figure 18. Average hostile deployed days, enlisted servicemembers, by service

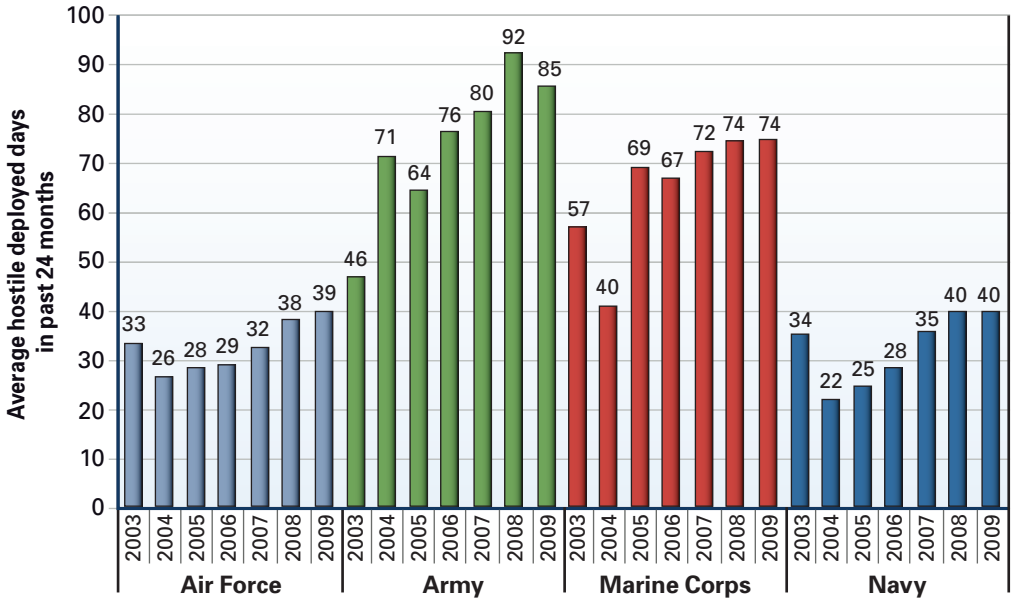


Figure 19. Average hostile deployed days, officer servicemembers, by service

Appendix C. Percentage receiving HFP or CZTE

Figures 20 and 21 show by June snapshot the share of enlisted and officer in the active component receiving HFP or CZTE in the past 24 months.

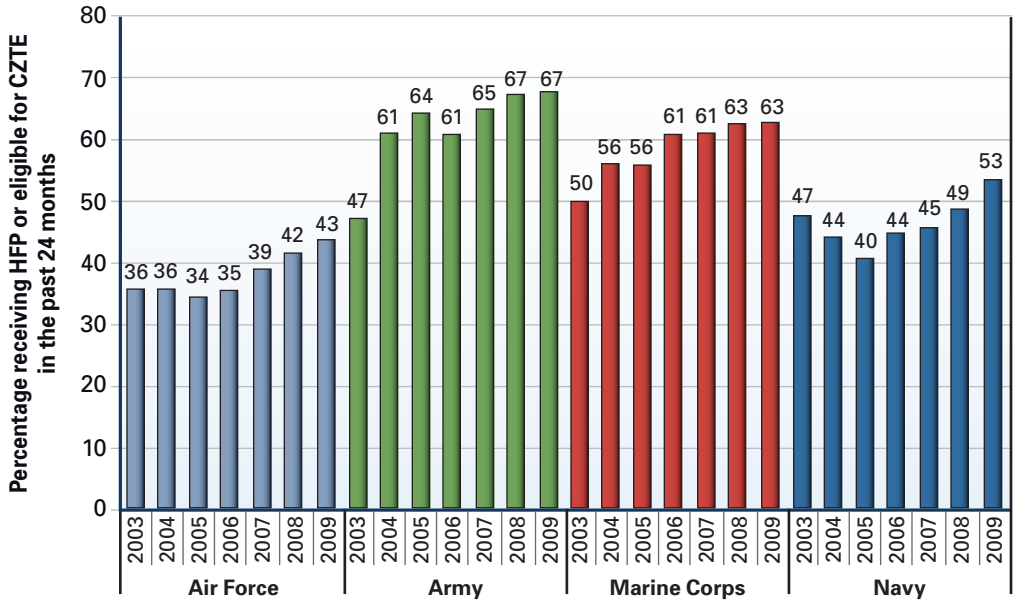


Figure 20. Percentage receiving HFP or CZTE, enlisted servicemembers, by service

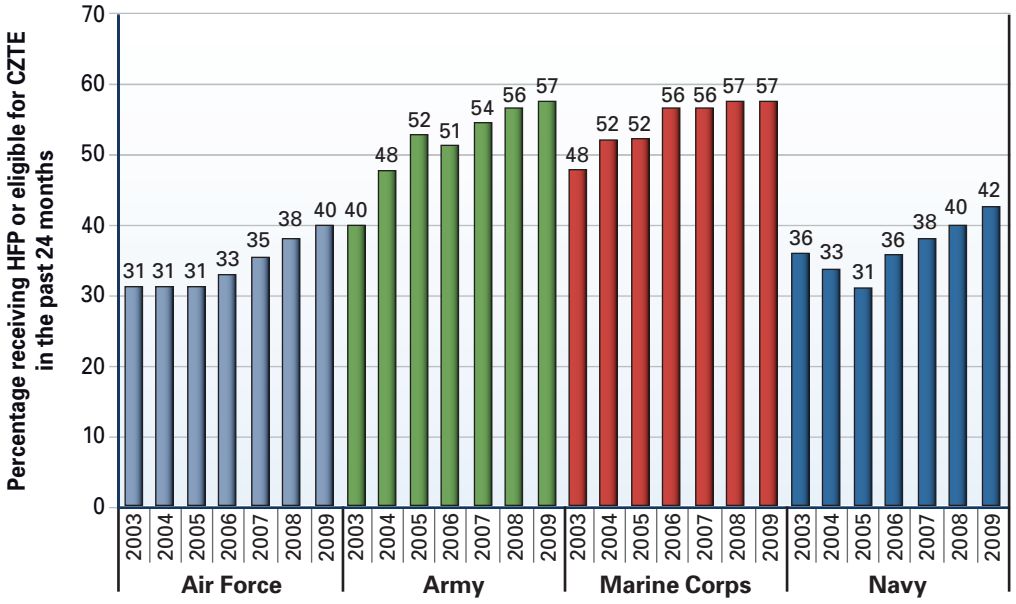


Figure 21. Percentage receiving HFP or CZTE, officer servicemembers, by service

Appendix D. Enlisted SELRES 12-month continuation rates by service component

Figures 22 through 24 are 2003–2009 June snapshots of enlisted SELRES 12-month continuation rates by receipt of HFP, broken out by service components.

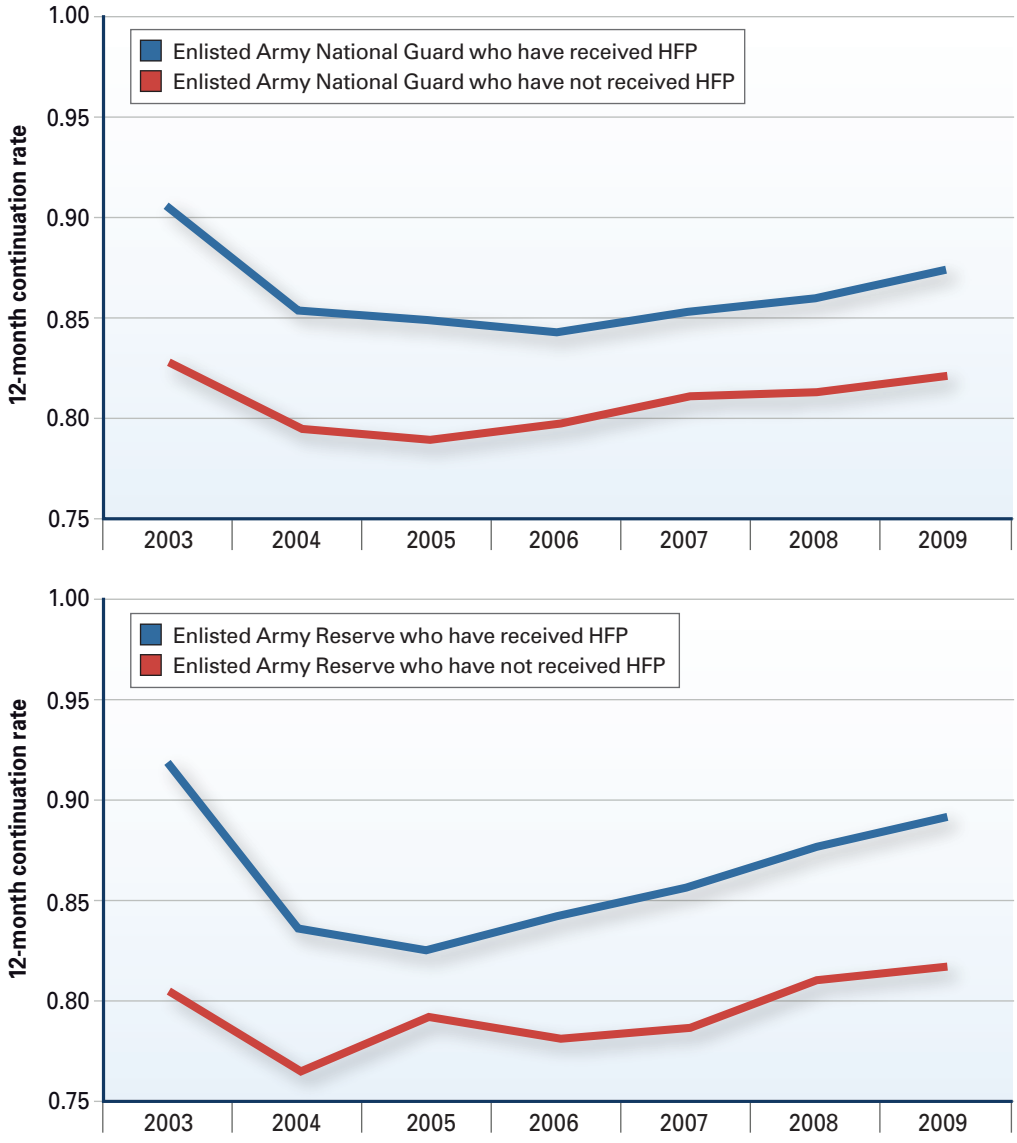


Figure 22. Enlisted Army National Guard and Army Reserve: 12-month continuation rates by receipt of HFP in past 24 months

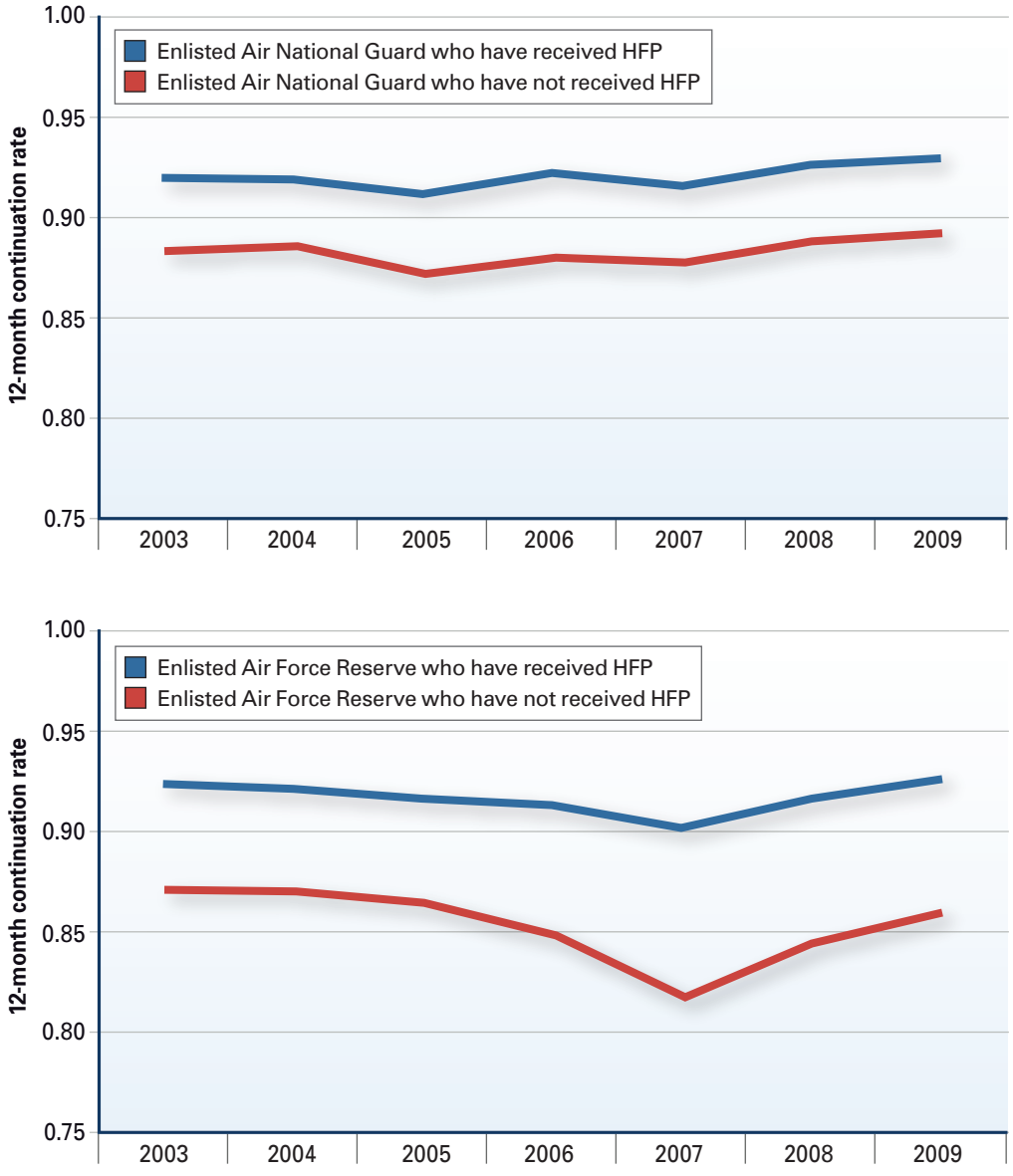


Figure 23. Enlisted Air National Guard and Air Force Reserve: 12-month continuation rates by receipt of HFP in past 24 months

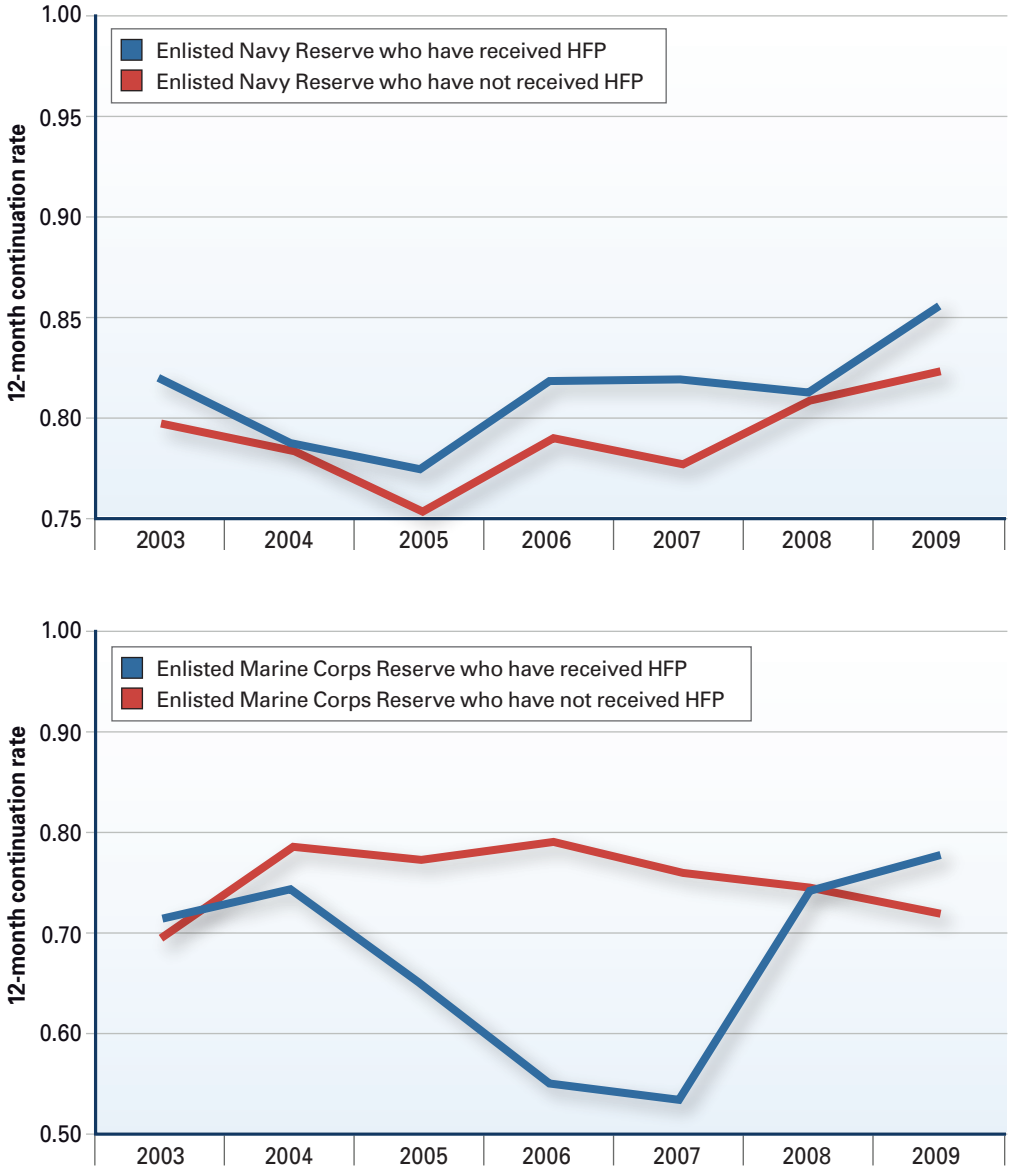


Figure 24. Enlisted Navy and Marine Corps Reserve: 12-month continuation rates by receipt of HFP in past 24 months

Figures 25 through 27 are June snapshots (2003 through 2009) of enlisted SELRES 12-month continuation rates by mobilization experience, broken out by service components.

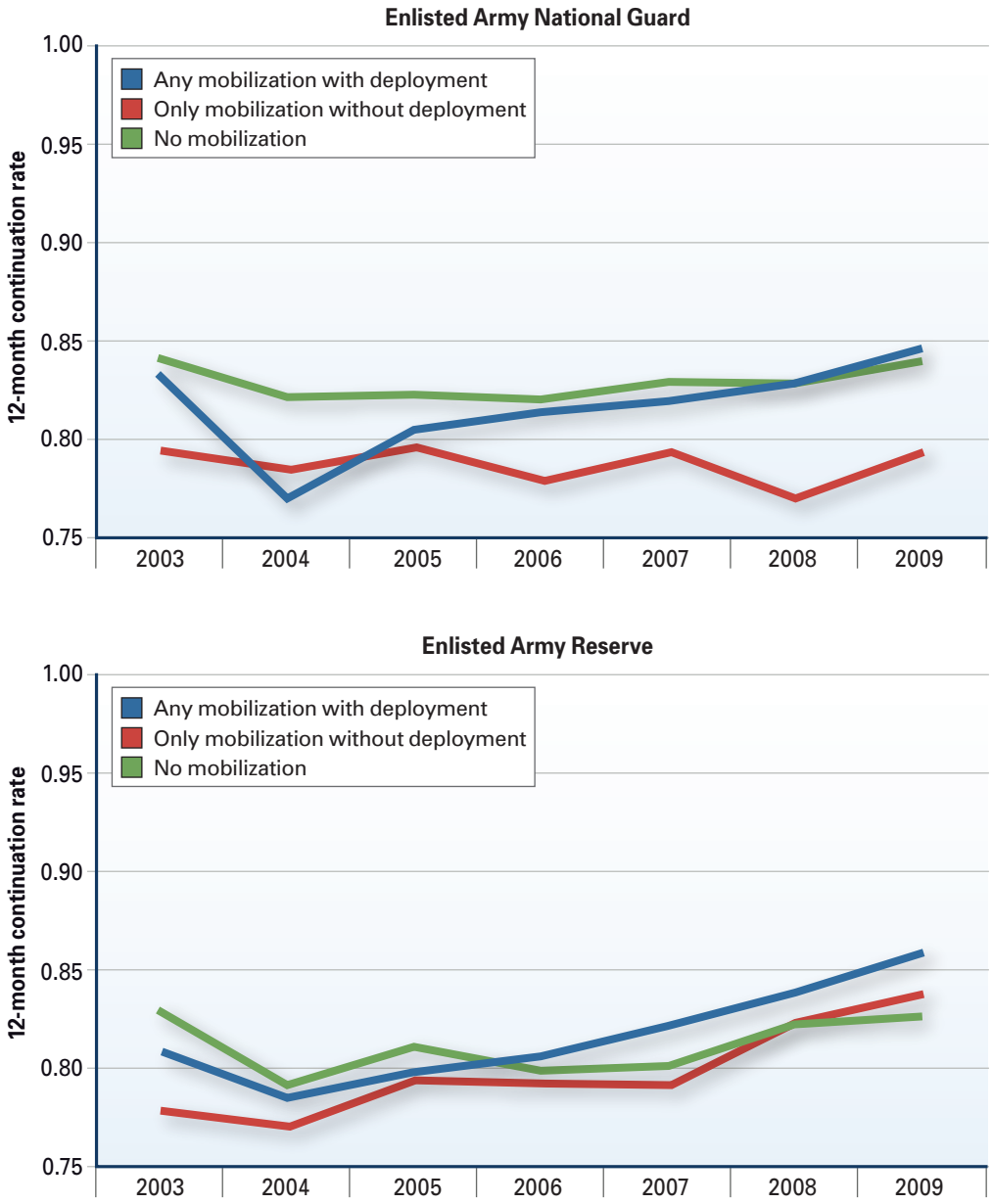


Figure 25. Enlisted Army National Guard and Army Reserve: 12-month continuation rates by mobilizations in past 24 months

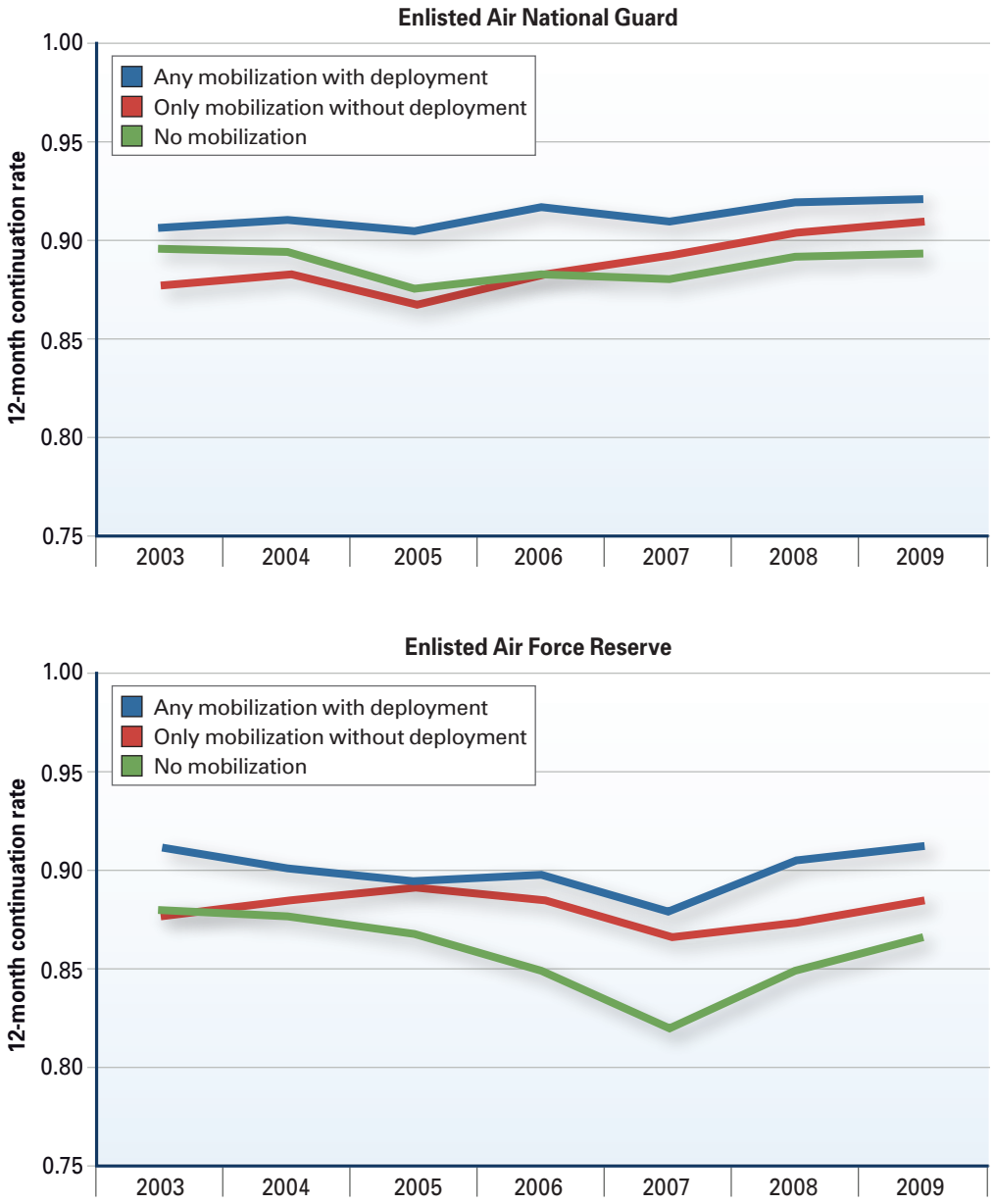


Figure 26. Enlisted Air National Guard and Air Force Reserve: 12-month continuation rates by mobilizations in past 24 months

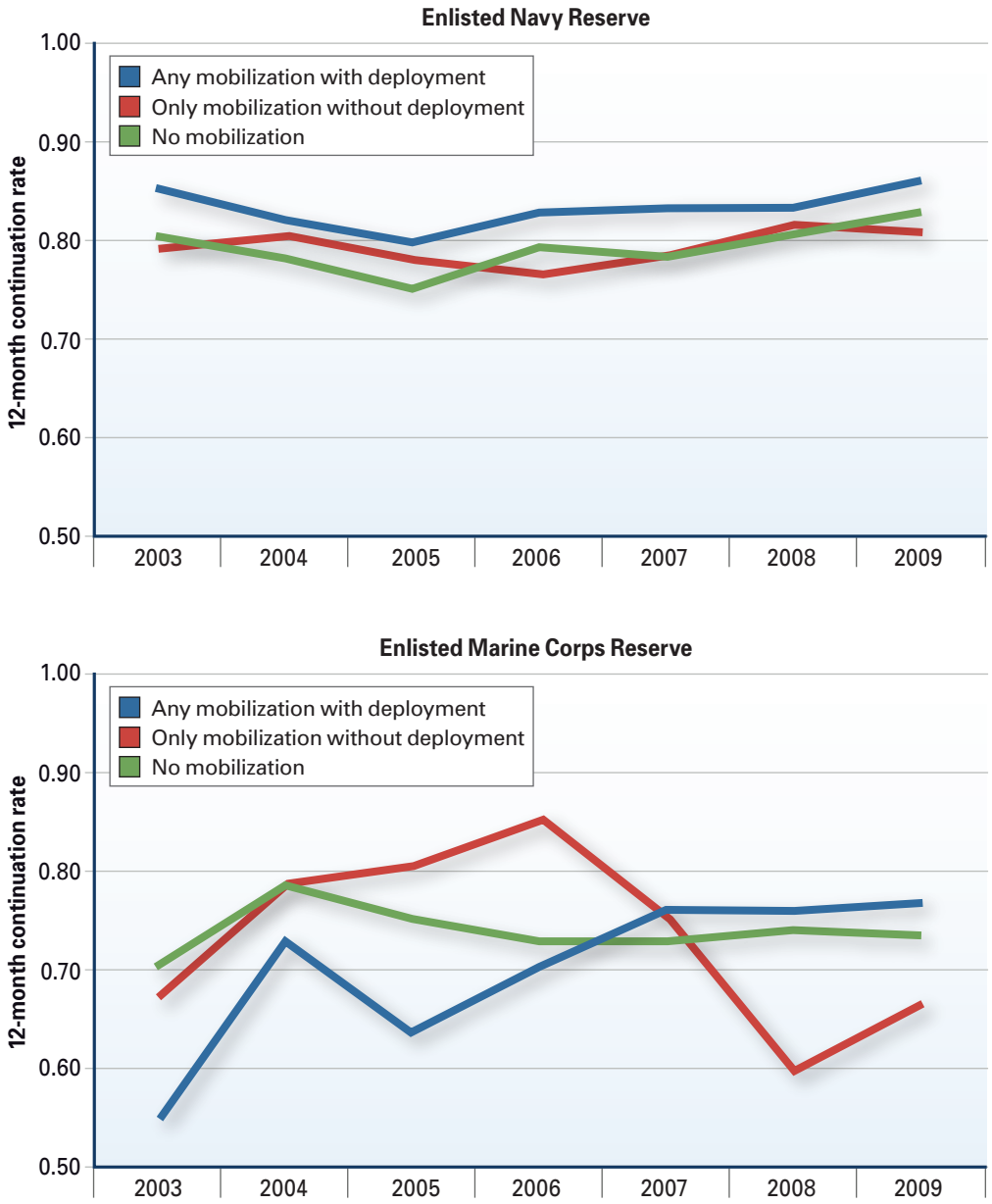


Figure 27. Enlisted Navy and Marine Corps Reserve: 12-month continuation rates by mobilizations in past 24 months

Appendix E. Officer SELRES 12-month continuation rates by service component

Figures 28 through 30 are June snapshots (2003 through 2009) of officer SELRES 12-month continuation rates by receipt of HFP, broken out by service components.

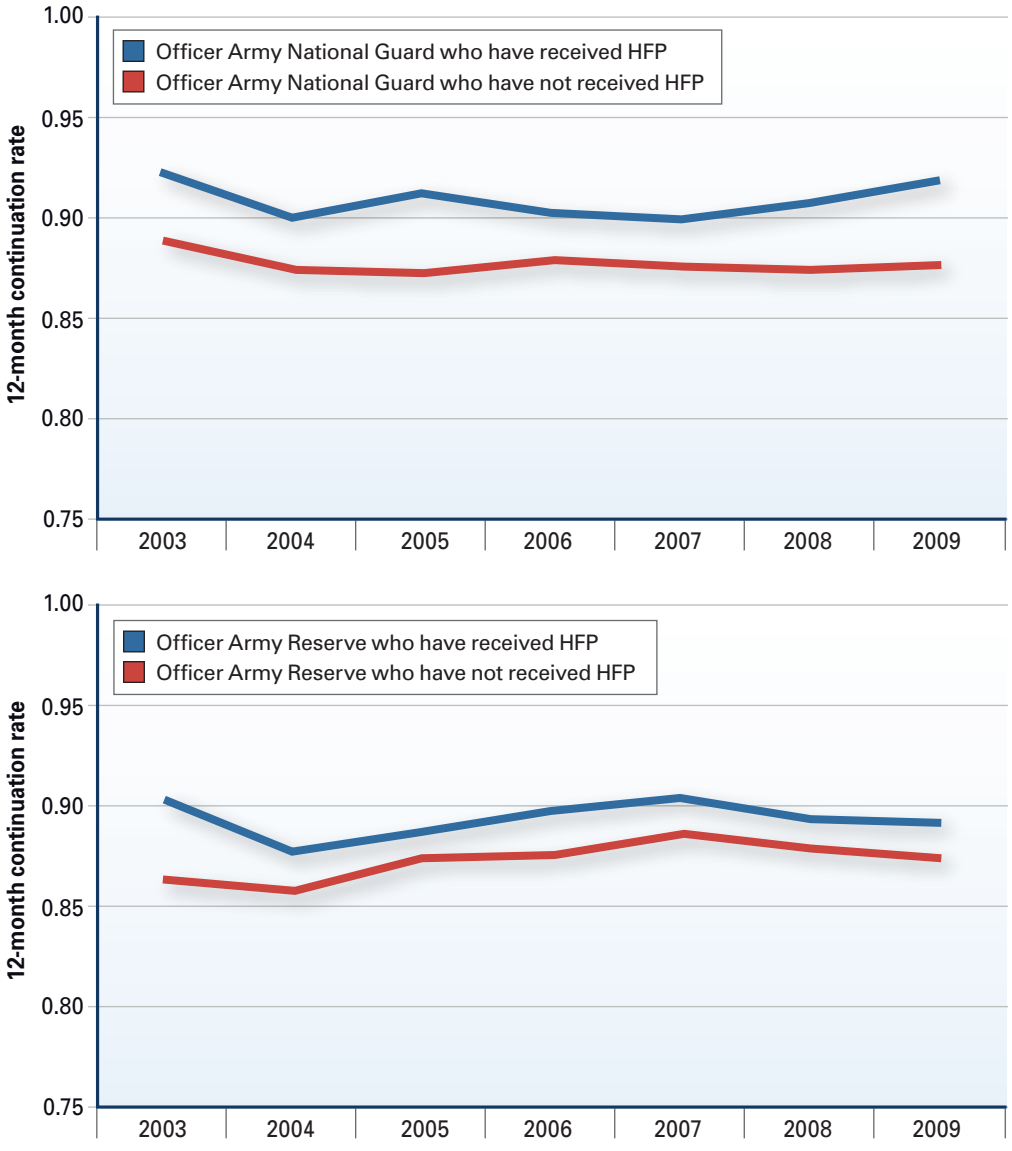


Figure 28. Officer Army National Guard and Army Reserve: 12-month continuation rates by receipt of HFP in past 24 months

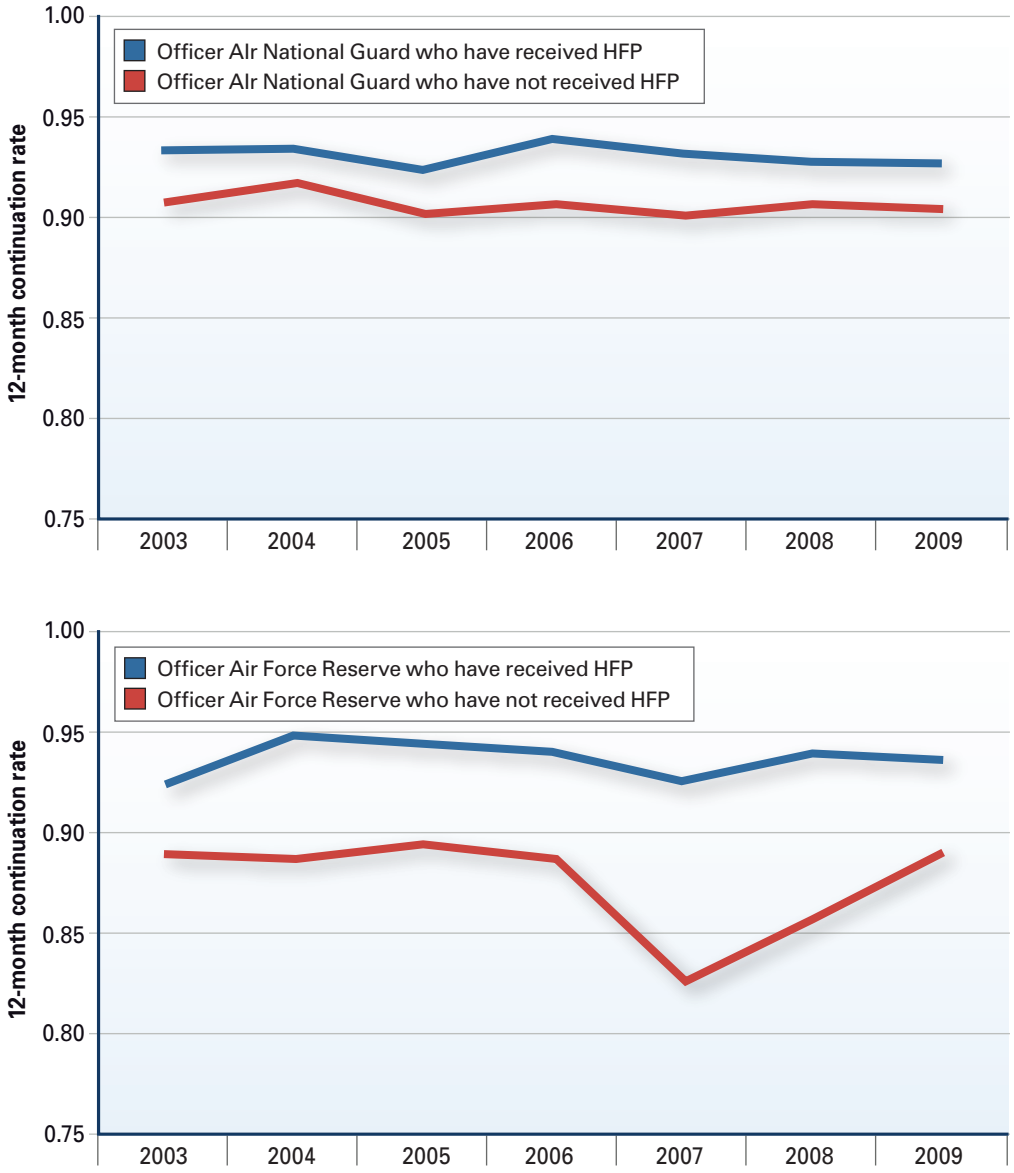


Figure 29. Officer Air National Guard and Air Force Reserve: 12-month continuation rates by receipt of HFP in past 24 months

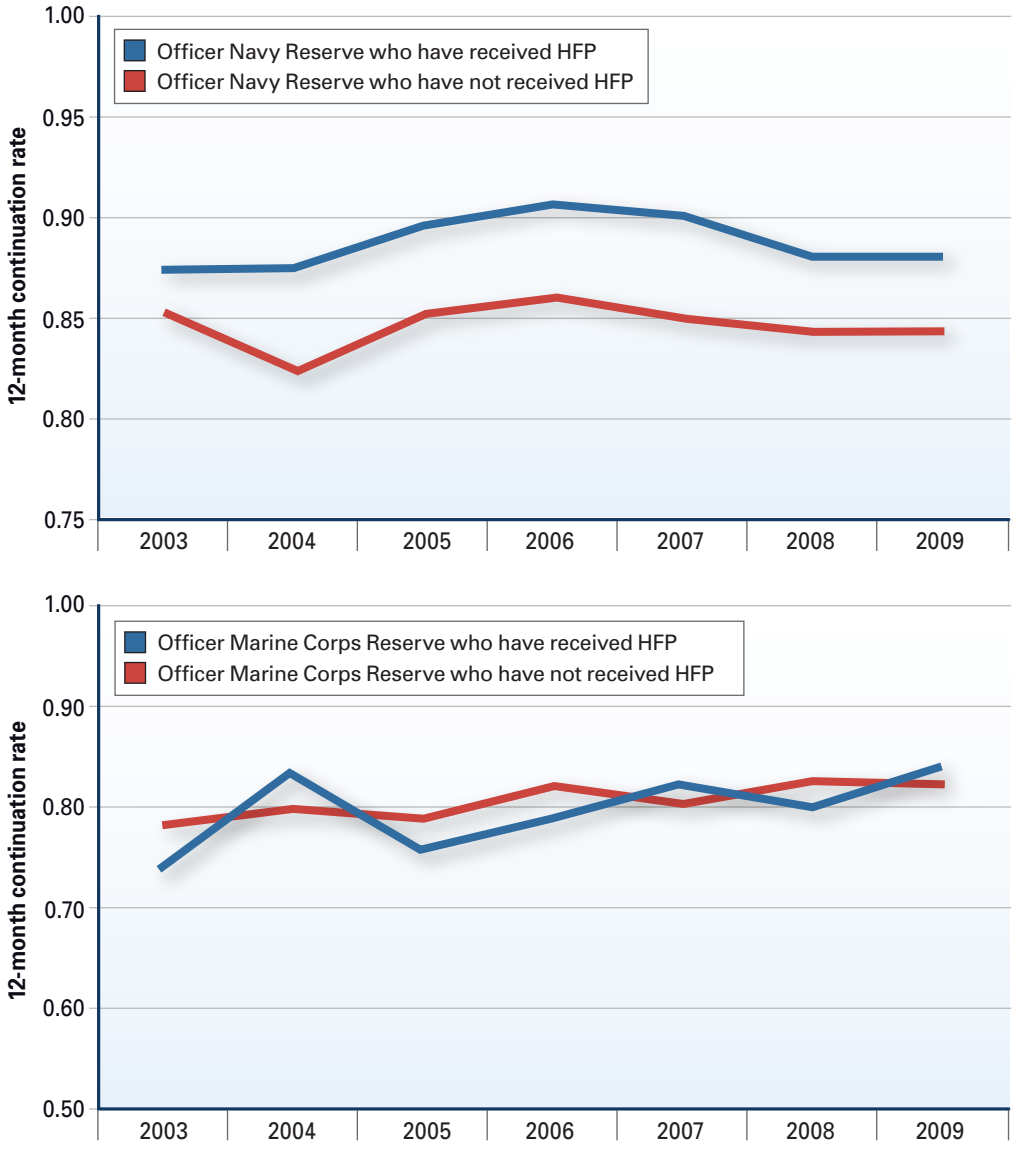


Figure 30. Officer Navy and Marine Corps Reserve: 12-month continuation rates by receipt of HFP in past 24 months

Figures 31 through 33 present June snapshots (2003 through 2009) of officer SELRES 12-month continuation rates by mobilization experience, broken out by service components.

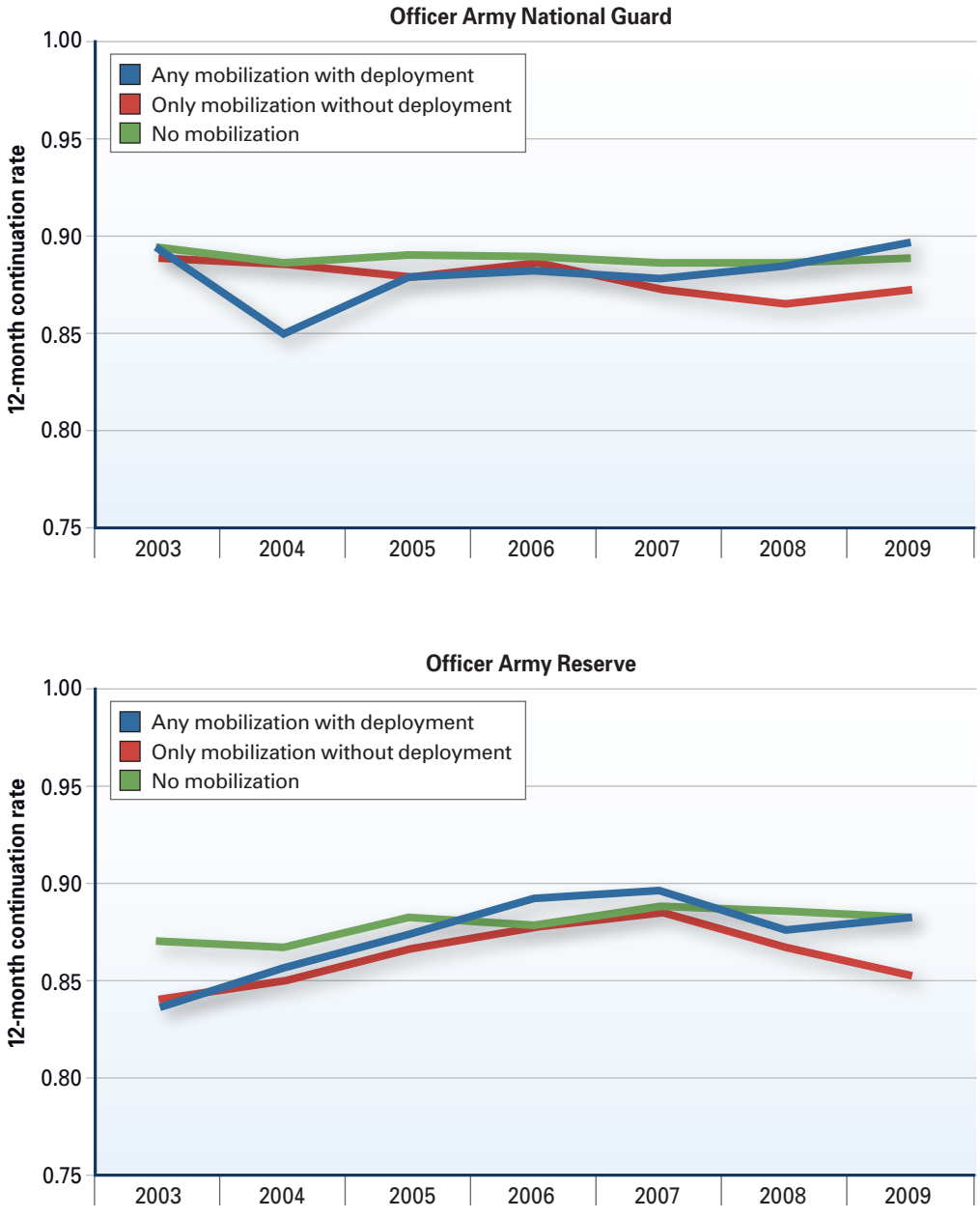


Figure 31. Officer Army National Guard and Army Reserve: 12-month continuation rates by mobilizations in past 24 months

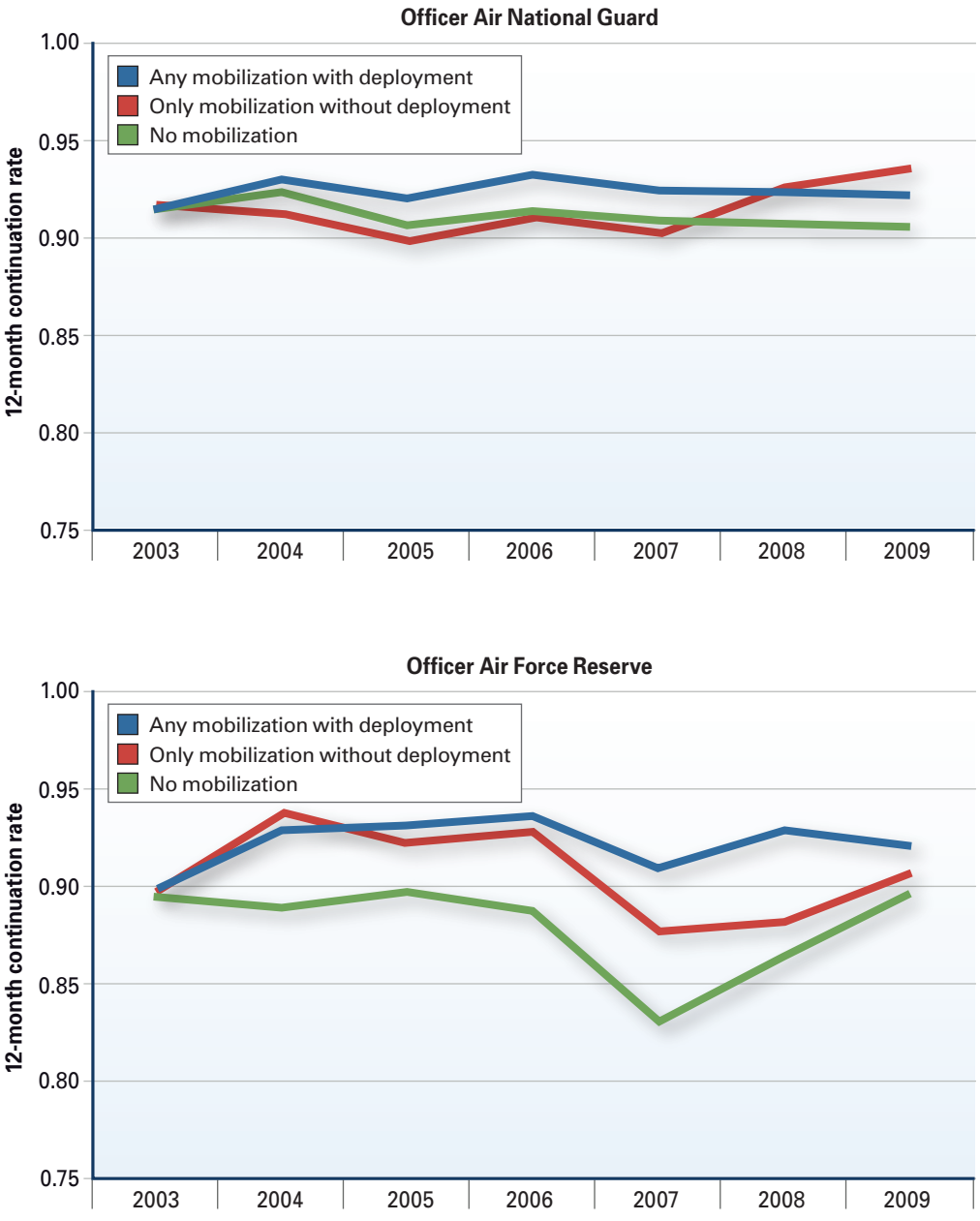


Figure 32. Officer Air National Guard and Air Force Reserve: 12-month continuation rates by mobilizations in past 24 months

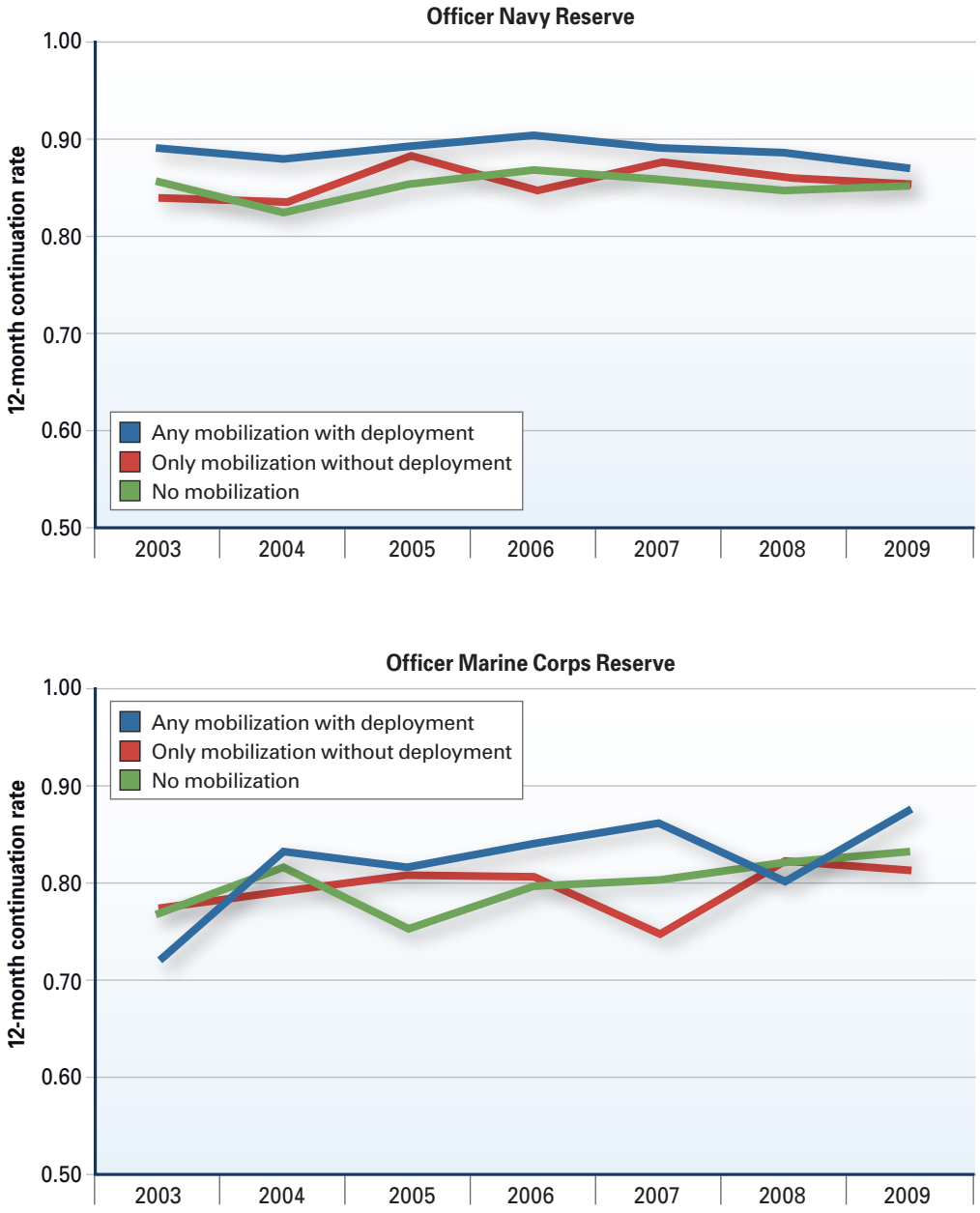


Figure 33. Officer Navy and Marine Corps Reserve: 12-month continuation rates by mobilizations in past 24 months

References

[1] Barack Obama. Memorandum for the Secretary of Defense, Subject: Eleventh Quadrennial Review of Military Compensation. Washington, DC: The White House, 11 Dec 2009

[2] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 10. "Special Pay—Duty Subject to Hostile Fire or Imminent Danger," May 2009

[3] James Hosek and Francisco Martorell. *How Have Deployments During the War on Terrorism Affected Reenlistment?* 2009 (RAND Publication MG-873-OSD)

[4] Secretary Robert Gates. SECDEF Memorandum, *Utilization of the Total Force*, 19 Jan 2007

[5] ALARACT 253/2007. *Individual Dwell Time (IDT) Deployment Policy*, Nov 2007

[6] General George W. Casey, Jr., Chief of Staff of the Army. Statement before the House Armed Services Committee, 2 Mar 2011

[7] MARADMIN Active Number 448/07 2007. *Post-deployment Mobilization Respite Absence (PDMRA)*, 27 Jul 2007

[8] General James F. Amos, Commandant of the Marine Corps. *2011 Report to Congress on the Posture of the United States Marine Corps*

[9] OPNAV Instruction 3000.13C from CNO. *Personnel Tempo of Operations Program*, 16 Jan 2007 <http://www.public.navy. mil/bupers-npc/support/ITEMPO/Pages/default.aspx>

[10] NAVADMIN 332/10. *Individual Augmentation Manpower Management (IAMM)*

[11] "The Air Force in Facts and Figures, 2011 USAF Almanac." *Air Force Magazine*, May 2011

[12] General John P. Jumper, Chief of Staff, U.S. Air Force. "Adapting the AEF—Longer Deployments, More Forces," Chief's Sight Picture, 4 Jun 2004 <http://www.au.af.mil/au/aul/img/ jumper_pdfs adapting_the_aef_longer_deployments_06 _2004.pdf>

[13] Jon Hanson, Air Force Personnel Center Public Affairs. "Air Force Officials Increase Deployment Times," updated 16 Sep 2010 <http://www.af.mil/news/story.asp?id=123221320>

[14] James T. Conway, Commandant United States Marine Corps. *United States Marine Corps Service Campaign Plan 2009–2015*. 3010 PP&O/PL. Dec 9, 2009

[15] Sgt. Darron Salzer. "Casey: Guard very different from 30 years ago." Mar 7, 2011. *Army.mil, the official homepage of the United States Army,* http://www.army.mil/article/52919/casey-guard.very-different-from-30-years-ago/

[16] NAVADMIN 235/08. *Navy Reserve Component Individual Augmentation (IA) Mobilization Business Rules*. Aug 2008

[17] "JA Perspective: The Air Force Lawyer in Athens, Greece" <http://www.afjag.af.mil/news/story.asp?id=123166634>

[18] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 44. "Withholding of Income Tax," Jul 2009

[19] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 17. "Special Pay—Hardship Duty," Dec 2010

[20] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 47. "Servicemembers' Group Life Insurance (SGLI) Program," Dec 2010

[21] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 51. "Savings Programs," Dec 2010

[22] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 15. "Special Pay—Assignment Incentive Pay," Nov 2010

[23] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 24. "Incentive Pay—Hazardous Duty Other Than Aerial Flights," Feb 2009

[24] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 27. "Family Separation Allowance (FSA)," Jun 2009

[25] Lynn C. Simpson, Chief of Staff, performing the duties of the Principal Deputy Under Secretary of Defense (Personnel and Readiness). "Hardship Duty Pay Location (HDP-L) for Certain Japan Locations," 1 Apr 2011 (DoD memo)

[26] DoD Financial Management Regulation, Summary of Major Changes to DoD 7000.14-R, Vol. 7A, Ch. 15. "Special Pay—Assignment Incentive Pay," May 2011

[27] James Hosek, Jennifer Kavanagh, and Laura Miller. *How Deployments Affect Servicemembers*, 2006 (RAND Publication MG-432-RC)

[28] Aline Quester et al. *Black and Hispanic Marines: Their Accession, Representation, Success, and Retention in the Corps*, Sep 2007 (CNA Research Memorandum D0016910.A1)

[29] Michael Hansen and Jennie Wenger. "Is the Pay Responsiveness of Enlisted Personnel Decreasing?" *Defence and Peace Economics*, Vol. 16, Issue 1, 2005: 29-43

[30] James Hosek and Mark Totten. *Serving Away From Home: How Deployments Influence Reenlistment*, 2002 (RAND Publication MR-1594-OSD)

[31] James Hosek. "Deployment, Retention, and Compensation." Testimony presented to the House Armed Service Committee, Subcommittee on Total Forces on 24 Mar 2004

[32] Diana S. Lien and David Gregory. *Deployment Tempo and Reenlistment Within the EOD Community*, May 2009 (CNA Annotated Briefing D0020519.A1)

[33] Diana S. Lien et al. *Marine Corps Deployment Tempo and Retention From FY04 Through FY07*, Oct 2008 (CNA Research Memorandum D0018757)

[34] James Hosek (ed.). *How Is Deployment to Iraq and Afghanistan Affecting U.S. Service Members and Their Families? An Overview of Early RAND Research on the Topic*, 2011 (RAND Publication OP-316)

[35] Neil B. Carey et al. *OPTEMPO and Retention Study: Statistical Analysis and Insights From Marines the Corps Wants To Keep*, May 2010 (CNA Annotated Briefing D0021852.A2/Final)

[36] Paul Hogan et al. *The Relationship Between Enlisted Deployment and Retention*, Aug 2009 (United States Army Research Institute for the Behavioral and Social Sciences, Study Note 2009-05)

[37] Pete Kostiuk and James Grogan. *Enlistment Supply Into the Naval Reserve*, 1987 (CNA Research Memorandum 87-239)

[38] M. Susan Marquis and Sheila Nataraj Kirby. *Reserve Accessions Among Individuals With Prior Military Service: Supply and Skill Match*, 1989 (RAND Corporation, R-3892-RA)

[39] Hong Tan. *Non-Prior Service Reserve Enlistments: Supply Estimates and Forecasts*, 1991 (RAND Corporation, R-3786-FMP/RA)

[40] Diana S. Lien, David Gregory, and Michael L. Hansen. *The Effect of Enlistment and Reenlistment Bonuses on Participation in the Navy Selected Reserve*, Apr 2006 (CNA Research Memorandum D0013385)

[41] Stephen S. Fugita and Hyder Lakhani. *The Economic and Non-economic Determinants of Retention in the Reserve/Guard Units*, Apr 1991 (U.S. Army Research Institute for the Behavioral and Social Sciences, Research Report 1585)

[42] Laura W. Castaneda and Margaret C. Harrell. "Understanding the Deployment Experiences of Reserve Component Families." In John D. Winkler and Barbara A. Bicksler (eds.), *The New Guard and Reserve*. San Ramon, CA: Falcon Books, 2008

[43] Erich W. Randall. "Military Leadership: The Effect of Leader Behavior on Soldier Retention in the Army National Guard." Ph.D dissertation, Cappella University, Jun 2006

[44] David S. Loughran and Jacob Alex Klerman. "The Effect of Activation on Reenlistment Earnings." In John D. Winkler and Barbara A. Bicksler (eds.), *The New Guard and Reserve*. San Ramon, CA: Falcon Books: 2008

[45] Michelle A. Dolfini-Reed et al. *Determining Patterns of Reserve Attrition Since September 11, 2001*, Jun 2005 (CNA Annotated Briefing D0011483.A2)

[46] Michelle A. Dolfini-Reed et al. *Patterns of Reserve Officer Attrition Since September 11, 2001*, Oct 2005 (CNA Annotated Briefing D0012851)

[47] Michelle A. Dolfini-Reed and Cathleen M. McHugh. *The Effect of Deployment Tempo on Marine Corps Selected Reserve Retention*, Jul 2007 (CNA Research Memorandum D0015788)

[48] Colin Doyle. "The Effect of Activation Policies on Accession and Continuation in the Army Reserve Components." In John D. Winkler and Barbara A. Bicksler (eds.), *The New Guard and Reserve*. San Ramon, CA: Falcon Books: 2008

[49] Defense Manpower Data Center. CTS Information Paper, Jun 2008

[50] Alexander O. Gallo et al. *Risk and Combat Compensation*, forthcoming (Institute for Defense Analyses P-4747)

[51] Anita U. Hattiangadi et al. *SelRes Attrition and the Selected Reserve Incentive Program in the Marine Corps Reserve*, Mar 2006 (CNA Research Memorandum D0013618)

Chapter 9

Risk and Combat Compensation

Saul Pleeter
Alexander O. Gallo
Brandon R. Gould
Maggie X. Li
Shirley H. Liu
Curtis J. Simon
Carl F. Witschonke
Stanley A. Horowitz

Executive Summary

The Eleventh Quadrennial Review of Military Compensation (11th QRMC) was chartered to review four areas of the military compensation system. The QRMC asked the Institute for Defense Analyses (IDA) to focus on combat compensation and, specifically, to:

- Document differences in combat-related compensation by pay grade and marital status
- Identify factors that could be used to distinguish the level of risk to which members are exposed
- Trace the development of the central features of U.S. policy on provision of combat (or imminent danger) pays

Combat compensation is an important element in the remuneration of military personnel. The principal justification for combat compensation is to recognize military personnel who face significant combat risk. In the past, there was a direct relationship between the risk faced by military personnel and the combat compensation they received. For example, Badge Pay was initially only awarded to front-line units in World War II. That relationship has eroded over time through numerous actions taken since WWII to broaden coverage. Today some members who are in declared combat zones are subject to little risk and receive all elements of combat compensation; others who are in hostile situations but not in combat zones do not

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

fully receive combat compensation. Examining casualty rates, both killed-in-action and wounded-in-action, we find many areas in designated combat zones give rise to very little risk (e.g., Saudi Arabia and United Arab Emirates, as well as ships in the combat zone)—more than half of the countries in combat zones have zero casualty rates. Surveys show that military members recognize their combat-zone deployments are often not dangerous.

Eligibility for combat compensation is determined by the designation and management of combat zones. Military members deployed to areas of combat or to combat support operations receive hostile fire pay/imminent danger pay (HFP/IDP) and the combat zone tax exclusion (CZTE). HFP/IDP provides $225 for any month or part of a month the member is deployed to a combat zone or to a designated imminent danger area. In a designated combat zone, all pays and bonuses received by an enlisted member or warrant officer are excluded from the calculation of federal and state income taxes. Officers, in 2011, can exclude up to $7,714.80 per month from their tax returns. HFP/IDP cost the Department of Defense $789 million in 2009 while the cost to the Treasury for CZTE was $3.6 billion—approximately 4.5 times the cost of HFP/IDP.

While all military members, regardless of rank, deployed to a combat zone receive the same amount of HFP/IDP, there is considerable variation in the value of the CZTE. The tax exclusion lowers the individual's income tax obligations and creates eligibility for various tax credits and deductions; therefore, depending upon an individual's circumstances—marital status, filing status, family size, medical deductions, etc.—the value of the CZTE is quite variable. IDA was able to collaborate with the Department of the Treasury to determine, for the first time, the value of the CZTE to the individual service member. In 2009, the average value of the CZTE was $5,990, with the value at the first percentile at $280 and the 99th percentile at $22,430—almost 100 times the value at the lower end. More than half of those deployed to a combat zone received at least $4,660 in federal tax savings and benefits. One unexpected aspect of CZTE-related compensation is that senior officers qualify for the Earned Income Credit (EIC), established to help low-wage earners. The O-6, whose total compensation is about five times that of the E-4, can receive more in EIC than an E-4 stationed in the United States. Over 2,000 officers of rank O-4 and above receive the EIC (sometimes called the Earned Income Tax Credit).

We find virtually no correlation across countries within combat zones between casualty rates and average combat compensation. Countries with zero casualty rates tend to have the highest average benefit primarily because of their pay grade structure. Furthermore, junior enlisted personnel (along with junior officers) have the highest incidence of death and injury, but, on average, benefit the least from the CZTE.

The divergence between the risks that military members face when deployed and the associated compensation can be brought into better alignment in a number of ways. The designation of combat zones is difficult to initiate and even more difficult to terminate. As a result, combat zones include areas where there is no combat, as well as areas in which there is no threat of hostilities. Better management of combat zones could eliminate combat compensation from being paid to areas in which there is no risk or threat of danger. As a result, compensation could be limited to members actually exposed to danger.

CZTE benefits, the major component of combat compensation, depend to a large extent upon individual circumstance and the vagaries of the tax code, which are totally unrelated to risk. Because of its complexity, it is not likely that members know the actual amount of benefit, nor can they compare these rewards with the risks of combat. CZTE benefits could be made more uniform by substituting a refundable income tax credit for the present system of income exclusion.

A major part of the current CZTE benefit is eligibility for the EIC—a program designed to assist low-wage households. Income exclusion allows field-grade officers and senior enlisted personnel—in some cases officers with basic pay and allowances in excess of $150,000 per year—to be eligible for this program. Basing EIC eligibility on all income, including that excluded for tax purposes by the CZTE, would restrict EIC payments to those households that qualify within the original intent of the program.

The stated philosophy of the Department of Defense (DoD) is for compensation to increase with increased danger or risk. This goal cannot be achieved within the current structure of CZTE. A closer relationship than current practice between risk and compensation could be attained in a variety of ways. For example, the CZTE could be eliminated in favor of a tiered, refundable tax credit available to those in designated areas. Another possibility would be for DoD to adopt a "true" combat pay for members actually in a combat environment. This combat pay could be a supplement to other kinds of combat compensation or a substitute.

1. Introduction

"I didn't deserve my combat pay," is the title of an Op-Ed piece in the Washington Post of March 18, 2011. Michael G. Cummings, the author, described the conditions surrounding his recent deployment to Iraq as being safe and the living conditions as plush. Captain Cummings wrote:[1]

1. Captain Cummings was an Army intelligence officer with multiple deployments to combat zones.

> I don't tell people I deployed to Baghdad. I say that I deployed to Victory Base Complex (VBC)—the largest, most luxurious base wartime soldiers have ever had the pleasure of visiting. I never set foot in Baghdad proper. The only gunshots I heard were from our shooting range. I never fired a weapon or rode in a convoy or on a helicopter. The only improvised explosive devices I saw were in pictures.
>
> On our compound, the water was always warm (sometimes too warm). The chow hall had a Caesar salad bar, a sandwich bar, an ice cream freezer, and shrimp and steak Fridays. My (personal) room had a working AC [air conditioning] unit and Internet connection. VBC hosted multiple PXs [Post Exchanges], coffee shops and nightly dance parties. I could buy pillows, microwaves, televisions or any video game.

Captain Cummings's comments largely focused on the merits of providing combat compensation for conditions that are not dangerous. As he wrote, "I absolutely do not mean to disparage troops who deploy but don't see combat. Yet our country needs to recognize and reward the sacrifices of those who really do fight on the front lines." Mr. Cummings's article provides a useful context for the QRMC's assessment of combat compensation.

Individuals who join the military should expect that sometime in their career they will see combat. While patriotism is a powerful motivator for joining and potentially placing one's self in harm's way, the nation has chosen to supplement patriotism by a compensation system in order for the military to recruit, retain, motivate, and secure a sufficient number and quality of service members.

The compensation system must establish a basic structure that makes a military career an economically viable alternative to private sector careers. Because there is no conscription, the military career must be chosen voluntarily. Throughout the individual's tenure in the military, compensation must remain sufficiently attractive relative to the private sector so that the Services are able to retain those individuals who are the most motivated and productive. The system must be structured to encourage meritorious performance and advancement to higher responsibilities through promotions.

While the system must be adequate to attract and retain personnel in the face of some generally expected level of risk, additional compensation may be warranted for those in especially risky situations. Aside from strictly economic considerations, it may be desirable to reward high risk service to improve morale or simply to recognize the importance of dangerous service in combat. Linking reward to risk is the principal justification for combat compensation.

It is this relationship that is the subject of this paper. Section 2 of the paper describes the elements of combat compensation, including their relative magnitude and cost. After a short theoretical discussion of risk and return in labor markets in Section 3, we provide data on the magnitude of and variation in combat-related benefits. Section 4 examines the relationship between compensation and risk. Eligibility for combat compensation is determined by the designation and management of combat zones, which is described in Section 5. We then focus further, in Section 6, on the reasons for variation in the level of benefits among those who receive combat compensation. Section 7 provides recommendations for modifying combat compensation and administering combat zones to ensure a closer relationship between combat compensation and risk.

2. Elements of Combat Compensation

Military members, when deployed to a combat zone, receive additional compensation and additional benefits. The two elements of compensation that are exclusive to combat and combat support operations are Hostile Fire Pay/Imminent Danger Pay (HFP/IDP) and the Combat Zone Tax Exclusion (CZTE).

A. Eligibility for Combat Compensation

HFP/IDP is paid in designated imminent danger areas according to criteria established by 37 U.S.C. §310, in which a member:

> (A) was subject to hostile fire or explosion of hostile mines;
>
> (B) was on duty in an area in which the member was in imminent danger of being exposed to hostile fire or explosion of hostile mines and in which, during the period the member was on duty in the area, other members of the uniformed services were subject to hostile fire or explosion of hostile mines;
>
> (C) was killed, injured, or wounded by hostile fire, explosion of a hostile mine, or any other hostile action; or
>
> (D) was on duty in a foreign area in which the member was subject to the threat of physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions.

Hostile Fire Pay (HFP) and Imminent Danger Pay (IDP) are both provided for in 37 U.S.C. §310, but in theory, they should be separate pays for separate purposes. HFP is an event-based pay; that is, it is applicable "when bullets are flying." IDP, on

the other hand, is a threat-based pay; it is applicable when there is a danger of hostilities breaking out.[2]

The Under Secretary of Defense for Personnel and Readiness USD (P&R) is responsible for designating which foreign areas contain members who are in imminent danger due to civil war, civil insurrection, terrorism, or wartime conditions. These designations are made based on recommendations from the Joint Staff (in coordination with the Services). Currently, locations in over 45 countries and 7 sea areas are designated for IDP. HFP/IDP is currently $225 per month or any part of a month for which the member is deployed to an IDP area. All members, regardless of rank or dependency status, receive the same amount.

The CZTE benefit relieves military members from paying federal income tax on pay received while in a designated combat zone.[3] All military pay and bonuses earned by enlisted and warrant officers can be excluded; the exclusion for officers is capped at the basic pay of the Senior Enlisted Advisor (SEA) plus the $225 per month received in HFP/IDP, equal in 2011 to $7,714.80 per month. Almost all states allow a similar exclusion on state income taxes. Members are still required to pay Federal Insurance Contributions Act (FICA) taxes on total earnings, including the income excluded for federal income tax purposes. The benefit to members is not easily quantified, since it depends upon the individual member's marginal tax bracket plus the impact on a variety of federal and state programs governed by adjusted gross income or net taxable income—e.g., the Earned Income Credit (EIC) and college tuition.[4]

Table 1 shows total expenditure by the Department of Defense (DoD) on HFP/IDP for the years 2003–2009. Also shown in the table is the total cost to the U.S. Treasury in lost income tax collections because of the CZTE for the years 2005–2009. In 2009, the total cost of HFP/IDP was $790 million—the equivalent of 292,000 man-years.[5] About 85 percent of HFP/IDP goes to enlisted personnel. Approximately 640,000 military members received at least one month of HFP/IDP in the 2009 fiscal year.

The revenue foregone by the federal government due to CZTE amounted to $3.6 billion in 2009, approximately 4.5 times as much as the cost of HFP/IDP. The average benefit was approximately $6,000.

2. 37 U.S.C. §351 proposes to separate these pays: 351(a)(1) would relate to hostile fire areas and hostile fire events; 351(a)(2) relates to hazardous duty incentive pay; and 351(a)(3) would apply to designated IDP areas.
3. See Appendix A for a list of current combat zones.
4. Financial aid and, therefore, college tuition at both state and private institutions is often based upon adjusted gross income. CZTE lowers adjusted gross income and presumably results in tuition reductions via financial aid.
5. Since deployment lengths vary and most often carry over two years, the number of members who receive at least one month of IDP in a given year will be much greater than 292,438.

Table 1. Hostile Fire Pay/Imminent Danger Pay (HFP/IDP) 2003–2009

Calendar Year	Total Personnel	Cost $M	Total Officers	Cost $M	Total Enlisted	Cost $M	Total CZTE Benefits ($M)
2003	322,681	871	43,147	116	279,534	754,742	n/a[a]
2004	198,534	536	35,161	95	163,373	441,107	n/a
2005	277,106	748	47,216	127	229,890	620,703	3,200
2006	257,687	696	36,891	100	220,796	596,138	3,200
2007	263,209	711	34,808	94	228,401	616,682	3,800
2008	291,469	787	41,740	113	249,729	674,270	3,800
2009	292,438	790	44,250	119	248,188	670,107	3,600

Sources: Department of Defense, Directorate of Military Compensation, Military Compensation Background Papers, 7th edition, forthcoming; and Department of the Treasury, Office of Tax Analysis, April 15, 2011.

a. Information on the cost to the Treasury was not available for 2003 and 2004.

B. Related Elements of Compensation

While the focus of this paper is on assessing the HFP/IDP and CZTE, there are a number of other elements of compensation that are keyed to operational deployments. These elements, defined below, comprise a relatively small fraction of combat-related compensation and are not assessed.

Another benefit received as combat compensation is the payment of Servicemembers' Group Life Insurance (SGLI) premiums for the duration of the member's deployment to a combat zone. Premiums amount to $.065 per $1,000 of life insurance or $26 per month for the maximum coverage of $400,000 plus $1 per month for the SGLI Traumatic Injury Protection Program (T-SGLI).

Other combat zone benefits include programs such as student loan repayment, income replacement for Reservists, savings program, and the Marine GYSGT John David Fry Scholarship[6]—to name a few—that are neither automatically distributed to members, nor very widespread in terms of the number of members receiving them.

Servicemembers deployed to a combat zone receive other pays and allowances not received by their counterparts stationed within the United States. Such compensation includes family separation allowance, hardship duty pay, and incidental expense allowance, none of which is considered combat compensation because servicemembers may also receive them in non-combat situations. Table 2 contrasts the pays and allowances received by an E-6 and an O-3 in Iraq with the compensation they would receive in a continental U.S. (CONUS) location. Compensation for the E-6 was more than 20 percent higher in the combat zone, more than half of which derived

6. Marine GYSGT John David Fry Scholarship is a GI Bill benefit paid to surviving dependent children. It is mentioned below as an ex-post compensation item.

from the CZTE. The benefit for the O-3, with fewer children and years of service (YoS), was $1,575, or 22 percent of CONUS compensation. Almost 60 percent of the $1,575 in additional compensation was attributable to CZTE.[7]

Military members serving in a combat zone are also eligible for a number of supplementary benefits as listed in Table 3.

Table 2. Military Compensation (Monthly)

	E-6, 10 YoS, married, 2 children		O-3, 8 YoS, married, 1 child	
	CONUS	Iraq (1 yr TDY)	CONUS	Iraq (1 yr TDY)
Basic Pay (BP)[a]	$3,192	$3,192	$5,449	$5,449
Basic Allowance for Housing (BAH)[b]	$1,526	$1,526	$1,759	$1,759
Basic Allowance for Subsistence (BAS)	$325	$325	$224	$224
Family Separation Allowance (FSA)	n/a	$250	n/a	$250
Temporary Duty (TDY)– Per Diem (Incidental Expense)[c]	n/a	$105	n/a	$105
Hardship Duty Pay–Location (HDP-L)[d]	n/a	$100	n/a	$100
Imminent Danger Pay (IDP)	n/a	$225	n/a	$225
Combat Zone Tax Exclusion (CZTE)[e]	n/a	$588	n/a	$895
Total	**$5,043**	**$6,311**	**$7,432**	**$9,007**
Difference (from CONUS Station)		$1,268		$1,575

Sources: Department of Defense, Directorate of Military Compensation, Selected Military Compensation Tables, January 2011; and Department of the Treasury, Office of Tax Analysis, April 15, 2011.

Notes:

a. From 1 Jan 11 pay table.

b. Assumes average BAH for all E-6s and O-3s, respectively, with dependents. Actual BAH rate would be determined based on geographical location.

c. Members on TDY who are provided meals and quarters receive the portion of per diem for "incidentals and expenses," which is $3.50/day ($105/mo) OCONUS.

d. DoD policy caps HDP-L at $150/mo., except in IDP areas, where it is capped at $100/mo. (The intent of this policy is to prevent dual payment for personal security issues.)

e. Amount of CZTE benefit varies by person (based on number of dependents, spousal income, length of deployment). Data is 2009 (latest available data) average per year/12.

7. See Appendix B for combat compensation in selected countries.

Table 3. Combat Zone Supplementary Benefit Programs

Program	Current Level
Death Gratuity	$100K
SGLI	$400K
T-SGLI	Up to $100K
Dependency & Indemnity Compensation (DIC)	Varies by grade/# of dependents
Survivor Benefit Plan (SBP)*	Varies by grade/# of dependents
Other:	
Social Security	
Basic Allowance for Housing (BAH)	Up to one year
Commissary & Exchange	
Federal Income Tax Forgiveness	
Post 9/11 Government Issue (GI) Bill	

Source: 2010 Uniformed Services Almanac, Debra M .Gordon, Dana L. Smith, and Sol Gordon, editors.

*or Reserve Component Survivor Benefit Plan.

The Death Gratuity, SGLI, T-SGLI, Dependency and Indemnity Compensation (DIC), and Survivor Benefit Plan (SBP) can be thought of as elements of insurance—ex-post compensation that would accrue to the survivors in the event of a death and/or the member in case of a traumatic injury. Other death benefits include the Social Security death benefit of $255 per month, payments to surviving spouse and children, and housing benefits equal to one year of the Basic Allowance for Housing (BAH) or housing on-base. Additional benefits are continued commissary and exchange privileges, forgiveness of federal income taxes in the year of the member's death, and eligibility for the Marine GYSGT John David Fry Scholarship. Reservists are eligible for a similar set of benefits.

Critical to achieving manpower goals and objectives, especially in the context of combat operations, is the use of reenlistment, enlistment, and critical skills retention bonuses. These payments are used to equate demand and supply by occupation, in the case of selective reenlistment and critical skills retention bonuses. Assignment incentive pay, by encouraging volunteerism, is an additional tool for balancing demand with supply. While these compensation elements have sometimes been targeted at participation in a combat operation,[8] they are principally applicable to non-combat operations. These compensation elements are listed in Table 4 with the statutory limits (caps) that can be offered.

8. For example, in 2004, soldiers in selected units who were involuntarily extended received $800 per month in assignment incentive pay. "Some Soldiers in Iraq to Receive Extra Pay," *Army News Service*, February 23, 2004.

Table 4. Selected Compensation Programs

Program	Statutory Limit (Cap)
Assignment Incentive Pay	$3,000 per month
Selective Reenlistment Bonus	$90K
Enlistment Bonus	$40K
Critical Skills Retention Bonus	$200K

3. Compensation and Risk—Theoretical Background

Most individuals consider risk and hardship to be undesirable characteristics of the work environment. While individuals may have different tolerances for those characteristics, it is certainly the case that at any given wage rate, the number of workers who are willing to supply their labor to risky occupations is lower than the number who would be willing to supply to safe occupations, all else being equal. Firms and other organizations that wish to attract workers into dangerous employments can only do so if they offer wages or other forms of compensation that are higher than in less dangerous employment. In equilibrium, wages will tend to be higher in riskier jobs. The wage premium necessary to secure the equilibrium level of employment above and beyond wages paid to similarly qualified workers in safe jobs is called the "compensating wage differential for risk."

Consider Figure 1, representing the tradeoffs between risk and compensation for an individual.[9] The vertical axis represents the individual's wage and the horizontal axis the probability of injury or death. The curve labeled UU' shows the increased wages the individual requires for increased risk. Anywhere along the curve UU', the individual considers himself to be just as well off as at any other point on the curve. As the curve illustrates, the minimum wage required for this individual to seek employment in a job with no risk of injury is W_0. As the probability of an injury increases, the individual requires a higher wage to be just as well off. In the diagram, a wage of W_1 is needed for a job where the probability of an injury is p_1. If individuals eschew risk, the supply of labor to risky occupations will be lower than the supply of labor to riskless occupations, so employers in risky occupations will have to pay a higher wage to attract a given number of workers. Given the demand for workers in given occupations, the market determines an equilibrium differential for different levels of risk, the compensating differential. The amount of the differential represents the premium needed to entice the last (most risk averse) worker to take the position for the increase in risk.

9. Job choice depends on a variety of factors, including expected job satisfaction. This assumes that other factors do not vary in order to simplify the choice to one between risk and wages.

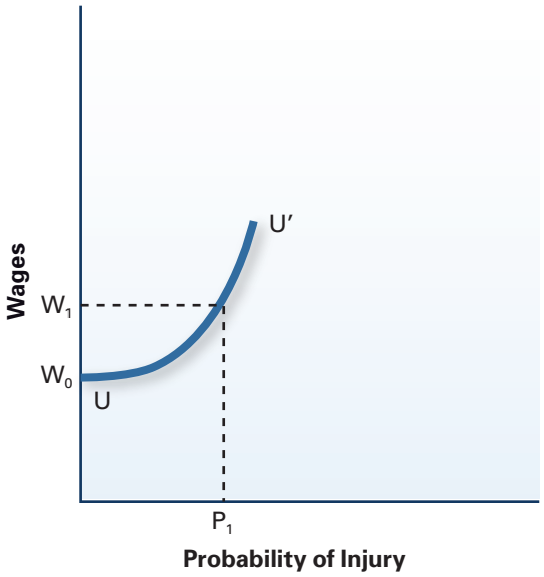


Figure 1. Tradeoffs between Risk and Compensation for an Individual

These compensating differentials are typically ex-ante amounts; that is, the individual, given his reservation price—the minimum wage that is needed to enter the labor force—compares risk and reward before starting employment to determine his or her optimum choice. In practice, Regular Military Compensation (RMC) is significantly higher than measurably comparable civilian earners, and this, along with enlistment and reenlistment bonuses, special and incentive pays, and the insurance provided to members, provides sufficient remuneration to compensate for the additional risk and hardships of being in the military.[10]

As discussed earlier, the DoD does provide increased compensation for combat and combat support operations. The stated DoD philosophy is the greater the risk, the greater should be the compensation.[11] While this added compensation may be an element of a compensating differential, historically the Department has considered combat compensation to be recognition pay, recognizing the hazards and hardships that members face in combat or the danger and hardship in combat support operations.[12]

4. The Relationship between Risk and Reward for Those Receiving Combat Compensation

A. The Relationship between Combat Risk and Compensation Today

All members within a designated combat zone receive combat compensation. However, the risk of injury or death varies considerably, depending upon the member's location within the zone and the member's occupation and responsibilities. Table 5 provides a summary by country of the killed-in-action (KIA) and wounded-in-action (WIA) rates for the Arabian Peninsula areas and Afghanistan combat zones

10. RMC consists of BP, BAH, BAS, and the tax advantage resulting from the non-taxability of the housing and food allowances.
11. Directorate of Military Compensation, Brief delivered to the Association for Financial Counseling and Planning Education, Denver, CO, November, 2010.
12. *Report of the 1971 QRMC: Hostile Fire Pay*, Second Edition, December 1971.

for 2010. Casualty rates are the number of killed and/or seriously wounded divided by the number of military members deployed as of a given date in 2010. As can be seen in the table, casualty rates vary considerably from a high of 57 per thousand deployed in Afghanistan to 0 in countries like the United Arab Emirates (UAE), Bahrain, and Israel.

Even within a country, there is considerable variation in casualty rates. For example, some areas of Iraq were incident free, while others had significant casualty rates.

Casualty rates also vary considerably by pay grade. Figure 2 and Figure 3, containing data from the Defense Manpower Data Center, illustrate combat zone casualty rates by enlisted and officer pay grade for 2005–2010. For both injuries and deaths, starting from the pay grade of E-2, casualty rates decreased with increased pay grade. For officers, there was almost always a decrease in casualty rate as the grade rose.

The benefit received by members within the combat zone varies widely. Since HFP/IDP does not vary by pay grade, any variation in combat compensation benefit is the result of differences in CZTE benefit. Table 6 and Figure 4 present the average CZTE savings by country. The average CZTE savings is calculated by pay grade and weighted by the number of members of that pay grade deployed,

Table 5. Casualty Rates by Country 2010 (Per Thousand Deployed Members)

Country	WIA	KIA	KWIA (total of WIA and KIA)
Afghanistan	46.69	10.38	57.07
Bahrain	0.00	0.00	0.00
Djibouti	0.00	1.28	1.28
Israel	0.00	0.00	0.00
Iraq	4.30	1.05	5.35
Jordan	0.00	0.00	0.00
Kuwait	2.86	5.66	8.52
Oman	0.00	0.00	0.00
Pakistan	0.00	33.89	33.89
Qatar	0.55	0.14	0.69
Saudi Arabia	0.00	0.00	0.00
Somalia	0.00	0.00	0.00
UAE	0.00	0.00	0.00
Yemen	0.00	0.00	0.00

Source: Defense Manpower Data Center.

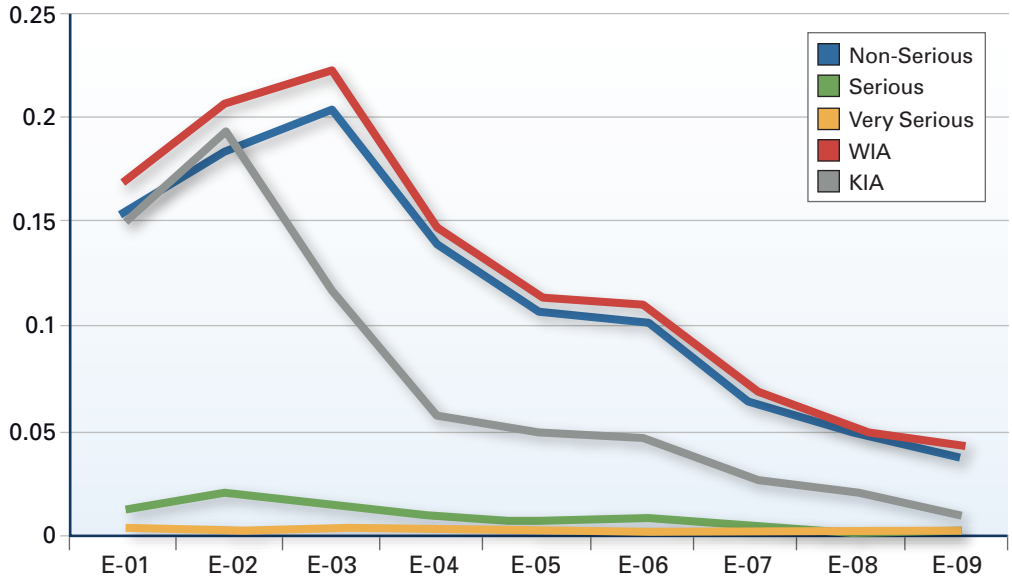


Figure 2. Casualty Rates by Enlisted Pay Grade 2005 to 2010

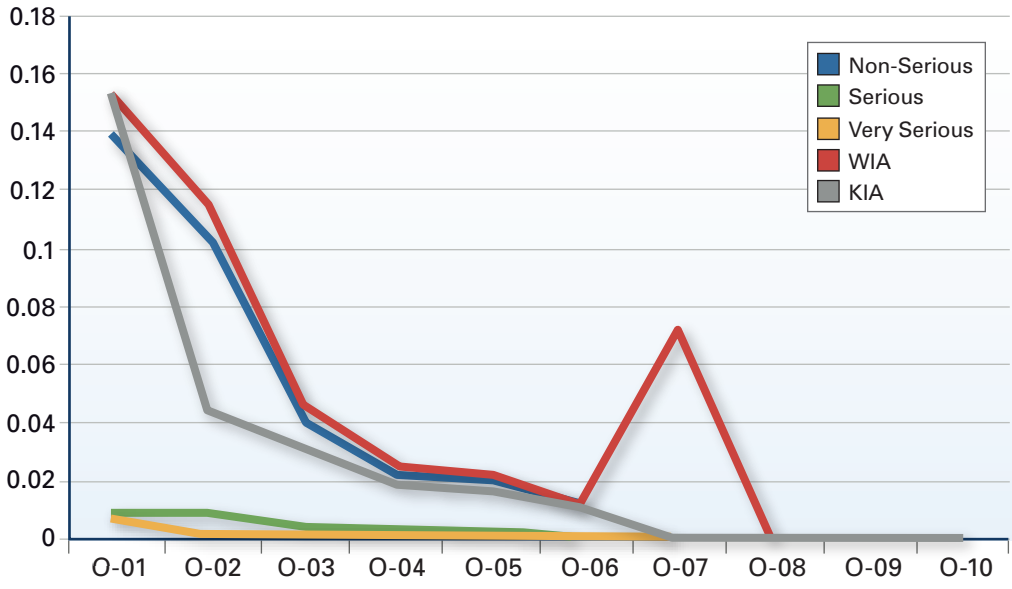


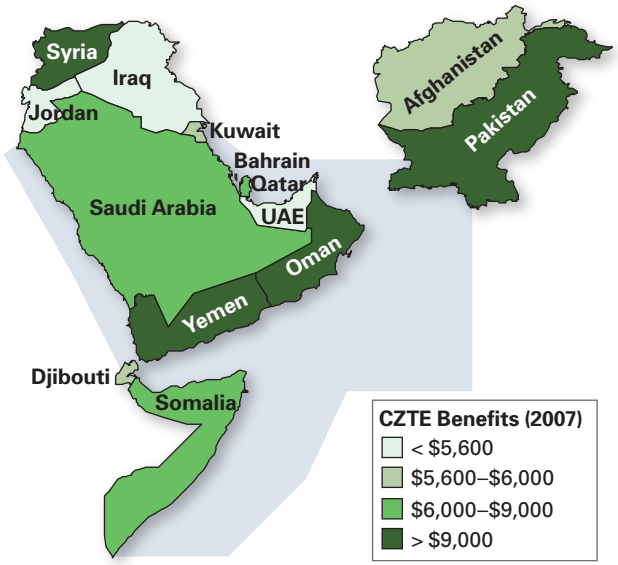
Figure 3. Casualty Rates by Officer Pay Grade 2005 to 2010

by country.[13] The greater the percentage of officers and the greater the seniority, the higher, in general, will be the average CZTE benefit.

Comparison of the average benefit with the average casualty rate, indicates many anomalies. For example, Oman, a country with a zero casualty rate, has an average benefit that is almost 50 percent higher than Afghanistan, the country with the highest casualty rate.

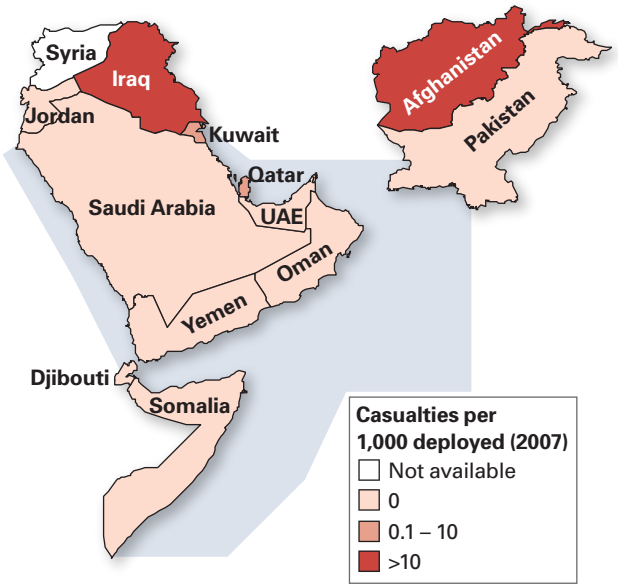
Table 7 and Figure 5 show casualty rates by country for 2007.[14] Comparing Table 5, with casualty rates from 2010, and Table 7, casualty rates for Iraq have decreased, while casualties in Afghanistan have increased, from 2007 to 2010. In both years we find the majority of countries have zero casualties.

A more aggregate comparison can be seen in Figure 6, which compares savings and casualties in combat-zone countries. Table 7 uses normalized data to show the relationship between CZTE savings and casualty rates. The points are the distance of each observation from the mean relative to the standard deviation in the total sample. This conversion allows us to represent each country's savings and casualty rates by numbers that are independent of the units in which the series was measured. A country that has CZTE savings that are greater than average will have a positive value for savings; a country with a zero casualty rate will be below the mean casualty rate and will have a



Source: Department of the Treasury, Office of Tax Analysis.

Figure 4. CZTE Savings by Country 2007



Source: Defense Manpower Data Center.

Figure 5. Casualties by Country 2007

13. Calculation of CZTE savings is based upon data provided by the Department of the Treasury. A detailed description of the procedure that was used to calculate these savings is provided in Section 6.

14. Appendix C provides data for the number of persons deployed, in man-years, by country, for 2005. Appendix D provides casualty rates for the period FY 2003–2009.

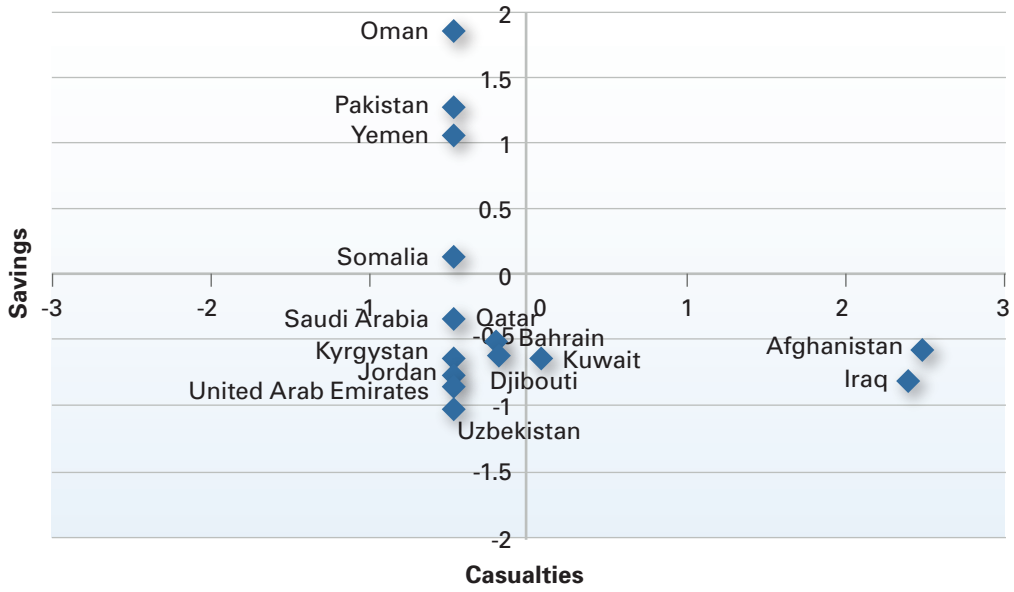
Table 6. CZTE Savings by Country 2007

Deployment Country	Average CZTE Benefit	Average Family Size	Percent Enlisted	Percent Officers	Percent Warrant Officers
Oman	$11,090	3.3	38.49%	61.51%	0.00%
Tajikistan	$10,839	3.1	65.31%	34.69%	0.00%
Syria	$9,982	2.5	64.91%	8.77%	26.32%
Pakistan	$9,879	3.1	47.35%	50.93%	1.72%
Yemen	$9,480	3.3	60.34%	22.41%	17.24%
Somalia	$7,411	2.2	83.33%	16.67%	0.00%
Saudi Arabia	$6,428	2.8	78.98%	20.16%	0.86%
Qatar	$6,092	2.5	78.39%	20.54%	1.07%
Bahrain	$6,075	2.6	81.06%	17.65%	1.29%
Afghanistan	$5,924	2.4	83.62%	13.67%	2.71%
Kyrgyzstan	$5,868	2.4	84.95%	13.03%	2.02%
Kuwait	$5,799	2.4	85.92%	11.91%	2.18%
Djibouti	$5,798	2.4	83.19%	16.04%	0.78%
Jordan	$5,565	2.4	79.19%	19.85%	0.96%
Iraq	$5,439	2.3	87.01%	11.24%	1.75%

Sources: Department of the Treasury, Office of Tax Analysis; and Defense Manpower Data Center.

Table 7. Casualty Rates by Country 2007 (Per Thousand Deployed Members)

Country	KIA	WIA	KWIA
Afghanistan	1.38	11.26	12.64
Iraq	1.44	10.83	12.27
Kuwait	0.26	2.12	2.38
Kyrgyzstan	0.10	1.15	1.25
Bahrain	0.59	0.59	1.18
Qatar	0.06	1.08	1.14
Oman	0.00	0.00	0.00
Pakistan	0.00	0.00	0.00
Yemen	0.00	0.00	0.00
Somalia	0.00	0.00	0.00
Saudi Arabia	0.00	0.00	0.00
Djibouti	0.00	0.00	0.00
Jordan	0.00	0.00	0.00
United Arab Emirates	0.00	0.00	0.00



Sources: Casualties: Defense Manpower Data Center; Savings: Department of the Treasury, Office of Tax Analysis.

Figure 6. Combat Zone Tax Exclusion Savings and Casualty Rates 2007

negative number associated with it. If there were a perfect positive correlation between savings and casualties, all observations would lie on an upward-sloping 45 degree line through the origin. Figure 6 shows virtually no correlation between the two series.[15]

This comparison of Table 6 and Table 7 shows that there is no correlation between the CZTE savings and the degree of risk of death or injury from service in the relevant countries. Members exposed to lesser risk often receive greater compensation. This is not surprising since (as noted earlier) the size of the CZTE is determined by the quirks of the U.S. tax code and the risk of death or injury in various countries by vastly different factors.

B. Members' Perceptions of Risk

Members were asked in the 2010 QuickCompass Survey to compare either their current deployment to a combat zone with their previous CONUS deployment, or, their previous deployment to a combat zone with their current CONUS location.[16] The survey results are given in Table 8 and Table 9.

15. Appendix D shows more detailed information and analysis on the distribution of casualty rates and savings by country and by military occupation.

16. 2010 QuickCompass Survey was a web-based survey of the Department of Defense community directed through the Human Resources Strategic Assessment Program (HRSAP), Defense Manpower Data Center (DMDC) on a wide range of personnel issues.

For those members currently in a combat zone (Table 8), about 30 percent view this deployment as no more dangerous than their CONUS deployment and only 21 percent perceive their combat zone deployment to be very dangerous. While there is a slight increase from the overall percentage in the percentage of members who view their current deployment as being no more dangerous with both enlisted and officer grade, there is also a slight increase in the percentage who feel their current deployment is much more dangerous. Marines had the highest percentage of respondents who felt their current deployment was no more dangerous, while the Army had the lowest percentage.

Results differ for members who have recently returned from a combat zone (Table 9). About 20 percent thought their deployment to be no more dangerous, while 30 percent of respondents believed their deployment to be much more dangerous. In this sample also, the perception that their previous deployment was much more dangerous increases with pay grade for both officers and enlisted members.

Table 8. Survey Results for Current Deployment Location

Compared with your last CONUS duty location, how dangerous is your current deployment location?						
1. No more dangerous	2. Slightly more dangerous		3. Somewhat more dangerous			
4. More dangerous	5. Much more dangerous					
	Percentages					**Max Margin of Error**
	1	**2**	**3**	**4**	**5**	
TOTAL	**31**	**14**	**17**	**17**	**21**	**±3**
Army	26	13	18	18	25	±4
Navy	40	15	16	15	14	±5
Marine Corps	49	14	13	13	12	±6
Air Force	30	18	17	18	17	±5
Received IDP in Past 36 Months	29	13	17	17	23	±3
Enlisted	30	14	18	17	22	±4
E1–E4	31	14	17	17	20	±6
E5–E7	28	13	18	16	24	±5
E8–E9	32	13	11	20	23	±7
Officers	28	13	15	20	25	±3
W1–W5	23	11	11	27	28	±11
O1–O3	27	14	16	20	24	±5
O4–O6	32	12	14	16	26	±5

Source: Defense Manpower Data Center, 2010 QuickCompass Survey of Military Members.

Table 9. Survey Results for Previous Deployment Location

Compared with your current CONUS duty location, how dangerous was your previous deployment location?						
1. No more dangerous	2. Slightly more dangerous		3. Somewhat more dangerous			
4. More dangerous	5. Much more dangerous					
	Percentages					Max Margin of Error
	1	2	3	4	5	
TOTAL	**22**	**12**	**15**	**21**	**30**	**±2**
Army	22	9	15	21	32	±4
Navy	28	14	18	18	21	±4
Marine Corps	21	14	14	22	29	±3
Air Force	18	16	14	22	31	±3
Received IDP in Past 36 Months	20	11	15	22	32	±2
Enlisted	23	11	15	21	30	±3
E1–E4	26	11	15	21	26	±4
E5–E7	21	10	15	21	32	±3
E8–E9	17	8	11	19	44	±5
Officers	10	12	14	26	38	±3
W1–W5	12	8	18	26	35	±9
O1–O3	12	10	15	26	36	±4
O4–O6	7	14	12	26	41	±4

Source: Defense Manpower Data Center, 2010 QuickCompass of Military Members.

We see that not only are risks, as reflected by casualties, quite low in some parts of designated combat zones, but that servicemembers know it. That is the message of both the 2010 QuickCompass survey responses presented here and the piece by Captain Cummings referred to at the start of the paper.

In sum, while the entire Gulf region is designated a combat zone, actual combat is and has been limited to a few countries. Similarly, the Red Sea, Gulf of Oman, Gulf of Aden, and a part of the Arabian Sea are included in the combat zone, but have not experienced any casualties. In addition, the Bosnia/Kosovo Combat Zone and especially the Adriatic and Ionian Seas have had little in the way of combat or casualties. The presence of commercial and private transit in these areas is evidence of the areas' safety. The conclusion we would draw from these data is that many members who are far removed from combat receive the same compensation as those who are actively engaged in combat. The next section examines why many safe areas are in designated combat zones.

5. The History of Combat Compensation

We have observed that servicemembers in relatively safe countries and relatively safe jobs are often eligible for combat compensation. In this section, we examine the evolution of practices regarding eligibility for and administration of combat compensation.

A. Hostile Fire Pay/Imminent Danger Pay

The purpose of recognition for combat risks originated in Badge Pay for combat infantry in World War II (WWII). Designed to boost flagging infantry morale, Badge Pay awarded $10 per month to holders of a Combat Infantryman's Badge, earned through combat service, and $5 to those with an Expert Infantryman's Badge, earned through proficiency in training. Unlike its successors, Badge Pay was not a combat pay in the traditional sense. Although other servicemembers endured similar risks and discomforts, Badge Pay was available only to the infantry, and once awarded, an infantryman would continue to receive compensation until the entitlement was curtailed in 1949. Future pays would extend eligibility beyond the infantry but restrict benefits to the periods of risk exposure. Still, by introducing the general concept of recognition and rewarding the "hazards and hardships" of infantry service, Badge Pay established two critical precedents for future special pays.

Combat Pay for servicemembers deployed to Korea, authorized in 1952, represented the first modern form of direct combat compensation. Advanced by the Army, Combat Pay awarded $45 per month to members serving at least six days in designated "combat units" or individuals wounded, injured, or killed by hostile fire. Defined by statute, "combat units" were effectively restricted to frontline ground units with the intent that special recognition extend only to those enduring the worst "hazards and hardships" of war. Combat pay was not available to those who received other special and incentive pays, such as flight or submarine pay. This narrow, conditions-based interpretation of the purpose of recognition echoed its predecessor, Badge Pay, but drew the ire of the Navy and Air Force, whose members faced slim prospects of eligibility. Almost immediately upon enactment, the other Services and their supporters in the Congress sought to replace "unit designation" with broad, zonal eligibility. From the perspective of its opponents, the dual standard of "hazards and hardships" was both administratively burdensome and distributionally inequitable. From this perspective, risk alone deserved recognition.

In 1963, Combat Pay, which had statutorily expired with the Korean armistice, was reauthorized as HFP. The legislative history of HFP indicated continuity in purpose and policy with its Korean War predecessor. As favored by the Army, eligibility would

be restricted to those serving at least six days with designated frontline "combat units," effectively excluding most members of the Navy or Air Force. However, unlike Korean War Combat Pay, which codified eligibility criteria into law, the new authorization granted the DoD near-complete discretion over administration of HFP.

Initially, the Department followed narrow historical precedent, continuing the dual standard of "hazards and hardships" and the policy of unit-based eligibility. However, as a result of internal deliberations, likely stemming from the fluid combat environment in Southeast Asia, the Department reversed course in 1965 and replaced the practice of designating combat units with the policy of zonal eligibility for Vietnam. The six-day criterion was also rescinded.

Immediately upon implementation of the 1965 directive, the number of HFP recipients quintupled. Although the purpose of HFP remained recognition for risk, in spirit, the substance of combat pay policy had shifted dramatically. No longer was recognition reserved to those who endured the worst "hazards and hardships" but all within the designated area who faced any level of risk were entitled to recognition.

The decades after the Vietnam War saw the entrenchment of the policy of zonal eligibility and the perspective of demanding "recognition for risk." In the absence of major conflict, the Department issued few new designations in the late 1970s and early 1980s. In 1983, the bombing of Marine barracks in Beirut and violence against servicemembers in El Salvador prompted the Department and the Congress to reevaluate combat pay policy. As HFP was traditionally reserved for the overt hazards of open warfare, existing policy struggled to recognize the latent risks of low-intensity conflicts, which characterized post-Vietnam military deployments. The Congress redressed the omission by authorizing a new special pay—IDP—recognizing the risk of "physical harm or imminent danger on the basis of civil insurrection, civil war, terrorism, or wartime conditions" short of open warfare. This change enhanced the relevance of combat pay to contemporary military deployments but once again lowered the risk threshold for pay eligibility.

Although the increasing number of low intensity designations for IDP corresponded to the risk environment of military deployments in the 1980s and 1990s, modern HFP/IDP may struggle to appropriately recognize the overt risks of the combat operations in Iraq and Afghanistan. Whereas previous decades featured either only high- or low-grade designations—Vietnam in the 1960–1970s, IDP designations thereafter—the coexistence of designations for open warfare and low intensity conflicts is a source of dissonance in modern combat pay policy. The status quo, wherein deployments in Afghanistan and Athens receive identical recognition despite vastly different hazards and hardships, is not explicable in terms of conventional notions of equity. The wide distribution of risks receiving special

pay may also dilute the impact of recognition on servicemember morale. In 2003, the Bush Administration grappled with this imbalance by proposing to extend a temporary raise in HFP/IDP (to $225/month) only for members deployed to Iraq and Afghanistan (all others would receive HFP/IDP at $150/month). Rather than limiting the increased HFP/IDP to members in Iraq and Afghanistan, the raise was made permanent for members in both low- and high-risk areas. This continues the misalignment between risk and reward.[17]

In summary, while combat pay has remained faithful to its broad historical purpose of risk recognition, the specific application of recognition has evolved considerably in response to new conflict environments and political coalitions. Originally intended to narrowly recognize only those enduring the worst "hazards and hardships" of frontline combat, modern combat pay now recognizes servicemembers exposed to widely varying degrees of risk, from those of front-line combat to those similar to duty in CONUS.

B. Combat Zone Tax Exclusion

The tax exclusion was originally established in World War I (WWI) to alleviate the burden of war finance from those who fought in the nation's conflicts. Military personnel were covered regardless of where they served. This persisted in WWII. The income tax exclusion during the Korean War was justified as compensation for members exposed to wartime risks. It was not targeted on specific units or occupations but was limited to clearly identifiable areas of risk. This philosophy has persisted since then but its application has changed over time.

Early combat zones were time-limited by statute, but benefits still outlived the combat conditions. WWI benefits continued until 1921, and WWII benefits continued until 1949. Korean War benefits were curtailed soon after combat operations ended.

The Vietnam Combat Zone[18] continued long after combat operations concluded. The rationale for not terminating the combat zone was to ensure that possible prisoners of war (POW) or members missing in action (MIA) who may have still been alive would continue to receive the CZTE benefit, but the combat zone continued until 1996, long after any known living POWs were released.[19] During the two decades that the Vietnam Combat Zone continued after the war, only a small number of military members were present in Vietnam and usually for only a short duration.

17. Although the nominal value of HFP/IDP has not changed since 2003, its real value has decreased through inflation. $225 in 2003 is equivalent to $190 in 2010 after adjusting for inflation.
18. Executive Order 11216, April 24, 1965, established the Vietnam Combat Zone effective January 1, 1964.
19. Executive Order 13002, May 13, 1996, terminated the Vietnam Combat Zone effective June 30, 1996.

The Persian Gulf Combat Zone, established in 1991,[20] was not terminated and now covers the current Iraq War. However, because the entire Gulf region was designated as a combat zone,[21] members are eligible for the CZTE benefit in high-risk areas with ongoing combat operations (Iraq) as well as low-risk areas in other parts of the Gulf region where members are not engaged in combat. In 1993, the Department of Defense terminated HFP/IDP in many low-risk areas in the Gulf region, but throughout the remainder of the 1990s, 7,000 to 16,000 servicemembers per year continued to receive CZTE benefits.

The Balkans presented a unique situation, with U.S. participation in a large-scale North Atlantic Treaty Organization (NATO) peacekeeping operation. There was political reluctance to establishing a combat zone, yet there was concern that large numbers of U.S. servicemembers might become engaged in combat-like and combat support operations. In 1995, the Congress established in statute the concept of a Qualified Hazardous Duty Area (QHDA) and established Bosnia and Herzegovina, Croatia, and Macedonia as a QHDA.[22]

The QHDA provided the same benefit to members as a combat zone (e.g., CZTE), but the benefit was dependent on receipt of HFP/IDP. While the Balkan QHDA is still in statute today, the CZTE benefits were curtailed in 2007 when the DoD terminated HFP/IDP in the QHDA countries. Nonetheless, CZTE benefits could be reinstated by isolated event-based eligibility for HFP/IDP. In fact, there were 20 military deaths (and only one recorded hostile fatality) in the Balkans from 1996 to 2007.

The Kosovo Combat Zone was established in 1999,[23] covering Serbia, Montenegro, Albania, the Adriatic Sea, and the Ionian Sea north of the 39th parallel. It remains in effect today. Servicemembers on Mediterranean-based ships that enter the northern Ionian or Adriatic Seas today receive the CZTE benefit, long after cessation of hostilities and risk.

The concept of Direct Support to operations in a combat zone was established during the Vietnam War to provide CZTE benefits to servicemembers supporting the war while in Cambodia, Laos, and Thailand. So long as the members were

20. Executive Order 12744, January 21, 1991, established the Persian Gulf Combat Zone effective January 17, 1991.

21. The Persian Gulf Combat Zone consists of the Persian Gulf, Red Sea, Gulf of Oman, Arabian Sea (north of 10 degrees North latitude, west of 68 degrees East longitude), Gulf of Aden, Iraq, Kuwait, Saudi Arabia, Oman, Bahrain, Qatar, and United Arab Emirates.

22. Public Law 104-117, November 21, 1995.

23. Executive Order 13119, April 13, 1999, established the Federal Republic of Yugoslavia (Serbia and Montenegro), Albania, Adriatic Sea, and the Ionian Sea north of the 39th parallel as the Kosovo Combat Zone, effective March 24, 1999.

directly supporting the operations in the combat zone and were receiving HFP/IDP for danger related to the combat zone, they were eligible for the CZTE benefit.[24] Direct Support was not used again in a significant way until the Global War on Terror and the establishment of the Afghanistan Combat Zone.

The Afghanistan Combat Zone was established in 2001[25] and supports the continuing combat operations in Afghanistan today. Unlike the Persian Gulf Combat Zone, the Afghanistan Combat Zone did not include surrounding countries, where combat or combat support operations were likely to be conducted. Instead, CZTE benefits were established outside of Afghanistan through DoD designation of Direct Support to operations in the combat zone. Servicemembers in countries surrounding Afghanistan such as Pakistan, Tajikistan, Kyrgyzstan, and Uzbekistan were designated in Direct Support of the combat zone.

Direct Support was also used for members engaged in the Global War on Terror in countries distant from Afghanistan, but where the threat was related to Al Qaeda terrorist operations. For example, the Philippines (members with orders referencing Operation Enduring Freedom), Yemen, and Djibouti were designated as Direct Support in 2002, and Somalia was designated as Direct Support in 2004.

A Direct Support designation provides the DoD the flexibility to not only establish CZTE benefits for areas outside a specific combat zone, but also to terminate those benefits in a timely manner when the threat or circumstances change. Even though the Persian Gulf Combat Zone was in place at the beginning of the Iraq War, Turkey, Jordan, Egypt, and the Mediterranean Sea east of 30 degrees East longitude were designated in Direct Support of the combat zone in 2003. As the war evolved and hostilities were limited to Iraq proper, the Department terminated the designations for Egypt and the region of the Mediterranean Sea later in 2003. The designation for Turkey was terminated in 2005. Nonetheless, many other countries in the region where there are no combat operations continue to receive CZTE benefits because they are included in the broadly defined Persian Gulf Combat Zone. This substantially weakens the link between risk and reward.

For most of the history of the CZTE all enlisted pay has been exempt from tax while officer pay up to the level of a relatively junior member of the highest enlisted rank has been exempt. In 1996 the officer exclusion was modified to include pay up to the level of the most senior enlisted personnel, the Senior Enlisted Advisors,

24. Treasury Department (TD) 7066, November 10, 1970, amended Treasury Regulation 1.112-1, providing that service in direct support of a combat zone that qualifies for HFP/IDP is deemed to be service in a combat zone.

25. Executive Order 13239, December 12, 2001, established the Afghanistan Combat Zone, effective September 19, 2001.

whose pay is 56 percent higher than that of an E-9 with ten years of service, the prior standard.[26] This has benefited field-grade officers considerably.

C. Conclusion

While the CZTE was first established in WWI to free those fighting the war from the burden of war finance, for most of their history, eligibility for both the CZTE and HFP/IDP were recognition pays clearly related to risk. Under pressure from various interest groups and the pressure of events, combat-related pays have expanded to a point that substantially weakens their connection to risk, their stated rationale.

6. Reasons for Variation in Combat Compensation

As was shown in Section 4, within designated combat zones, geographic variation in the amount of combat compensation received is uncorrelated with risk. This section will examine the reasons combat compensation varies among individuals.

The two components of combat compensation, HFP/IDP and CZTE, are distributed very differently among servicemembers. While HFP/IDP is a constant amount a servicemember receives, regardless of pay grade, for any month or part of a month for which the member is deployed to a combat zone, the distribution of the CZTE benefit is much more complex.

For every month (or part of a month) that a member is deployed to a combat zone, that servicemember is eligible to exclude from federal income tax calculations the total income received, if he or she is an enlisted member, or up to $7,714.80 per month (2011), the maximum enlisted pay plus HFP/IDP, if that member is an officer. Table 10 provides an example of the calculated benefit of being deployed to a combat zone for an E-4 with over 4 YoS, married with two children, and an E-6 with 10 YoS, married with one child. We assume the E-4 and E-6 are deployed to a combat zone for 6 months in the 2010 tax year.[27]

The bottom line in the table is the CZTE benefit. For the E-4, the benefit consists of the $428 in income taxes that he or she avoids plus the additional $1,856 in EIC, for a total of $2,284.[28] The E-6 saves $5,112—$2,062 in income taxes that he or she no longer has to pay plus $3,050 in EIC that the member is now eligible for.

26. 142 Cong. Rec. H1670 (daily ed. March 5, 1996).

27. Both cases assume no spousal income, members take the standard deduction, and there are no other sources of additional income or credits. A member's total deployment could still be 12 months extending over two tax years.

28. The Earned Income Credit is a federal program designed to assist low wage earners by providing a refundable tax credit based upon earnings.

Table 10. Examples of the Calculation of CZTE

	E-4 over 4 YoS, 2 Children		E-6 over 10 YoS, 1 Child	
	Not in CZ	In CZ	Not in CZ	In CZ
Annual Basic Pay + HFP/IDP	30,299	30,299	41,678	41,678
Annual – CZTE Excluded Pay	0	15,149	0	20,839
Adjusted Gross Income	30,299	15,149	41,678	20,839
Std Ded and Exemptions	26,000	26,000	22,350	22,350
Taxable Income	4,299	0	19,328	0
Tax (Negative #)	(428)	0	2,062	0
EIC	3,180	5,036	0	3,050
CZTE Benefit	**0**	**2,284**	**0**	**5,112**

Source: Internal Revenue Service 2010.

The actual value to an individual member of being deployed to a combat zone depends upon a number of factors:

- Income – Since our income tax system is progressive, higher incomes push people into higher marginal tax rates. Marginal tax rates vary from the lowest rate of 10 percent to the highest current rate of 35 percent. The greater the family income, including spousal income, the greater should be the value of CZTE to the individual.
- Family Size – The larger the family, the greater are the number of personal exemptions to be subtracted from Adjusted Gross Income. Additionally, depending upon a number of conditions including the age of the children, the family would become eligible for a variety of income tax deductions and credits. For example, there is both a Child Tax Credit and a Child Care Deduction. Since larger families, because of deductions and credits, would tend to have lower marginal tax rates than otherwise similarly situated families, the value of the CZTE is expected to be lower for them.
- Deductions, additional income, and other income tax variables – Any factor that would change net taxable income, deductions, and/or tax credits would change the individual's income tax liability and hence, the value of the CZTE benefit.
- Time spent deployed – The greater the number of months deployed, the greater tends to be the CZTE benefit, since each additional month for an enlisted member (and most officers) increases the amount of income that

can be excluded. However, this is not always the case, primarily due to the structure of the EIC.[29]

- Distribution of deployment time across years – Because of the structure of the EIC, benefits can vary with the distribution of a fixed number of months of deployment across tax years. At the lowest income levels, increasing income raises the EIC benefit. Benefits reach a maximum based upon family size and remain constant over some range of income. After maximum specified income is reached, benefits phase out gradually.

To discern the effect of the timing of deployment on an individual member, we simulated the effect of various distributions for the E-4, over 4 YoS. We assume that all deployments are 12 months in length, but not necessarily in one tax year, there is no spousal income, all members take the standard deduction, and the member has two children and no other source of income. The results of our simulation are illustrated in Figure 7. The bars show the savings due to the CZTE as a function of the distribution of the deployment across two adjacent years. The first bar shows a $428 savings if all of the deployment is in a single year.[30] Note that the benefit for six months of service (Table 10) was $2,284, while the benefit for an entire calendar year is $428. This is a striking example of how provisions of the tax code distort the compensation of those who serve in combat zones.

Why does this occur? Up to a point, the gain in EIC increases as more income is sheltered by the CZTE. The increase in EIC complements the reduction in income tax producing an even greater total benefit. The maximum EIC benefit ($5,036 for two children) can only be received if income is greater than $12,590 or less than $21,450. Incomes greater than $21,450 or less than $12,590 result in a loss of benefit.[31] As the deployment in a given tax year increases, that is, as further income is sheltered, the EIC benefit falls and beyond some point there is no additional reduction in the member's income tax. In this situation, the service member must elect either to base the EIC on the member's gross income or on the net taxable income. For the married E-4 with at least two years of service and two children, serving 12 months in any calendar year in the combat zone will result in the least benefit. The largest benefit accrues to this individual if he or she is deployed 5, 6, or 7 months in one year and the remainder in the next tax year. Over the two tax years, this member, deployed 6 months in one year and 6 months in the next, would have a total CZTE benefit of $4,596, more than ten times the savings received by

29. Appendix E provides information on average deployment time per year.

30. See Appendix F for a hypothetical tax return that was used in the simulation.

31. See Figure 9 for an illustration of the relationship between EIC benefit and income.

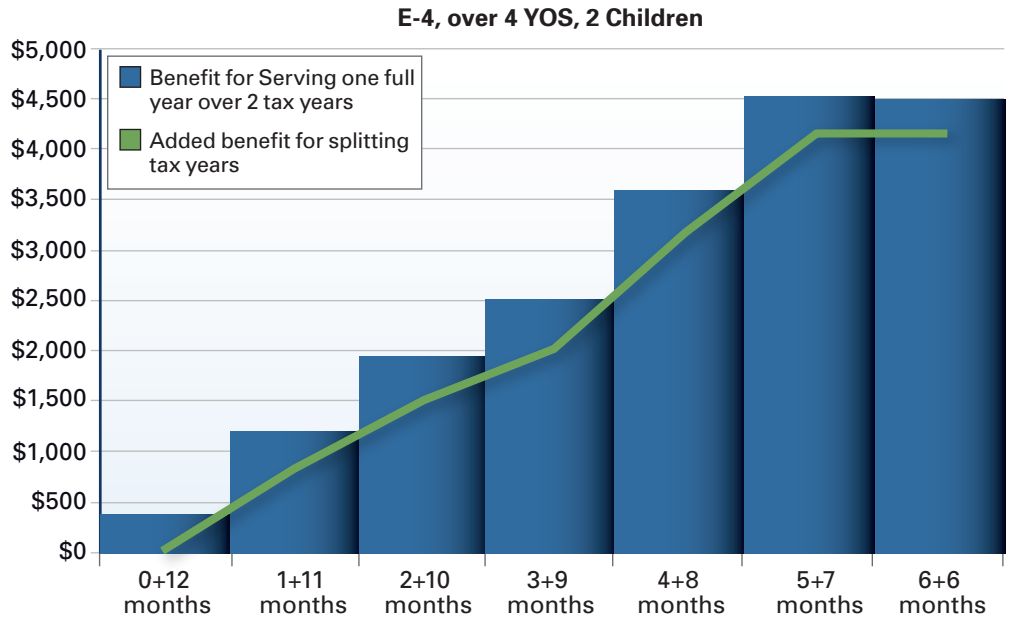


Figure 7. Distribution of Time in Combat Zone across Adjacent Years

his or her counterpart, deployed 12 months in a single tax year. The source of the difference is the EIC calculation rather than the tax liability.

The optimal distribution of deployment varies by grade and all of the other factors that relate to income tax calculations and tax credits. While 6 months in year one and 6 months in year two, 5 months in year one and 7 months in year two, or 7 months in year one and 5 months in year two is advantageous for this E-4, a 12-month deployment all in one year (0+12), for example, may be beneficial for an O-6.

We were able to acquire the actual distribution of CZTE benefits from the Department of Treasury, Division of Tax Analysis. The W-2 form for members

Table 11. Distribution of CZTE Benefit

Year	1%	5%	25%	Median	75%	95%	99%	Mean
2005	$250	$1,460	$2,500	$3,950	$6,610	$12,600	$19,380	$5,130
2006	$410	$1,570	$2,680	$4,150	$7,040	$13,390	$20,590	$5,470
2007	$520	$1,690	$2,890	$4,540	$7,690	$14,680	$22,070	$5,960
2008	$350	$1,630	$2,960	$4,670	$7,830	$14,770	$22,270	$6,030
2009	$280	$1,480	$3,000	$4,600	$7,770	$14,720	$22,430	$5,990

Source: Department of the Treasury, Office of Tax Analysis, April 15, 2011.

who have been deployed in the combat zone includes a box containing data on the amount of income that has been excluded. The Division of Tax Analysis was able to recalculate income tax liability with the excluded income added. It should be noted that both the actual and recalculated tax liability include income from all sources—spousal, interest, dividends, etc. Similarly, the tax liability depends upon any deductions or credits taken as well as number of dependents. Eligibility for tax credits like EIC were also recalculated. We then defined the CZTE benefit as being the difference between the total tax burden (tax liability minus tax credits) as reported by the member for each tax year and the total tax burden the individual would face if all excluded income were included.[32] Actual benefits are shown in Table 11. The table provides the distribution of benefits by percentile for each of the tax years 2005–2009. CZTE benefits over the 5-year period ranged from a few hundred dollars to well over $20,000. The median benefit was under $4,700 and the average benefit was between $5,130 and $6,030.

Table 12 presents the average CZTE benefit by pay grade and component for 2009. As is shown in the table, CZTE benefits increase with increases in pay grade. Benefits also appear to increase with increased number of dependents. The cause of this result is the structure of EIC benefits. The greater the number of children, the higher the maximum benefit. Additional information on the distribution of tax savings during the period 2005–2009 is provided in Appendix G and Appendix H.

Figure 8 compares average CZTE benefit by pay grade and number of dependents (2007). Benefits are higher with increased pay grade. In general, benefits for the E-1–E-3 group are about one-quarter of the benefits received by the O-4–O-6 group. While these amounts represent average benefits, there is considerable variation within each category and, furthermore, the amount of benefit is generally unknown—either to the recipient or to the DoD. The benefit is essentially determined outside of the DoD and is driven by the specific provisions of the Internal Revenue Code.

Income exclusion as a result of deployment to a combat zone not only affects the individual's income tax liability, it also has a direct impact on eligibility for a variety of federal and state programs that have eligibility or benefit levels tied to income. The major benefit program for military members is the EIC.

As discussed above, the EIC plays a major role in determining the value of the CZTE benefit. First enacted in 1975, the EIC has been expanded by tax legislation numerous times since its enactment to become the nation's foremost anti-poverty

32. It should be noted that this "income included" amount is not the liability the individual would have from a CONUS deployment because of the $325 per month in HFP/IDP and Hardship Duty Pay the member receives in a combat zone.

Table 12. Distribution of CZTE Benefit by Pay Grade, Number of Dependents, and Component

Distribution of CZTE Benefit						
Active						
Pay Grade Group	*0 Dependents*	*1 Dependent*	*2 Dependents*	*3 Dependents*	*4 Dependents*	*Overall*
E1–E4	$2,812	$3,543	$4,154	$4,505	$4,741	$3,260
E5–E6	$4,287	$5,310	$6,138	$6,908	$7,240	$5,710
E7–E9	$7,573	$8,414	$8,547	$9,165	$9,335	$8,862
O1–O3	$7,539	$9,768	$10,443	$11,410	$11,887	$9,251
O4–O6	$13,102	$14,448	$13,950	$14,583	$15,086	$14,468
Guard						
E1–E4	$2,965	$4,291	$4,904	$5,370	$5,579	$3,599
E5–E6	$4,496	$6,461	$7,065	$7,725	$7,844	$6,200
E7–E9	$7,299	$9,267	$9,498	$9,957	$9,874	$9,386
O1–O3	$7,452	$10,751	$11,170	$12,225	$12,239	$10,006
O4–O6	$12,754	$15,509	$15,391	$16,501	$16,501	$15,775
Reserves						
E1–E4	$2,687	$3,584	$4,315	$4,885	$5,330	$3,130
E5–E6	$4,156	$5,772	$6,461	$7,377	$7,667	$5,694
E7–E9	$7,405	$9,002	$9,326	$10,139	$10,250	$9,401
O1–O3	$7,671	$9,585	$10,154	$10,785	$10,887	$9,376
O4–O6	$12,865	$14,557	$14,559	$15,137	$15,910	$14,830

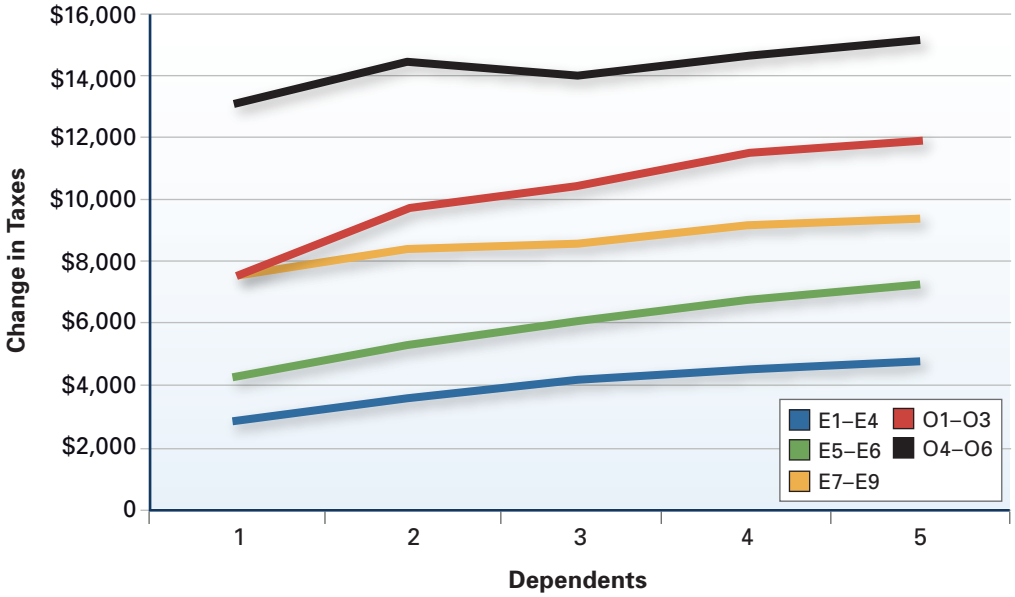
Source: Department of the Treasury, Office of Tax Analysis, April 15, 2011.

tool. The EIC was created to supplement the income of low-income households by creating a refundable tax credit that varies with number of dependents and income.

Figure 9 illustrates the structure of the EIC program. The EIC has three component parts—a phase-in that increases with increased income, a plateau where benefit levels are constant as income increases, a phase-out that decreases benefits with increased income and a maximum amount where benefits are exhausted. Four different relationships are shown in Figure 9 ranging from No Children to 3 or More Children. Increasing family size (up to family size 5) increases the benefit and the phase-in and phase-out levels.

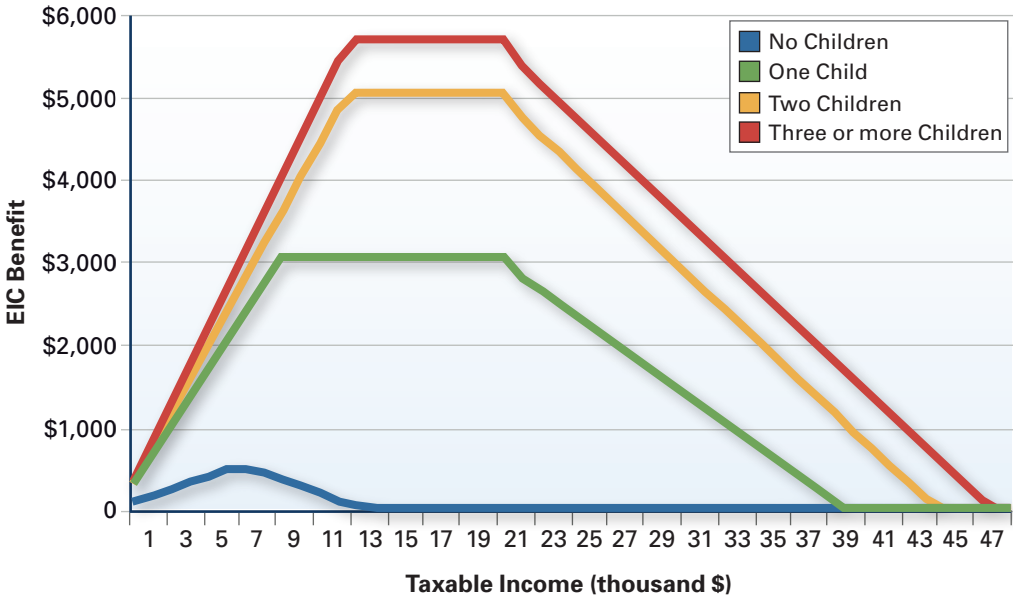
Present policy allows members to decide whether or not to count income received in a combat zone.[33] Consider an E-4 with over 4 years of service with two children serving in a combat zone for 6 months. Monthly pay for this E-4 is approximately $2,200 per month. Assuming no spousal income, this E-4's monthly pay, plus $325 per month in HFP/IDP and Hardship Duty Pay, results in an annual total of

33. This is an all or nothing decision. Members cannot choose to count a portion of their income.



Source: Department of the Treasury, Office of Tax Analysis, April 15, 2011.

Figure 8. Combat Zone Tax Savings (2007 Active Duty)



Source: Department of the Treasury, Internal Revenue Service.

Figure 9. EIC Benefit and Income

$30,300.[34] EIC for this family would be $3,160. With CZTE, the member can opt to not count $15,150 in income earned while deployed to a combat zone. This reduces the member's income by half and increases EIC to the maximum of $5,036.[35]

Now consider an O-6 with two children and over 20 YoS. The O-6's annual basic pay, HFP/IDP, and Hardship Duty Pay is $113,048. Adding to this average non-taxable housing and subsistence allowances, annual income for an average O-6 is $144,704. If this O-6 is deployed 12 months to a combat zone, he can elect to not count $92,532 of his income towards EIC. Because allowances are not taxable, the O-6's net income is reduced to $20,516 and, consequently, he becomes entitled to the maximum EIC payment of $5,036.[36] The O-6, whose total compensation is about five times that of the E-4, can receive more in EIC than an E-4 stationed in the United States. This is incongruous because the EIC is supposed to be a social program to assist low-wage earners.

Using data provided by the Internal Revenue Service (IRS), the number of EIC recipients by pay grade and the average benefit they receive (shown in Table 13) were tabulated. The Division of Tax Analysis then recalculated each EIC recipient's income tax return including the income that was excluded because of deployment to a combat zone. The difference between the number of personnel receiving EIC with and without counting the income excluded because of deployment to a combat zone is provided in Table 14.

As can be seen in Table 14, the total increase in EIC recipients due to the CZTE was almost 90,000 in 2005. Almost half of this increase is in grades E-5 and E-6. Increases in the E-7–E-9 and O-4–O-6 ranges (i.e., senior enlisted and field-grade officer) amount to almost 5,400, or 6 percent of the total. The average RMC for an E-8 is $85,000; the average for an O-5 is $134,000.

The goals of combat compensation are to compensate for higher levels of risk, reward service, improve morale, and recognize the importance of combat service. To achieve these goals, at the very least, members should have an idea as to their combat compensation. While HFP/IDP is readily known and clearly transparent, the same cannot be said for CZTE. As we have shown, there is considerable variation in the CZTE benefit that is totally unrelated to risk. Furthermore, the complexity of the CZTE benefit calculated from an income tax return reduces the likelihood that an individual can compare the risks and rewards of combat.

34. This E-4 would also receive $18,514.44 in housing and subsistence allowances as part of his or her Regular Military Compensation (RMC) of $47,218.66 per year.

35. Actual EIC benefit is based upon family income. EIC benefits could increase or decrease based upon income exclusion and spousal income.

36. The relationship between time deployed and CZTE benefit for an O-6 is similar to the previous discussion for the E-4 for Figure 7 on page 30.

Table 13. Average EIC Benefit by Pay Grade of Members Receiving EIC

Pay Grade	2005	2006	2007	2008	2009
E-01 to E-03	2,135.14	2,216.99	2,309.42	2,373.68	2,681.18
E-04	1,948.85	1,996.95	2,055.53	2,179.44	2,515.92
E-05	1,944.58	2,045.01	2,115.72	2,216.28	2,555.22
E-06	1,942.66	2,020.20	2,202.55	2,313.30	2,641.83
E-07	1,856.66	1,999.83	2,139.84	2,277.55	2,621.64
E-08 to E-09	1,771.87	1,948.06	2,082.16	2,169.64	2,429.56
W-01 to W-03	1,896.80	2,153.54	2,243.98	2,328.13	2,609.47
0-01 to 0-03	1,529.75	1,611.97	1,663.99	1,677.20	2,073.95
0-04 to 0-06	1,899.43	1,981.92	2,094.53	2,128.91	2,454.04

Source: Department of the Treasury. Office of Tax Analysis, April 15, 2011.
Note: Average amounts are in nominal dollars.

Table 14. Change in Number of Military Personnel Receiving EIC Because of Ability to Exclude Combat-Zone Income (2005)

Pay Grade	Regular U.S. Army and Marines	Regular U.S. Air Force and Navy	National Guard and Reserves—All Services	Total
E-01 to E-03	1,710	825	636	3,171
E-04	6,999	1,835	7,780	16,614
E-05	9,910	3,345	9,835	23,090
E-06	9,737	4,544	6,510	20,791
E-07	6,042	2,580	2,987	11,609
E-08 to E-09	1,769	441	886	3,096
O-01 to O-03	1,281	356	4,832	6,469
O-04 to O-06	973	153	1,061	2,187
W-01 to W-03	582	40	1,687	2,309
Total	**39,003**	**14,119**	**36,214**	**89,336**

Source: Department of the Treasury, Office of Tax Analysis, April 15, 2011.

7. Potential Changes to Combat Compensation

The present-day divergence between the risks that military members face when deployed and the associated compensation can be brought into better alignment in a number of ways. Declared combat zones include areas where there is no combat, combat hostilities, or the threat of hostilities. As a consequence, members exposed to virtually no more risk in these areas than in CONUS and members actually engaged in combat are eligible for the same set of benefits. Furthermore, given the grade distribution in risky and non-risky areas within the combat zone, there can be an inverse relationship between risk and reward. Proposals for change include facilitating the initiation and termination of combat zones, modifying the CZTE benefit, and, introducing more risk-related compensation.

A. Administering Combat Zones

The process for initiating a combat zone may take considerable time and may result in a period during which members are conducting combat operations but are not yet eligible for CZTE benefits, though there may be a retroactive designation. Sometimes, as in Somalia in 1993 and 1994, a combat zone is not designated despite combat operations.

Currently, termination of a combat zone requires an Executive Order or a provision of law. This requirement could be altered to make termination easier to accomplish by including a sunset provision in the combat zone establishment order. These combat zones would automatically terminate at a specific end-date, perhaps the end of every fiscal year, unless positive action was taken to renew them.

An option for administering combat zone benefits more efficiently could be a distinction drawn between termination of the combat zone and termination of combat zone benefits. CZTE and combat zone benefits could be made contingent on the receipt of HFP/IDP in a manner similar to QHDAs. Since receipt of HFP/IDP is subject to the authority of the Secretary of Defense, the DoD could terminate CZTE benefits without actually terminating the combat zone. By not relying on the issuance of an Executive Order, the termination of combat zone benefits could be more timely and coincident with combat conditions. Once combat zone benefits are terminated, the process of terminating the combat zone should be easier to accomplish.

Initiation and termination decisions can involve considerable sums of money. Measures that facilitate the termination process could have an impact on the initiation process as well, making it, too, more responsive to combat conditions.

B. Distribution of CZTE Benefits

In terms of magnitude, the greatest source of variation in combat compensation is due to the CZTE. Income exclusion generally yields greater federal income tax savings for those with higher incomes. Junior members, especially those with larger families, have little in the way of taxable income and thus pay little in income taxes; therefore, income exclusion confers little benefit on these members. More senior enlisted personnel and warrant officers can exclude all their income and receive a tax benefit. Officers are able to exclude up to $7,714.80 a month for each month or part of the month that they are deployed to a combat zone. This exclusion, historically high relative to enlisted pay, results in the greatest benefit accruing to more highly ranked individuals.

An additional major source of variation is the relationship between income exclusion and eligibility for EIC—a refundable tax credit intended to supplement the incomes of low-wage earners and their families. Income exclusion allows members to qualify for EIC who otherwise would not be eligible. It can also change the EIC benefit for members who would otherwise qualify—and not necessarily to their advantage.

As we have shown, a compounding factor in the relationship between income exclusion, tax savings, and EIC is the spread of the deployment over tax years. Depending upon the member's family income and family size, a distribution of this deployment over adjacent tax years may significantly increase the total benefit in terms of income tax avoidance and EIC (as well as other tax credits and deductions).

Instead of excluding income and having the benefit of this exclusion dependent upon family income, family size, and the panoply of deductions and credits of the tax code, a simple refundable tax credit could be substituted. For example, if the average CZTE benefit were $6,000 per year, with an average deployment of 7 months, a refundable tax credit of $850 per month could replace current policy at no additional cost. This amount would be available to all members—junior enlisted to senior officers—and the value of the benefit would be independent of all of the factors causing present day differences. Similarly, the benefit would not be different whether the member's deployment was spread out over two years or confined to a single year. The total cost of combat zone benefits would not change, but the distribution of these benefits among the various grades and family sizes would.

This proposal would be consistent with notions of fairness for many military members. Survey responses from officers and enlisted members call into question the fairness of the current system. Only 27 percent of enlisted members surveyed,

compared with 50 percent of officers, believe it is fair that higher income members reap a greater benefit from income exclusion.[37]

Present policy allows officers to deduct the maximum enlisted pay, that of the SEA. In 2011, SEA pay was $7,489.80. SEA pay is higher than the pay level of an O-5 with over 14 years of service and considerably higher than E-9 levels. It is also considerably higher than the historical relationship defining the maximum excluded income for officers. In the absence of a shift to a fixed tax credit per month of deployment, changing the officer exclusion to the pay level of an E-9 with over 26 years of service would be closer to the historical relationship and would reduce the benefit accruing to the most senior officers.

C. Income Exclusion and EIC

Income exclusion resulting from deployment to a combat zone can reduce taxable income by more than $91,000 per year. An O-6 with 26 years of service and two children, for example, would have his taxable income reduced to about $7,000 and therefore qualify for $2,800 in EIC. If he or she were deployed for 11 months rather than a full year, the EIC benefit would increase to $5,036.

A simple solution to this problem is to require that all members treat basic pay as earned income for purposes of EIC eligibility. This would effectively remove the 2,000 officers with RMC in excess of $100,000 from eligibility for the EIC program.

D. Varying Combat Compensation with Risk

To establish a closer relationship between risk and compensation, the DoD could add a "true" combat pay for members actually in a combat environment. This combat pay could be a supplement to the CZTE or an alternative.[38]

If a refundable tax credit were to replace the current income exclusion, combat compensation could be introduced as a tiered benefit within this framework. For example, for members exposed to combat, a refundable tax credit of $850 per month could be established as a benefit. For members with minimal exposure to risk, but within a combat zone, the benefit would be a percentage of the full benefit—for example, $425 per month.

37. Defense Manpower Data Center, January 2011 Status of Forces Survey. For active duty members, question 164 c, d, and e. For Reserves, question 233 c, d, and e.

38. 37 U.S.C. §351 could be a vehicle for increasing HFP and turning it into a combat pay.

E. Concluding Comment

Combat-related compensation today does not reflect the goal of providing more money to those who face more risk. The two main reasons for this are (1) that individuals in areas with low risk are eligible for HFP/IDP and the CZTE, and (2) that the rules that govern the value of the CZTE provide considerable benefit to those who face little risk. The proposals presented here could move DoD toward a more risk-related combat compensation system.

Appendix A. Current Combat Zones

Table A-1. Current Combat Zones

Executive Order (EO)	Combat Zone
EO 12744 (1/17/91)	Persian Gulf, Red Sea, Gulf of Oman, Part of Arabian Sea (N of 10°lat, W of 68°E long), Gulf of Aden, Iraq, Kuwait, Saudi Arabia, Oman, Bahrain, Qatar and UAE.
EO 13119 (3/24/99), also by PL 106-21	Fed Rep of Yugoslavia, Albania, Adriatic Sea and Ionian Sea north of 39th parallel. Congress also designated several Balkan locations as Qualified Hazardous Duty Areas (QHDA) - Bosnia and Herzegovina, Croatia and Macedonia - PL 104-117 (11/21/1995).
EO 13239 (9/19/01)	Afghanistan

Appendix B. Combat Compensation for Selected Countries

Table B-1. Combat Compensation for Selected Countries

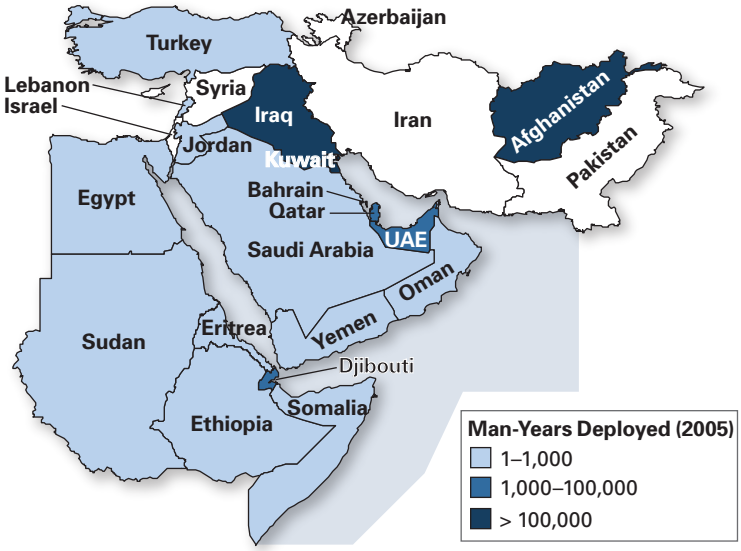
Category	Japan	Germany	UK	Australia	France
Monthly Combat Pay (Iraq)	$8,988	--	$1,473	$5,003	1.5x pay
Monthly Combat Pay (Afghanistan)	--	$4,975	$1,473	$6,670	1.5x pay
Tax Exclusion?	N/A	N/A	Some	YES	YES
Risk-Based?	YES	YES	NO	YES	NO

Appendix C. Number of Members Deployed by Country 2005

Table C-1. Number of Members Deployed by Country 2005

Country	Man-Years Deployed
Iraq	228777
Kuwait	160252
Afghanistan	138428
Qatar	7411
Bahrain	1511
Djibouti	1341
United Arab Emirates	1100
Saudi Arabia	234
Ethiopia	92
Somalia	82
Oman	56
Egypt	49
Jordan	43
Yemen	17
Sudan	9
Lebanon	5
Turkey	1

Source: Defense Manpower Data Center.



Source: Defense Manpower Data Center.

Figure C-1. Number of Members Deployed by Country 2005

Appendix D. Casualty Rates and HFP/IDP

Another way to gauge the relationship between combat risk and combat compensation is to calculate the fraction of combat compensation that has been received by personnel in combat zones that account for the greatest number of casualties. Individual-level data on the number of individuals on active duty killed or seriously wounded for the period FY 2003–2009 were totaled up for each country in which at least 25 service members served and which was designated to be a combat zone during some part of that period. Data were also available on compensation. The data contained information for all individuals ever deployed to a combat zone and included basic pay, total pay, total bonuses, IDP, and other components of compensation by calendar year for the period FY 2003–2009.

Data on combat casualties and combat compensation by country of deployment are seen in Table D-1. The data have been ranked from high to low by the number of personnel KIA. During this period, there were 4,012 KIA and 9,754 KIA or seriously wounded (KSW). Iraq accounted for 3,078 KIA, or 76.7 percent of the total, and for 6,048 KSW, about 75.7 percent of the total. Notice that individuals deployed to Iraq received just 44.2 percent of the total of about $2.5 billion in IDP over the period. Individuals deployed to Afghanistan accounted for 857 KIA and 1687 KSW, about 21 percent of the total, but received only about 11 percent of the IDP payments.

A convenient way to view the data is to examine the relationship between the cumulative percentages of casualties and IDP at each point in the data. For example, Iraq accounts for about 77 percent of total KIA and Afghanistan for another 21 percent, so the two countries combined account for 98 percent of all personnel KIA and about 55.2 percent of total IDP. The resulting relationships are seen for personnel KIA in Figure D-1 and for personnel KSW in Figure D-2.

Table D-1. Casualty Rates and IDP FY 2003–2009

Country	Person Years Served	KIA	KIA or Seriously Wounded	IDP	KIA (1% of total)	KIA or Seriously Wounded (% of total)	IDP (% of total)
Iraq	1,448,846	3,078	6,048	1,105,284,184	0.767	0.757	0.442
Afghanistan	313,635	857	1,687	275,152,623	0.214	0.211	0.110
Kuwait	1,058,267	27	127	848,912,487	0.007	0.016	0.339
Phillippines	20,009	14	15	13,572,975	0.003	0.002	0.005
Pakistan	4,516	11	14	3,456,937	0.003	0.002	0.001
Bahrain	57,811	10	25	50,277,169	0.002	0.003	0.020
United Arab Emirates	34,394	5	13	25,602,071	0.001	0.002	0.010
Qatar	130,847	4	24	99,027,019	0.001	0.003	0.040
Kenya	184	2	4	121,029	0.000	0.001	0.000
Uzbekistan	7,677	1	3	4,863,729	0.000	0.000	0.002
Cuba	364	1	3	16,225	0.000	0.000	0.000
Saudi Arabia	17,462	1	6	14,860,696	0.000	0.001	0.006
Djibouti	21,799	1	10	13,518,915	0.000	0.001	0.005
Israel	892	0	0	862,743	0.000	0.000	0.000
Somalia	940	0	0	647,164	0.000	0.000	0.000
Turkey	11,518	0	0	8,863,505	0.000	0.000	0.004
Oman	4,652	0	0	4,420,764	0.000	0.000	0.002
Kyrgyzstan	36,022	0	12	27,809,191	0.000	0.002	0.011
Algeria	199	0	0	15,525	0.000	0.000	0.000
Uganda	42	0	0	10,592	0.000	0.000	0.000
Jordan	2,827	0	0	2,865,120	0.000	0.000	0.001
Yemen	177	0	0	184,450	0.000	0.000	0.000
Ethiopia	112	0	0	83,475	0.000	0.000	0.000
Tajikistan	108	0	0	79,251	0.000	0.000	0.000

Note: Casualty data refer to FY 2003-2009 and IDP data to CY 2003-2009. Data are shown for combat zone countries with at least 25 personnel-years served.

Looking first at Figure D-1, there is a fairly tight relationship between the cumulative percentages of personnel KIA and IDP. The countries of Iraq, Afghanistan, Kuwait, and the Philippines account for 99 percent of all KIA. Looking at Figure D-2, they account for 98.55 percent of all KSW. The same four countries also

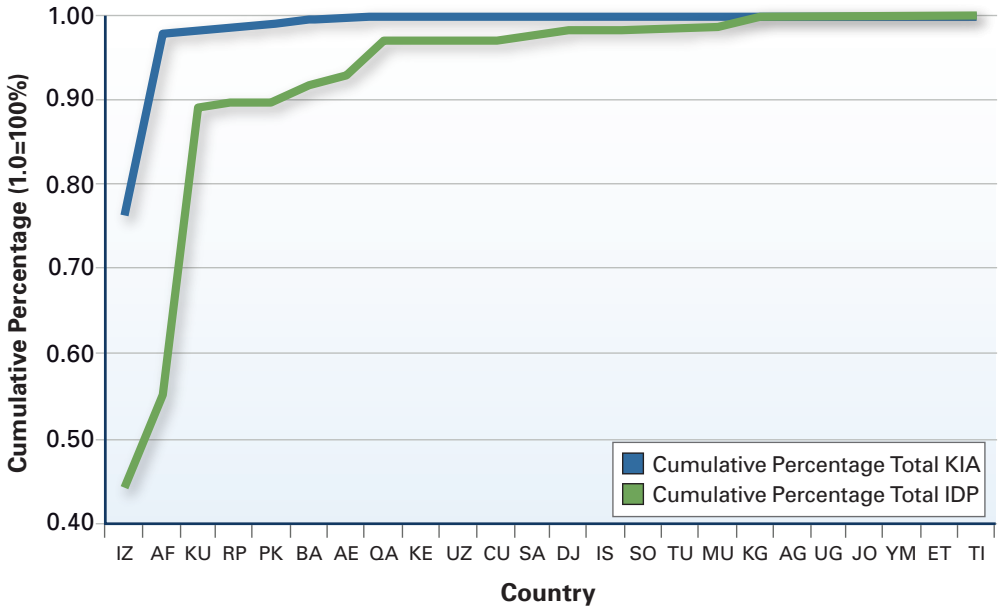


Figure D-1. Cumulative Percentages KIA and IDP

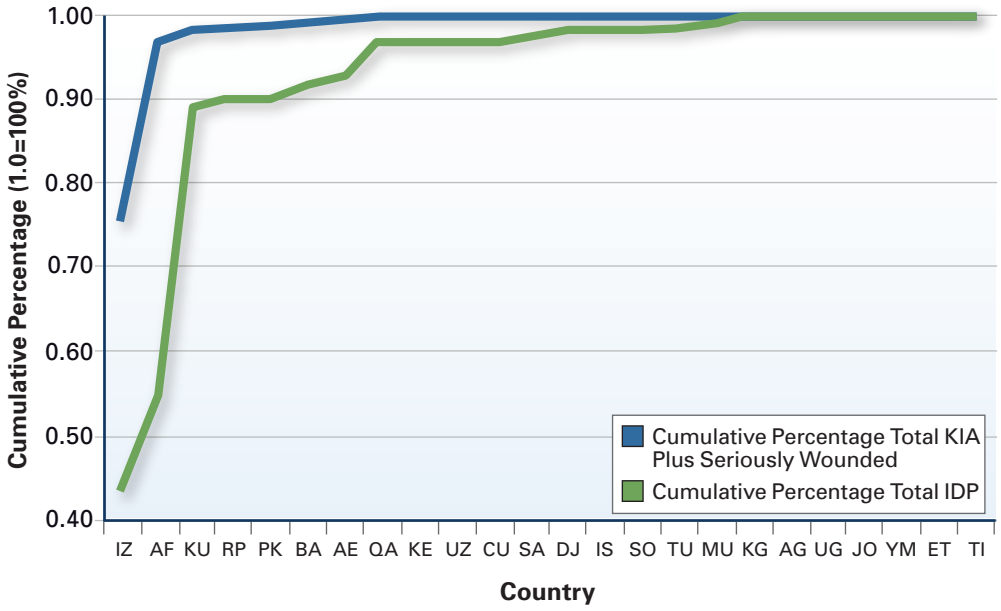


Figure D-2. Cumulative Percentages KSW and IDP

account for 89.7 percent of all IDP and (not shown in the table or figures to reduce clutter) for 90.3 percent of all CZTE months.

If IDP and CZTE for individuals in countries other than Iraq, Afghanistan, Kuwait, and the Philippines were eliminated, IDP and CZTE benefits would fall by 10 percent. These four countries account for $2.24 billion of the $2.5 billion in IDP, resulting in a savings in IDP over the 7-year period of about $360 million.

Because not all individuals within a country are at equal risk of becoming a fatality, it is informative to examine the same cumulative relationships when the data are broken out by service and occupation as well as by country. The data are limited to country-service-occupation cells with at least 10 personnel-years served over the FY 2003–2009 period. Figure D-3 shows the cumulative percentages of personnel KIA and IDP.

There are 6,606 country-service-occupation cells. As before, the data are sorted by active KIA from low to high. Because cells with fewer than 10 personnel years have been omitted—as they are not important in a qualitative sense—there are 3,468 total KIA. The first 419 country-service-occupation cells account for this entire total, but just 51.5 percent of all IDP. In other words, just under 50 percent of all IDP paid out over the 2003–2009 period went to individuals in country-service-occupation cells in which no one died.

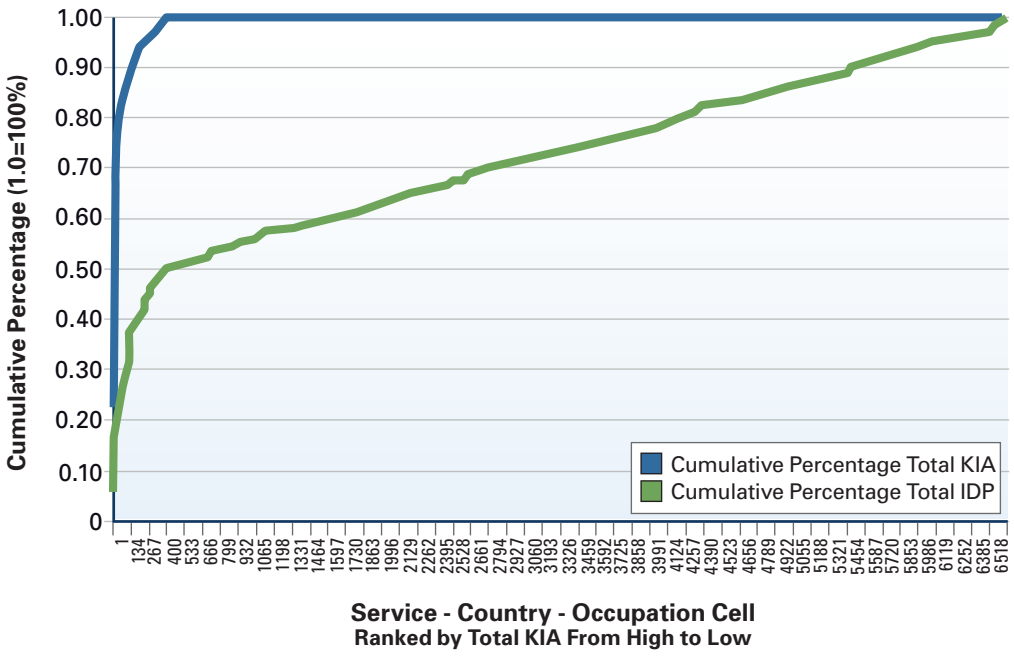


Figure D-3. Cumulative Percentages KIA and IDP by Country, Service, and Occupation

Figure D-4 shows the same relationship for KSW. The difference in the cumulative distributions is much less pronounced than for KIA, as can be seen by the fact that the cumulative distribution of KSW is upward sloping throughout. About 50 percent of IDP was paid out to individuals in cells that accounted for less than 10 percent of total casualties, and about 25 percent of IDP was paid out to individuals in cells that accounted for 3.5 percent of casualties.

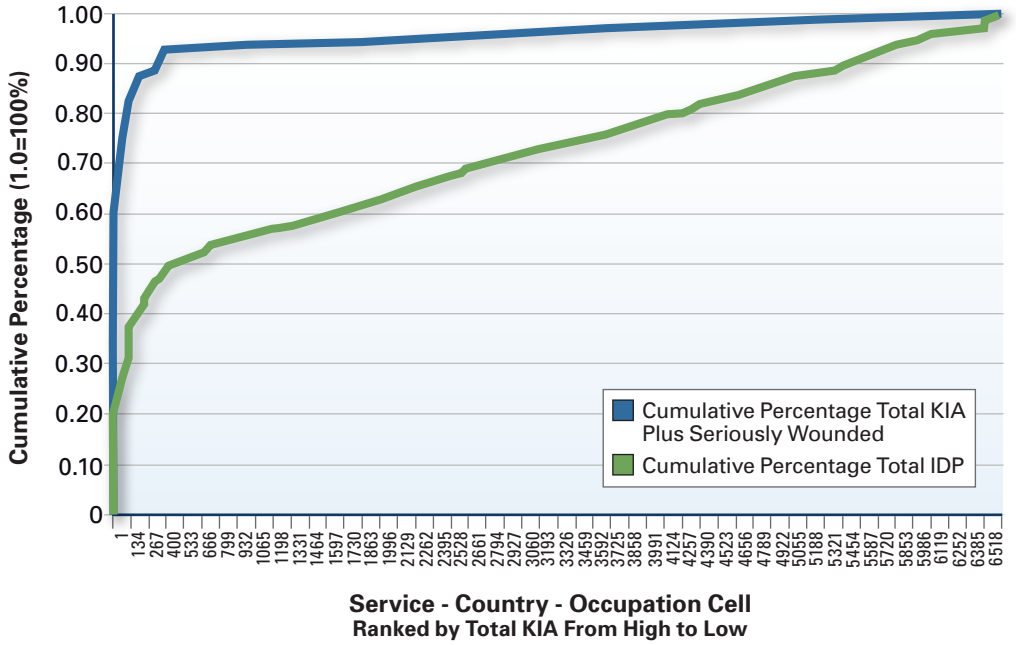
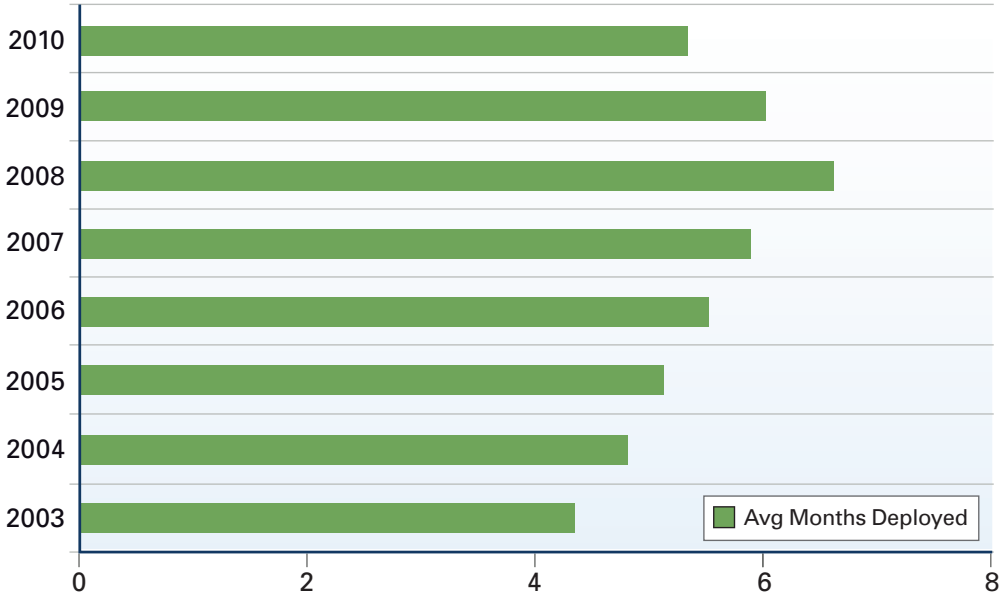


Figure D-4. Cumulative Percentages KSW and IDP by Country, Service, and Occupation

Appendix E. Average Months Deployed by Year



Source: Defense Manpower Data Center.

Figure E 1. Average Months Deployed by Year

Appendix F. Hypothetical Tax Return for E-4

Enduring Freedom

Form **1040** Department of the Treasury - Internal Revenue Service **U.S. Individual Income Tax Return 2010** (99) IRS Use Only-Do not write or staple in this space.

For the year Jan. 1-Dec. 31, 2010, or other tax year beginning ,2010, ending ,20 — OMB No. 1545-0074

Label (See instructions) **Use the IRS label.** Otherwise, please print or type. LABEL HERE

Name: GI Joe
Spouse's Name (if Joint Return): Melissa Joe
Home Address: 121 W East St
City, State, and ZIP Code: ARLINGTON VA 22222

Your social security number: 827-99-2368
Spouse's social security no.: 828-99-2368

▲ You **must** enter your SSN(s) above. ▲

Checking a box below will not change your tax or refund.

Presidential Election Campaign ▶ Check here if you, or your spouse if filing jointly, want $3 to go to this fund (see instructions) ▶ [X] **You** [X] **Spouse**

Filing Status Check only one box.

1 [ ] Single
2 [X] Married filing jointly (even if only one had income)
3 [ ] Married filing separately. Enter spouse's SSN above and full name here. ▶
4 [ ] Head of household (with qualifying person). (See instructions.) If the qualifying person is a child but not your dependent, enter this child's name here. ▶
5 [ ] Qualifying widow(er) with dependent child (see instructions)

Exemptions

6a [X] **Yourself.** If someone can claim you as a dependent, **do not** check box 6a
b [X] **Spouse**
c **Dependents:**

(1) First name Last name	(2) Dependent's social security no.	(3) Dependent's relationship to you	(4) ✓ if qualifying child for child tax credit (see inst)
Aaron Joe	829-99-2368	SON	X
Kimberly Joe	830-99-2368	DAUGHTER	X

If more than four dependents, see instr. and check here ▶ [ ]

d Total number of exemptions claimed

Boxes checked on 6a and 6b 2
No. of children on 6c who:
• lived with you 2
• did not live with you due to divorce or separation (see instr.) 0
Dependents on 6c not entered above 0
Add numbers on lines above ▶ 4

Income

7	Wages, salaries, tips, etc. Attach Form(s) W-2		7	29,900.
8a	**Taxable** interest. Attach Schedule B if required		8a	
b	**Tax-exempt** interest. **Do not** include on line 8a	8b		
9a	Ordinary dividends. Attach Schedule B if required		9a	
b	Qualified dividends (see instructions)	9b		
10	Taxable refunds, credits, or offsets of state and local income taxes (see instructions)		10	
11	Alimony received		11	
12	Business income or (loss). Attach Schedule C or C-EZ		12	
13	Capital gain or (loss). Attach Schedule D if required. If not required, check here ▶ [ ]		13	
14	Other gains or (losses). Attach Form 4797		14	
15a	IRA distributions 15a	b Taxable amount (see inst.)	15b	
16a	Pensions and annuities 16a	b Taxable amount (see inst.)	16b	
17	Rental real estate, royalties, partnerships, S corporations, trusts, etc. Attach Schedule E		17	
18	Farm income or (loss). Attach Schedule F		18	
19	Unemployment compensation (see instructions)		19	
20a	Social security benefits 20a	b Taxable amount (see inst.)	20b	
21	Other income. List type and amount (see instr.)		21	
22	Combine the amounts in the far right column for lines 7 through 21. This is your **total income** ▶		22	29,900.

Attach Form(s) W-2 here. Also attach Forms W-2G and 1099-R if tax was withheld.

If you did not get a W-2, see instructions.

Enclose, but do not attach, any payment. Also, please use Form 1040-V.

Adjusted Gross Income

23	Educator expenses	23		
24	Certain business expenses of reservists, performing artists, and fee-basis gov. officials. Attach Form 2106 or 2106-EZ	24		
25	Health savings account deduction. Attach Form 8889	25		
26	Moving expenses. Attach Form 3903	26		
27	One-half of self-employment tax. Attach Schedule SE	27		
28	Self-employed SEP, SIMPLE, and qualified plans	28		
29	Self-employed health insurance deduction (see instr.)	29		
30	Penalty on early withdrawal of savings	30		
31a	Alimony paid b Recipient's SSN ▶	31a		
32	IRA deduction (see instructions)	32		
33	Student loan interest deduction (see instructions)	33		
34	Tuition and fees. Attach Form 8917	34		
35	Domestic production activities deduction. Attach Form 8903	35		
36	Add lines 23 through 31a and 32 through 35		36	
37	Subtract line 36 from line 22. This is your **adjusted gross income** ▶		37	29,900.

For Disclosure, Privacy Act, and Paperwork Reduction Act Notice, see instructions. Form **1040** (2010)

BCA US1040$1

Form 1040 (2010) GI & Melissa Joe 827-99-2368 Page 2

Tax and Credits	38	Amount from line 37 (adjusted gross income)		38	29,900.
	39a	Check if: You were born before Jan. 2, 1946, Blind. Spouse was born before Jan. 2, 1946, Blind. Total boxes checked ▶ 39a			
	b	If your spouse itemizes on a separate return or you were a dual-status alien, see instructions and check here ▶ 39b			
	40	Itemized deductions (from Schedule A) or your standard deduction (see instructions)		40a	11,400.
	41	Subtract line 40a from line 38		41	18,500.
	42	Exemptions. Multiply $3,650 by the number on line 6d		42	14,600.
	43	Taxable income. Subtract line 42 from line 41. If line 42 is more than line 41, enter -0-		43	3,900.
	44	Tax (see instructions). Check if any tax is from: a Form(s) 8814 b Form 4972		44	393.
	45	Alternative minimum tax (see instructions). Attach Form 6251		45	
	46	Add lines 44 and 45 ▶		46	393.
	47	Foreign tax credit. Attach Form 1116 if required	47		
	48	Credit for child and dependent care expenses. Attach Form 2441	48		
	49	Education credits from Form 8863, line 23	49		
	50	Retirement savings contributions credit. Attach Form 8880	50		
	51	Child tax credit (see instructions)	51	393.	
	52	Residential energy credits. Attach Form 5695	52		
	53	Other credits from Form: a 3800 b 8801 c	53		
	54	Add lines 47 through 53. These are your total credits		54	393.
	55	Subtract line 54 from line 46. If line 54 is more than line 46, enter -0- ▶		55	
Other Taxes	56	Self-employment tax. Attach Schedule SE		56	
	57	Unreported social security and Medicare tax from Form: a 4137 b 8919		57	
	58	Additional tax on IRAs, other qualified retirement plans, etc. Attach Form 5329 if required		58	
	59	a Forms(s) W-2, box 9 b Schedule H c Form 5405, line 16		59	
	60	Add lines 55 through 59. This is your total tax ▶		60	
Payments	61	Federal income tax withheld from Forms W-2 and 1099	61		
	62	2010 estimated tax payments and amount applied from 2009 return	62		
	63	Making work pay and government retiree credits. Attach Schedule M	63	800.	
If you have a qualifying child, attach Schedule EIC.	64a	Earned income credit (EIC)	64a	3,253.	
	b	Nontaxable combat pay election 64b			
	65	Additional child tax credit. Attach Form 8812	65	1,607.	
	66	American opportunity credit from Form 8863, line 14	66		
	67	First-time homebuyer credit from Form 5405, line 10	67		
	68	Amount paid with request for extension to file (see inst.)	68		
	69	Excess social security and tier 1 RRTA tax withheld (see inst.)	69		
	70	Credit for federal tax on fuels. Attach Form 4136	70		
	71	Credits from Form: a 2439 b 8839 c 8801 d 8885	71		
	72	Add lines 61, 62, 63, 64a and 65 through 71. These are your total payments ▶		72	5,660.
Refund	73	If line 72 is more than line 60, subtract line 60 from line 72. This is the amount you overpaid		73	5,660.
Direct deposit? See instructions and fill in 74b, 74c, and 74d, or Form 8888.	74a	Amount of line 73 you want refunded to you. If Form 8888 is attached, check here ▶		74a	5,660.
	b	Routing number ▶ c Type: Checking Savings			
	d	Account number ▶			
		Amount of line 73 you want applied to your 2011 estimated tax ▶	75		
Amount You Owe	76	Amount you owe. Subtract line 72 from line 60. For details on how to pay, see inst. ▶		76	
	77	Estimated tax penalty (see instructions)	77		

Third Party Designee Do you want to allow another person to discuss this return with the IRS (see instructions)? Yes. Complete the following. ☒ No
Designee's name ▶ Phone no. ▶ Personal identification number (PIN) ▶

Sign Here Joint return? See instr. Keep a copy for your records.
Under penalties of perjury, I declare that I have examined this return and accompanying schedules and statements, and to the best of my knowledge and belief, they are true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Your signature	Date	Your occupation	Daytime phone number
		US Military	571-555-3456
Spouse's signature. If a joint return, **both** must sign.	Date	Spouse's occupation	
		Housewife	

Paid Preparer's Use Only

Print/Type preparer's name	Preparer's signature	Date	Check if self-employed	PTIN
				S28012731

Firm's name ▶ Falls Church Skillsource Ctr 1 Firm's EIN
Firm's address ▶ 6245 Leesburg Pike N 315 Phone no.
FALLS CHURCH VA 22044

BCA US1040$2 Form **1040** (2010)

Appendix G. Distribution of Tax Savings for Officers by Service, Pay Grade, and Year

The source for all data in this appendix is Department of Treasury, Office of Tax Analysis, April 15, 2011.

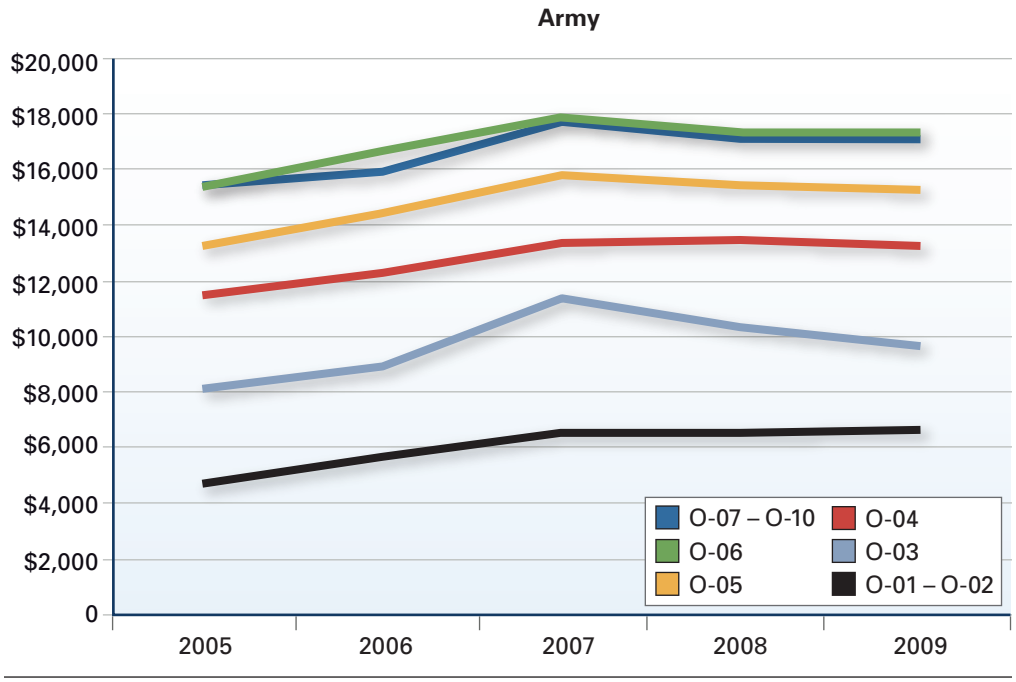


Figure G-1. Distribution of Tax Savings for Army Officers

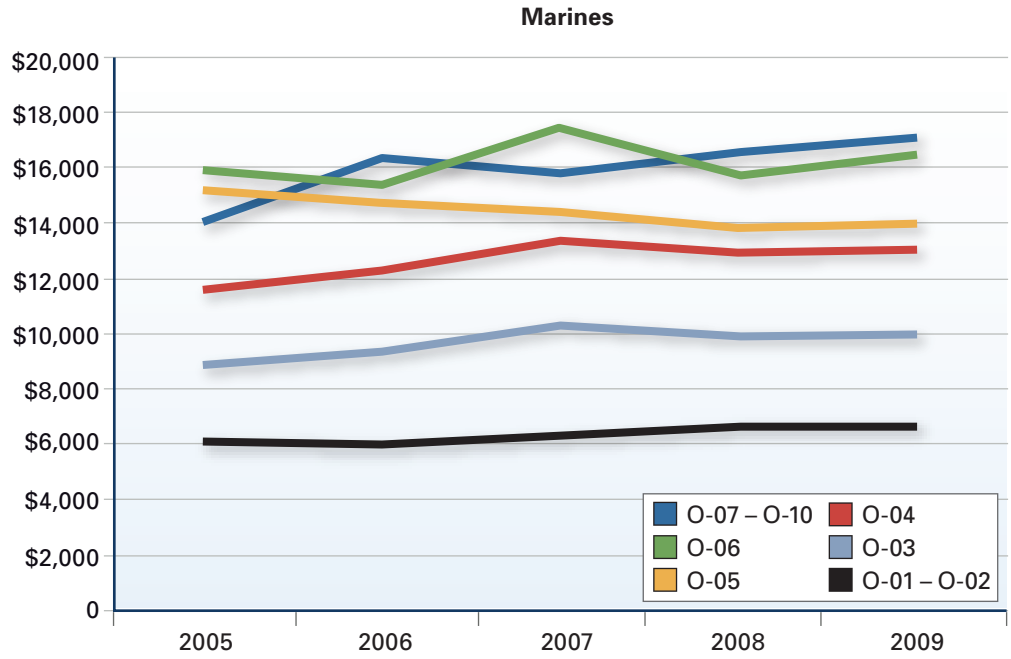


Figure G-2. Distribution of Tax Savings for Marine Officers

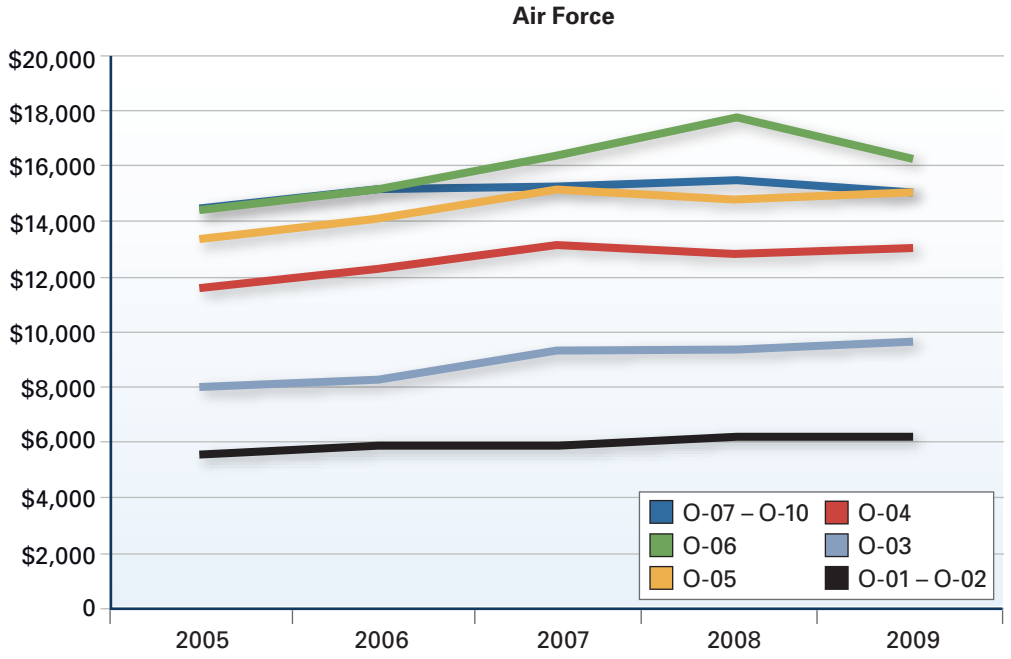


Figure G-3. Distribution of Tax Savings for Air Force Officers

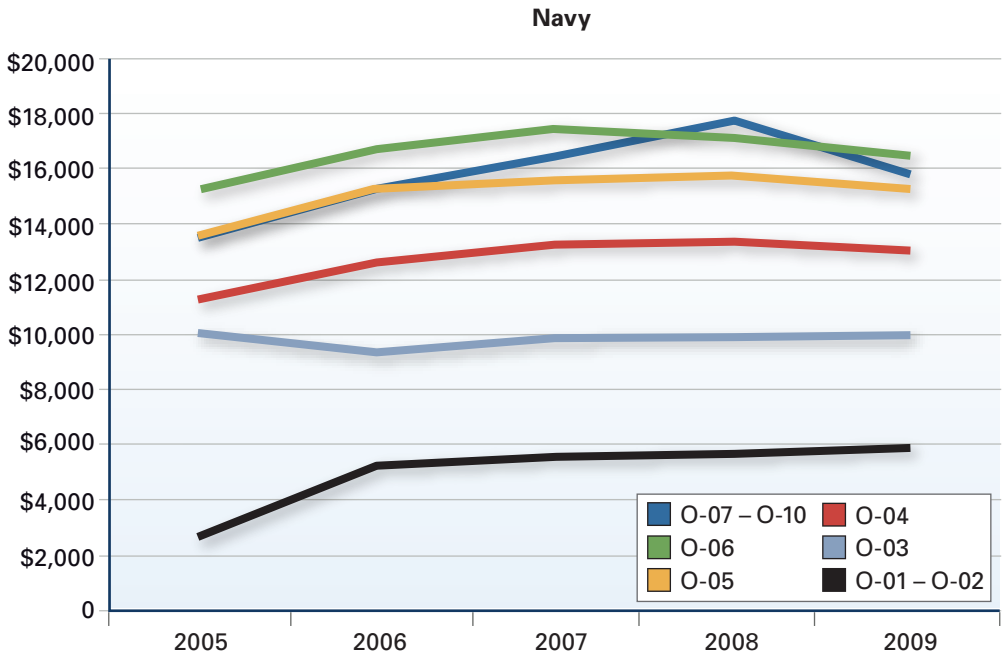


Figure G-4. Distribution of Tax Savings for Navy Officers

Appendix H. Distribution of Tax Savings for Enlisted by Service, Pay Grade, and Year

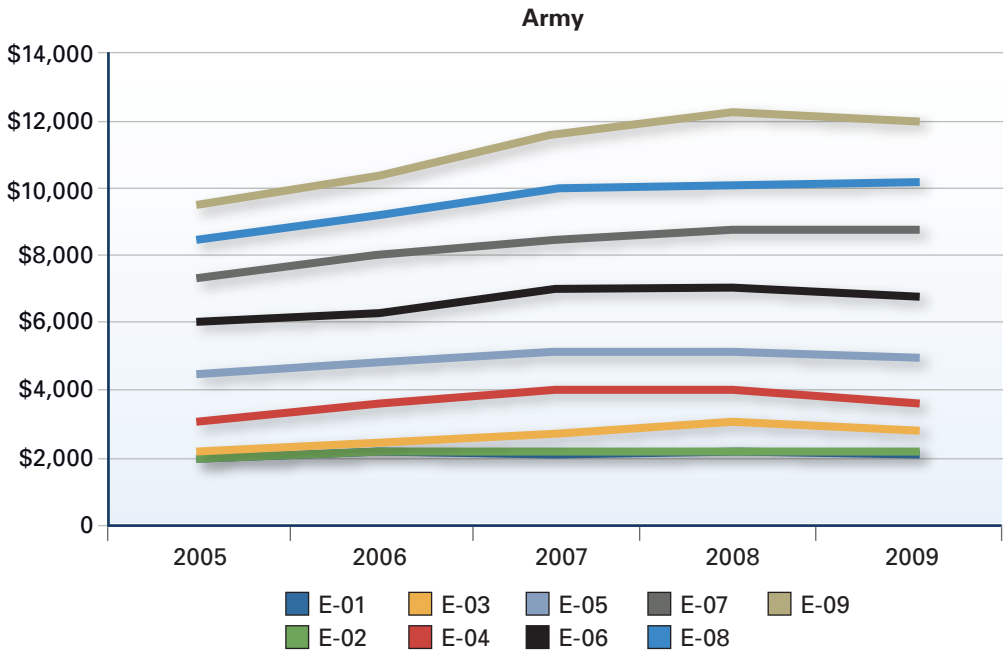


Figure H-1. Distribution of Tax Savings for Army Enlisted Personnel

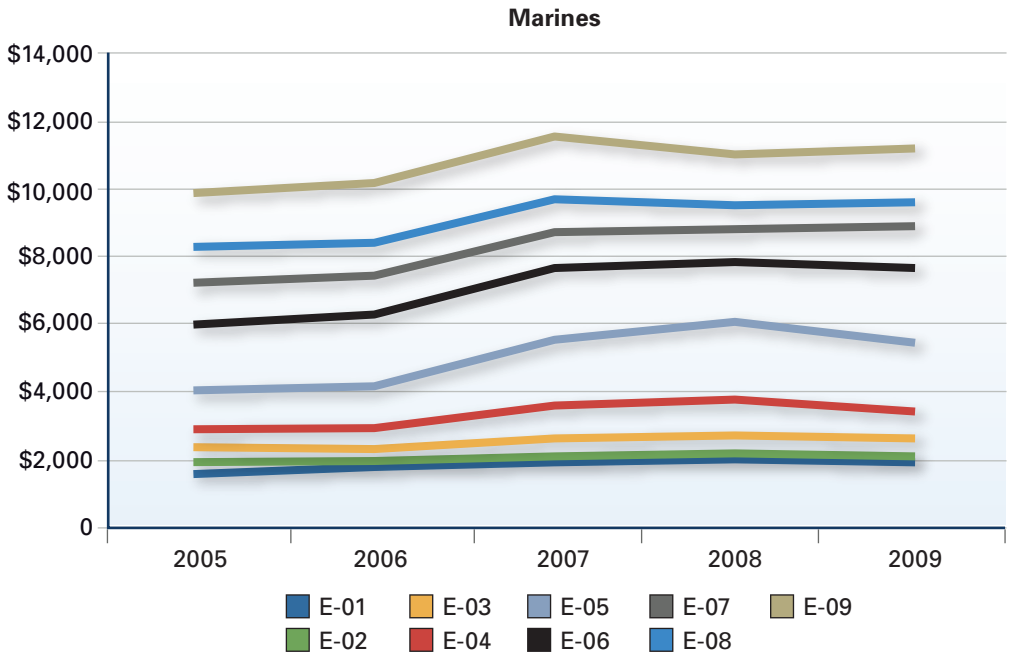


Figure H-2. Distribution of Tax Savings for Marine Enlisted Personnel

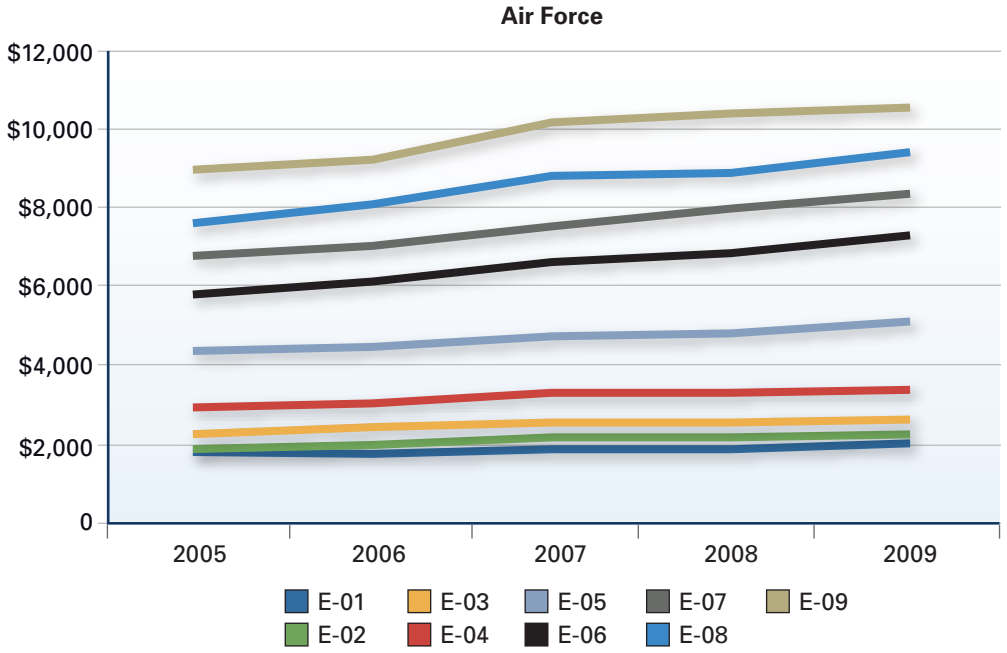


Figure H-3. Distribution of Tax Savings for Air Force Enlisted Personnel

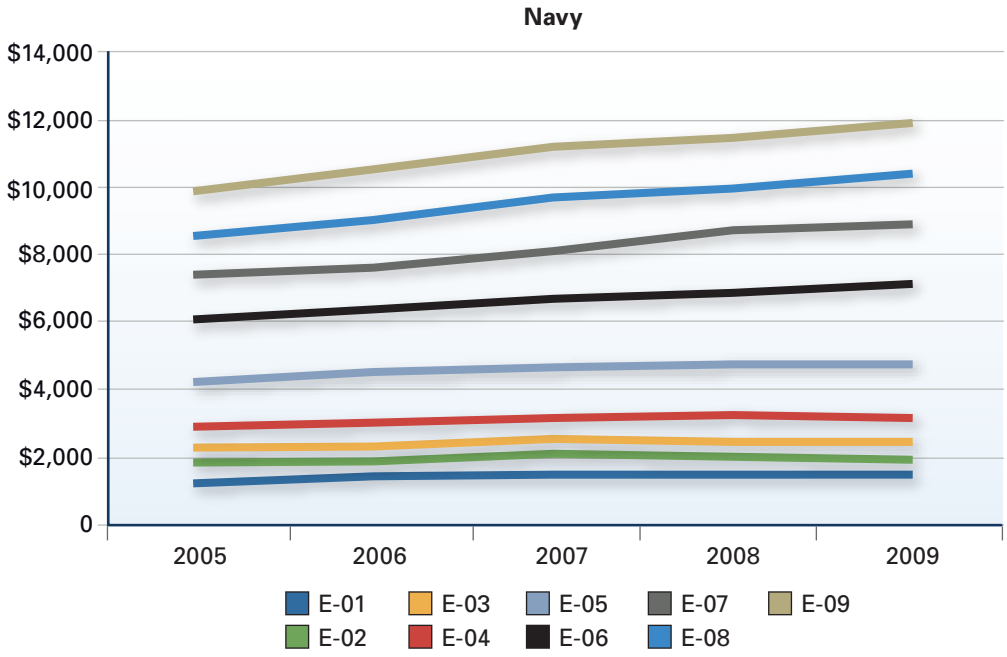


Figure H-4. Distribution of Tax Savings for Navy Enlisted Personnel

References

Defense Manpower Data Center. January 2011 Status of Forces Survey. For active duty members, question 164 c, d, and e. For Reserves, question 233 c, d, and e.

Directorate of Military Compensation. Brief delivered to the Association for Financial Counseling and Planning Education, Denver, CO, November, 2010.

Exec. Order No. 11216, April 24, 1965.

Exec. Order No. 12744, January 21, 1991.

Exec. Order No. 13002, May 13, 1996.

Exec. Order No. 13119, April 13, 1999.

Exec. Order No. 13239, December 12, 2001.

Human Resources Strategic Assessment Program (HRSAP), Defense Manpower Data Center. 2010 QuickCompass Survey.

Public Law 104-117, November 21, 1995.

Public Law 106-21, April 19, 1999.

Report of the 1971 QRMC: Hostile Fire Pay, Second Edition, December 1971.

"Some Soldiers in Iraq to Receive Extra Pay," *Army News Service*, February 23, 2004.

Treasury Department. TD 7066, November 10, 1970.

Chapter 10

Combat Risk and Pay: Theory and Some Evidence

Curtis J. Simon
Shirley H. Liu
Saul Pleeter
Stanley A. Horowitz

Executive Summary

The Department of Defense (DoD) has long acknowledged the importance of recognizing, in the form of monetary compensation, servicemembers' sacrifice during times of conflict. Currently, combat-related compensation takes the form of Hostile Fire Pay/Imminent Danger Pay (HFP/IDP) and the Combat Zone Tax Exclusion (CZTE). HFP/IDP is currently set at $225 per month for any part of a month while in a designated area or exposed to hostile activities. The CZTE designation permits servicemembers to forgo paying federal and state income tax on service-related income earned while in a combat zone. Under current policy, CZTE designation and payment of HFP/IDP is based solely on geography. Despite the original intention of such pays to compensate only those who face significant probabilities of death or injury, in practice they cover individuals who face a wide range of risks to life and limb. For this reason, the 11th Quadrennial Review of Military Compensation (QRMC) is reexamining the way in which combat pays are determined.

This report examines the relationship between total cash compensation and risk in the U.S. military. Total military cash compensation includes a variety of special pays and bonuses that are relevant to an examination of compensation servicemembers receive and the risks to which they are exposed. In addition, the current report examines the relationship between total cash compensation and combat risk using information on individuals deployed both inside and outside combat zones.

This report uses the conceptual model of compensating differences, which is well known to economists. The model posits that total compensation must rise with combat risk to induce individuals to accept that level of risk. In practice, individual servicemembers may sort themselves across different military occupations so that

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

those least averse to risk choose the most dangerous occupations. In that case, the most economically efficient combat compensation scheme conceivably would involve paying servicemembers in more dangerous occupations smaller increments for risk than servicemembers in safer occupations. By that logic, the rule that incremental compensation for risk should rise at higher levels of risk applies only within occupations.

This report uses data drawn from two sources. The information on combat killed and wounded was taken from individual-level "event" information that covered the period FY 2003–2009. Information on deployment and years served was collected from calendar year payroll observations that included every individual who deployed to a combat zone at any time between 2003 and 2009.

Military service is a *very* dangerous way of life, particularly when the member is deployed in a combat zone. Using data from between 2003 and 2009, the probability of being killed per year served averaged 0.014 per 1,000 servicemembers deployed in non-combat zone assignments and 1.164 per 1,000 servicemembers deployed in combat zone assignments. The figure for those deployed to a combat zone is orders of magnitude higher than in the civilian sector. For example, Viscusi (2004) estimates a probability of being killed in a manufacturing environment of just 0.03 per 1,000 full-time workers.

To analyze the relationship between compensation and combat risk, a regression model was estimated using data on enlisted personnel for the period 2003–2009. Information on both compensation and the risk of death was categorized by location, occupation, Service, and pay grade. Using data on individuals deployed to combat zones and those not deployed, we estimated that an increase in risk of death of one per thousand personnel was associated with $551 per person more in annual compensation. Variation in compensation within the combat zone was found to be much less strongly related to risk.

1. Introduction

Since September 11, 2001, the United States has been engaged in a number of conflicts of varying intensity. The Armed Forces were reasonably well adapted to staffing an All-Volunteer Force (AVF) during times of relative peace, although recruiting challenges arose occasionally during times of a particularly healthy civilian economy. Staffing a force that is at constant war posed new challenges, particularly for the Army, which has incurred the brunt of the casualties.

The Department of Defense (DoD) has long acknowledged the importance of recognizing, in the form of monetary compensation, servicemembers' sacrifice during times of conflict. Currently, combat-related compensation takes the form of Hostile

Fire Pay/Imminent Danger Pay (HFP/IDP) and the Combat Zone Tax Exclusion (CZTE). HFP/IDP is currently set at $225 per month for any part of a month while in a designated area or exposed to hostile activities. The CZTE designation permits servicemembers to forgo paying federal and state income tax on service-related income earned while in a combat zone. Under current policy, CZTE designation and payment of HFP/IDP is based solely on geography. Despite the original intention of such pays to compensate only those who face significant probabilities of death or injury, in practice they cover individuals who face a wide range of risks to life and limb. For this reason, the 11th Quadrennial Review of Military Compensation (QRMC) is reexamining the way in which combat pays are determined.

The notion that individuals must be compensated for facing above average risks has its roots in Adam Smith's (1776) theory of compensating differences, and Rosen (1986) devised what has become the standard neoclassical economic theory relating wages to the differing conditions (including risk) of various occupations. In its modern form, what economists call hedonic wage theory has been used to measure the willingness of individuals to accept employment in jobs that pose high levels of risk. In particular, the dollar increment to compensation necessary to induce an individual to accept a given increase in the probability of being killed on the job is called the value of a statistical life (VSL), a metric that has become widely used for the purposes of cost-benefit analysis by economists as well as by the U.S. government.

While VSL is a widely accepted way of thinking about wage differentials in the civilian sector, this is less true of the U.S. military. For example, Koopman and Hattiangadi (2002, 151) identify special and incentive pays as being "recognition pays" for hazardous or unpleasant duty, with no indication that HFP/IDP might be related to the values that individuals place on their own lives, or that combat pay should be commensurate with the risks involved.

The purpose of this paper is to further examine the relationship between the total cash compensation individuals in the U.S. military receive and the risk they face. Total military cash compensation includes a variety of special pays and bonuses that, although not serving a strictly combat-pay purpose, may in part reflect what must be paid to induce individuals to accept the greater risk inherent in particular occupations or other circumstances. These elements of compensation thus may augment, or even substitute for, combat pays as compensation for risk. This paper will examine the relationship between total cash compensation and combat risk, using information on individuals deployed both inside and outside combat zones.

The paper is organized as follows. Section 2 briefly reviews the history of combat compensation. Section 3 uses the well-known model of compensating differences to

illustrate how the various special and incentive pays might be used in an economically efficient combat pay system. Section 4 describes the data and presents new estimates of the annual probability of being killed or seriously wounded in action, and how this probability varies over time, across Services, across occupations, and between countries. Section 5 presents evidence on the empirical relationship between combat risk and total monetary compensation during the period 2003–2009. This is presumably linked to how much servicemembers must be paid to bear additional risk. Section 6 concludes with a brief summary and suggestions for future research.

2. Combat Pay: Background

Since World War I, members of the U.S. military have received war-related compensation in addition to their regular pays and allowances. The CZTE was originally established in World War I (WWI) "to alleviate the burden of war finance from those who fought in the nation's conflicts" (Pleeter et al. 2011, 23). Recognition for combat risks in the form of additional cash pay originated during World War II (WWII) with Badge Pay for combat infantry (Gould and Horowitz 2011, 21). These pays were limited in temporal and geographical scope and not intended to reproduce the operations of a voluntary labor market.

Another benefit received as combat compensation is the payment of Servicemembers' Group Life Insurance (SGLI) premiums for the duration of the member's deployment to a combat zone. Premiums amount to $.065 per $1,000 of life insurance (or $26 per month for the maximum coverage of $400,000), plus $1 per month for the SGLI Traumatic Injury Protection Program (T-SGLI).[1] Other combat zone benefits include programs such as student loan repayment, income replacement for Reservists, a savings program, and the Marine GYSGT John David Fry Scholarship[2]—to name a few—that are not automatically distributed to members and not widespread in terms of the number of members receiving them. (Pleeter et al. 2011, 5).[3]

1. Servicemembers normally are permitted to purchase up to $400,000 worth of life insurance. The decision to purchase life insurance, like the decision to purchase other assets, is a component of the consumption-saving decision extended to a world of state-dependent utility (see, for example, Lewis 1989). If priced actuarially fairly, payments into the system equal payments out and the expected value of the insurance is zero for servicemembers as a group. To the extent that insurance is subsidized¾for example, the insurance fee is waived for servicemembers deployed to a combat zone¾one should count the actuarially fair value of the insurance premiums as compensation received by servicemembers when they are alive.
2. Marine GYSGT John David Fry Scholarship is a GI Bill benefit paid to surviving dependent children.
3. Cash compensation for military personnel can be divided into regular military compensation (RMC), special and incentive (S&I) pays, and miscellaneous allowances and cost-of-living allowances (COLAs). RMC is the sum of basic pay, housing allowance, subsistence allowance, and the federal tax advantage owing to the non-taxability of allowances. The various special and incentive pays have different rationales. Bonuses, for example, enable the recruitment and retention of personnel in critical skill areas. The retirement system

DoD has considerable flexibility with respect to the assignment of military personnel once someone has enlisted or received a commission. However, it must attract individuals to join in the first place. The military is confronted with a constant need to attract and motivate large numbers of individuals from a population with heterogeneous tastes for different types of careers and with different attitudes toward risk.

Staffing a volunteer military during periods of conflict and casualties may require higher levels of compensation than are necessary during periods of peace. The fact that individuals value life and limb implies that some increase in compensation will be necessary. This may be offset in part or in whole by patriotic motivation—the desire to embrace an obligation of citizenship. The theoretical framework of this paper focuses on aversion to risk and the increased compensation that must be provided when risk rises, but the empirical portion of the paper is agnostic with respect to which effect dominates.

Historically, the military compensation system has tended to vary along only two dimensions: rank and years of service. However, the advent of the AVF led DoD to develop a range of new compensation tools to enable it to meet the nation's defense manpower requirements. Various special pays have long been considered to be good policy.[4] DoD has taken advantage of the flexibility given it by the Congress to differentiate compensation across individuals who possess particularly desirable and scarce initial qualifications. Recently, DoD has implemented a wide range of differential compensation in the form of initial enlistment bonuses for occupational and term commitments (Simon and Warner 2009), College Funds for High Quality recruits, bonuses for native language speakers, and differentiation of pay across location (e.g., the Navy's Assignment Incentive Pay (AIP) System).[5]

However, when it has come to combat pay, DoD has implemented little variation either geographically or with regard to the risks faced (Pleeter et al. 2011). Much of the variation in the value of combat compensation, whether by chance or design, bears little or even an inverse relation to the risk faced by military personnel.

---

creates a strong incentive for military personnel to stay beyond 10 years and to leave after 20 years (Asch et al. 2008, 8).

4. The Selective Reenlistment Bonus (SRB) was established in 1974, which provides re-enlistees in selected occupations with a bonus in return for at least 3 additional years of service. In addition to occupation, the SRB has varied with experience level. In 1999, the Army further refined the SRB with the Targeted SRB, which varied by assignment location, unit, and Special Qualification Indicator (SQI). The Location SRB was introduced to award higher multipliers for personnel in units mobilized to Afghanistan, Iraq, and Kuwait (Simon and Warner 2010, 508-9).

5. In AIP, sailors submit bids online for the amount of additional compensation they would require to accept an assignment listed in AIP up to a preset maximum The Navy selects the "winner" based on the total cost to the Navy, defined to be the sum of AIP payments, training costs, Permanent Change of Station costs, and the costs of any "gap" in the billet (quoted from Carrell and West 2005, 807).

As noted earlier, combat compensation is not the only element of total military pay and benefits that can compensate for bearing risk. Questions naturally arise as to how much the overall compensation scheme compensates for risk and it how efficiently it does so. The next section presents a theoretical model to show how total compensation should vary with risk in an efficient system.

3. Theory of Compensating Differentials

The theory of compensating differentials can be traced to Smith (1776), but modern developments of the theory are found in Rosen (1986). In its simplest form, individuals are assumed to maximize utility over just two job characteristics, the wage rate W and the level risk as measured by the probability of an adverse event, p. The indifference curves reflect fixed values of utility $U=U(W,p)$, and, drawn in p-W space, are upward sloping and convex to the origin, indicating that higher levels of job risk must be compensated in the form of higher wages.

Notice that wages must rise with risk at an increasing rate. To see why, consider how much any particular individual would be willing to sacrifice in wages in return for additional safety. It is intuitively plausible that as risk declines, the willingness to sacrifice wages in return for additional increments in safety declines. Put informally, a given individual is less willing to sacrifice a dollar of wages in return for additional safety in an office job than, for example, in a job felling trees.[6] In a more formal sense, it is the result of the diminishing marginal rate of substitution (MRS) between goods. Here the two goods are safety and everything else (wages). Diminishing MRS means a convex indifference curve in wage-safety space. The less safety one has, the more one will be willing to pay for a given increment.

Figure 1 shows indifference curves for two different individuals. The red upward-sloping curve shows the indifference curve for an individual of type A and the blue upward-sloping curve shows the indifference curve for an individual of type B. Individual A is less averse to risk because the indifference curve is flatter at any given level of risk, indicating that a smaller increment in the wage rate is required to compensate for any given increase in risk. Looking at the intersection of the two curves, it can be seen that the indifference curve of individual A is flatter than that of individual B, meaning that individual B is willing to sacrifice more in the form of lower wages for a given reduction in the level of risk.

6. Bommier and Villeneuve (2010) extend the life-cycle consumption model to incorporate what they call mortality risk aversion in addition to risk aversion over consumption levels. Their correction leads to greater weight being placed on mortality risk reduction of the young.

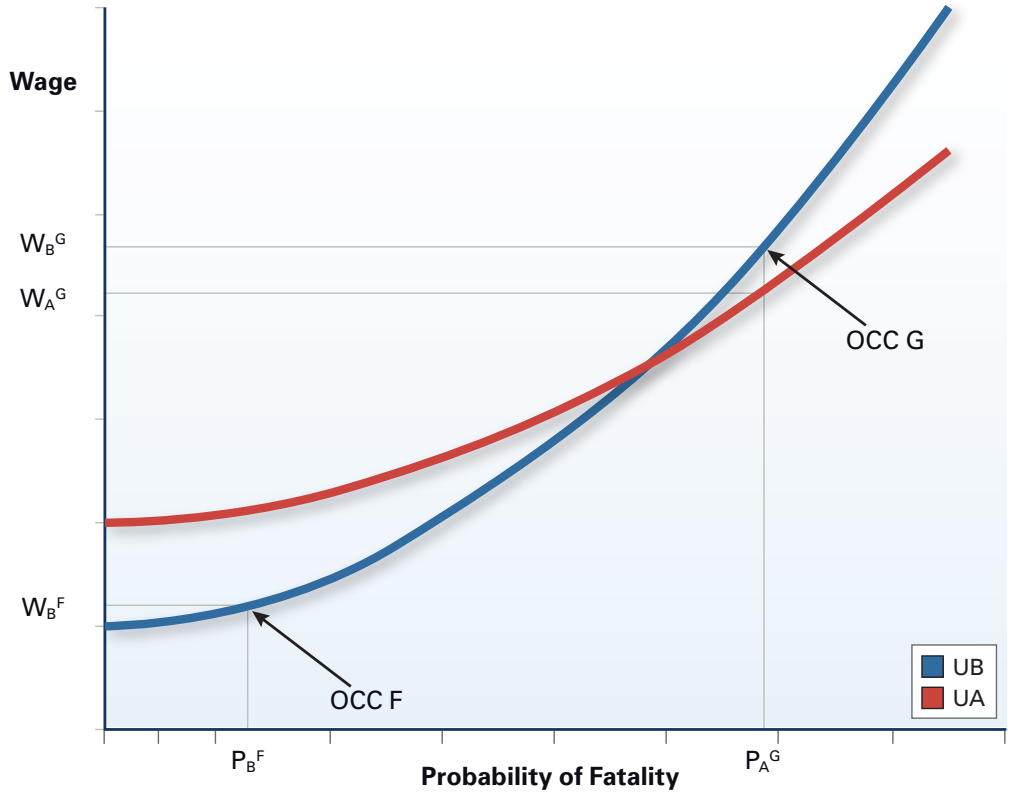


Figure 1. Individuals Least Averse to Risk Choose to Work in the Most Dangerous Firms

Suppose that there are two occupations, F and G, where the probability of fatality in occupation G, p_A^G is higher than in occupation F, p_B^F.[7] In competitive equilibrium, individuals of type A will match up with firms of type G and individuals of type B will match up with firms of type F. The VSL approximately determines the wage differential necessary to induce an individual to accept the increase in risk when moving from occupation F to occupation G. As can be seen, the VSL is higher for

7. In order to simplify the presentation, it is assumed that risk in each occupation is fixed. In the more general hedonic model, the preferences of firms are a function of profits. Because safety is costly, reductions in risk must be accompanied by a reduction in wages in order to keep profits constant at any given level. Therefore, the curves that show combinations of W and p that deliver equal profit, or iso-profit curves, must be positively sloped. Under the assumption that the cost of reducing risk on the job is increasing at an increasing rate, the iso-profit curves will be concave. A firm is said to be more dangerous when wages must be reduced more in order to achieve any given reduction in risk, that is, when the iso-profit curve is steeper. In competitive equilibrium, all firms earn zero economic profit. This equilibrium entails a tangency between each firm's zero-profit iso-profit curve and the indifference curve of the workers willing to supply their labor at the lowest possible price.

individual B than individual A because of their different preferences with respect to wages and risk.[8]

Suppose for the moment that individual B is offered a wage sufficiently high to accept the more dangerous occupation, W_B^G. The wage differential per unit increase in risk required for workers of type B to accept the more dangerous job is equal to $(W_B^G - W_B^F)/(p_A^G - p_B^F)$. Assume that the job in occupation G has a risk of being killed 1/1000 higher than firm F, and that individual B requires $4,000 per year in order to accept the more dangerous job. Then the wage differential per unit increase in risk is $4,000 x 1,000 = $4 million. One thousand, individuals such as B would require $4 million collectively in order to accept the possibility that an average of 1 more of them would die each year than in firm F. The wage differential per unit increase in risk is called the VSL. The differential illustrated in Figure 1 is the discrete approximation to person B's VSL. As the denominator becomes infinitesimally small (say by reducing the level of risk in assignment G), this ratio measures the marginal rate of substitution (MRS) between wages and risk, or the true VSL evaluated at (p_B^F, W_B^F).[9]

If individuals of Type A are available, it is not efficient for individuals of type B to work in occupation G. The reservation price of workers of type A for working in occupation G is lower. The VSL for individuals of type A when they work in occupation G, which is equal to the slope of the indifference curve, is flatter at the point p_A^G than individual B's, indicating that A's VSL is lower than B's.[10]

8. Matching worker B to firm G ("too dangerous") would require paying B wages sufficiently high so as to make him at least as well off as he is at F, meaning that one would have to keep B along his indifference curve. This would entail higher wage costs and lower (that is, negative) economic profits. Similarly, matching worker A to firm F ("too safe") would allow firm F to pay lower wages, but not as low a wage as they can pay worker B. The firm would have to keep A along his indifference curve , meaning that the firm would have to earn a negative profit.

9. Formally speaking, VSL is the marginal rate of substitution between money and mortality risk per unit time period, that is, the slope of an indifference curve between risk and wealth at a point. It is *not* the value of saving an individual's life with certainty (Cropper et al. 2000, 2, emphasis added).

10. The VSL is the most useful metric for valuing life, especially when compared with values imposed by the system of jurisprudence, for several reasons. First, it is market behavior that is relevant for how individuals value their own lives and safety and not the judgments of others. Second, Viscusi (1999) found that although judges avoided many pitfalls exhibited by jurors and the population at large, such as hindsight bias (59), they nevertheless exhibited systematic errors, particularly for small probability-large loss events (26). Third, Viscusi (2001) shows that jurors "fall substantially short of what one might hope for in terms of a desired pattern of decisions, particularly in small-probability, large-loss cases.… Jurors fault companies for thinking systematically about risk, even in situations in which on the basis of the usual economic criteria the firm was not negligent and complied with state-of-the-art economic evaluation practices employed by the responsible regulatory agencies" (135). Interestingly, though, Cohen and Miller (2003, 165) find that "pain and suffering" awards in a sample of 1200 consumer product related injury and intentional assault cases implied a VSL of between $1.4 and $3.8 million, "well within the range of estimates derived independently from wage-risk studies."

A. Implications for Military Compensation

Like employers in the model presented above, the military has to attract and retain people in occupations that face different degrees of risk and, to a first approximation, desires to do so without spending more on compensation than is necessary. For now, it will be assumed that the "production process" of the military is separable into two occupational tasks, F and G.[11] In addition to two occupations (OCCs), it will be assumed that individuals can either be stationed within the Continental United States (CONUS) or deployed overseas, where it is assumed that all deployments are alike within an occupation. It will be assumed that occupations F and G are both "safe" when individuals are in the U.S., while F is relatively safer than G when deployed.

The various assignments possible are shown in Figure 2. For now, it is assumed that there are only individuals of type B in the population. For stateside assignments, the efficient combination of W and p is found along the indifference curve. For example, OCCs F and G must pay a wage W^{CONUS} at risk level P_B^{CONUS} in order to attract volunteers.[12] In order for individuals in occupation F to deploy voluntarily, they must be paid a wage of at least $W_B^{F.DEP}$. In order for individuals employed in occupation G to be willing to deploy voluntarily, they must be paid a wage of at least $W_B^{G.DEP}$. Because mission G is more dangerous than mission F when deployed, $W_B^{G.DEP} > W_B^{F.DEP}$.[13]

11. The probability of mission success is a function of the number of personnel, the quantity and quality of capital, and other factors. Incorporating the probability of mission success is well beyond the scope of this paper. Another distinguishing feature of military service, compared with the civilian sector, is that the matrix of threats typically evolves at a much faster pace (e.g., improvised explosive devices (IEDs) and suicide bomber vests).

12. For individuals to be willing to volunteer in the military, B's indifference curve must lie at or above the indifference curve that corresponds to the level of utility offered in the civilian sector. This indifference level is not shown, to reduce clutter in the figure.

13. The same analysis could be applied to the case of a single occupation and two possible deployments, one more dangerous than the other.

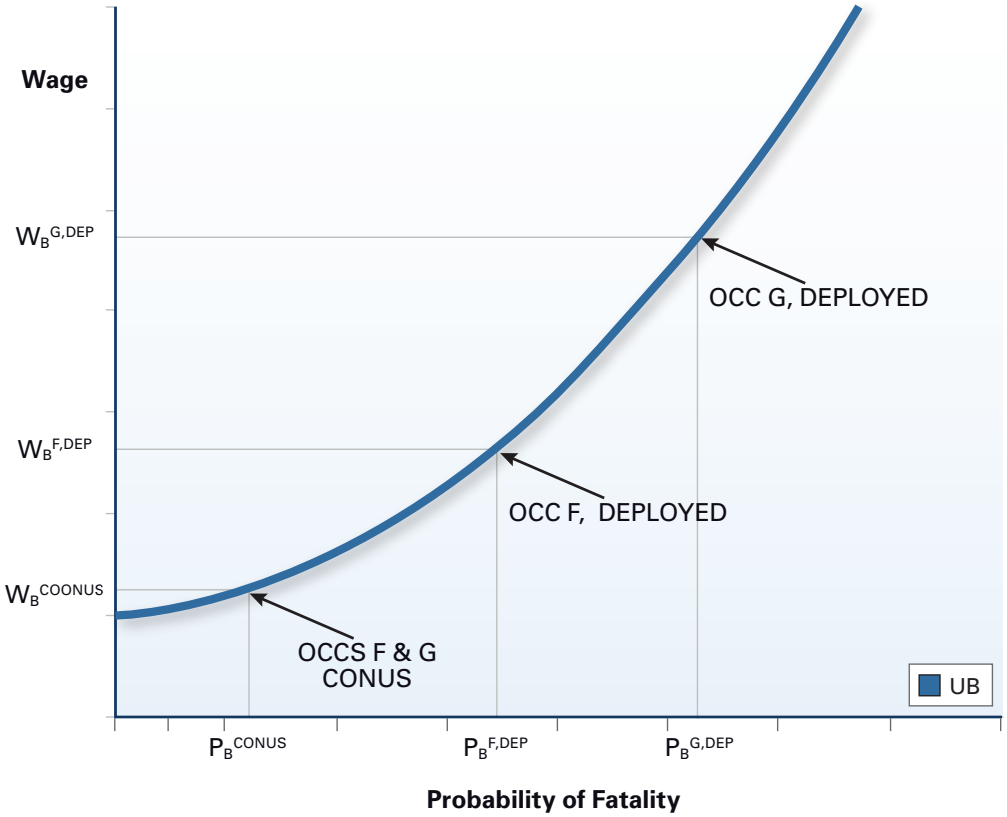


Figure 2. Wages Rise to Compensate Individuals for the Risk of Being Deployed

B. Cost-Minimizing Compensating Wage Differentials in the Military

The cost-minimizing combat compensation policy is one that just compensates individuals in occupations F and G for the added risk due to deployment. Because deployment increases risk by more in occupation G than occupation F, the cost-minimizing combat pay policy requires a higher pay differential in G than F. Under current compensation policy, all individuals deployed within a country designated as a combat zone receive an additional $225 HFP/IDP per month or part of month that they are in theater. By design, then, it is not possible to differentially compensate individuals who face different levels of combat risk using HFP/IDP alone. However, there are a number of other components of pay that might serve such a purpose, including Hardship Duty Pay (HDP), Special Duty Assignment Pay (SDAP), or enlistment (and re-enlistment) bonuses (EB).[14]

14. The analysis here abstracts from tax considerations, that is, CZTE. Hardship duty pays include compensation for undesirable locations (HDP-L), difficult missions (HDP-M), or for involuntary extension of contract. Currently, the maximum combined HDP is capped at $1,500 per month. The military also pays a variety of

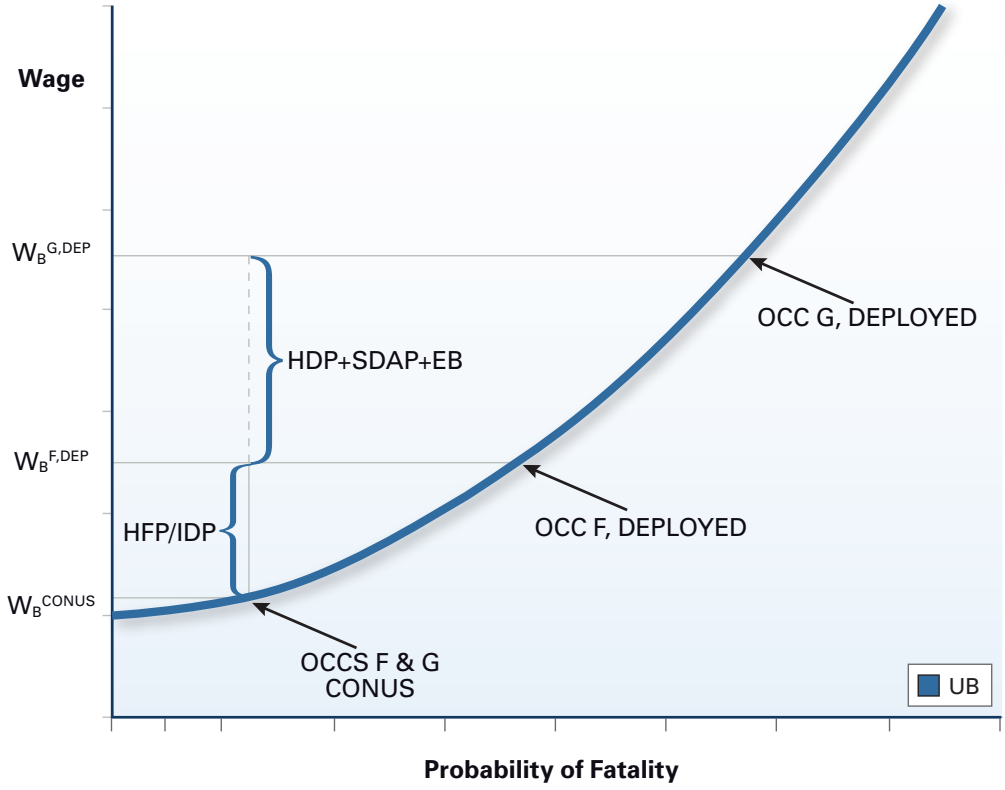


Figure 3. Optimal Compensating Wage Differentials in the Military

The efficient compensation policy is seen in Figure 3. HFP/IDP is used to ensure that individuals deployed in occupation F are no worse off deployed than in CONUS, and a combination of HDP, SDAP, and EB is used to compensate further individuals employed in the more dangerous occupation G.

C. Consequences of Overpaying HFP/IDP

Because current DoD policy pays all individuals HFP/IDP of $225 per month for serving in a combat zone, the possibility arises that DoD will overpay some individuals for combat risk, in the sense that they would be willing to serve at lower levels of total pay.[15] This scenario is depicted in Figure 4. HFP/IDP has been set at a level higher than necessary to compensate individual B for the risk of deployment in occupation F. It is assumed that the sum of HFP/IDP, HDP, SDAP, and EB just compensates individual B for the risk of deployment in occupation G when deployed.

Special Duty Assignment Pays (SDAP). DoD has been aware that reductions in one component of pay can be offset by increases in others (see, for example, Kapp 2003).

15. With heterogeneous tastes and incomplete sorting, such overpayment is inevitable; overpayment occurs when the marginal individual—the individual most averse to risk—would be willing to serve at lower pay.

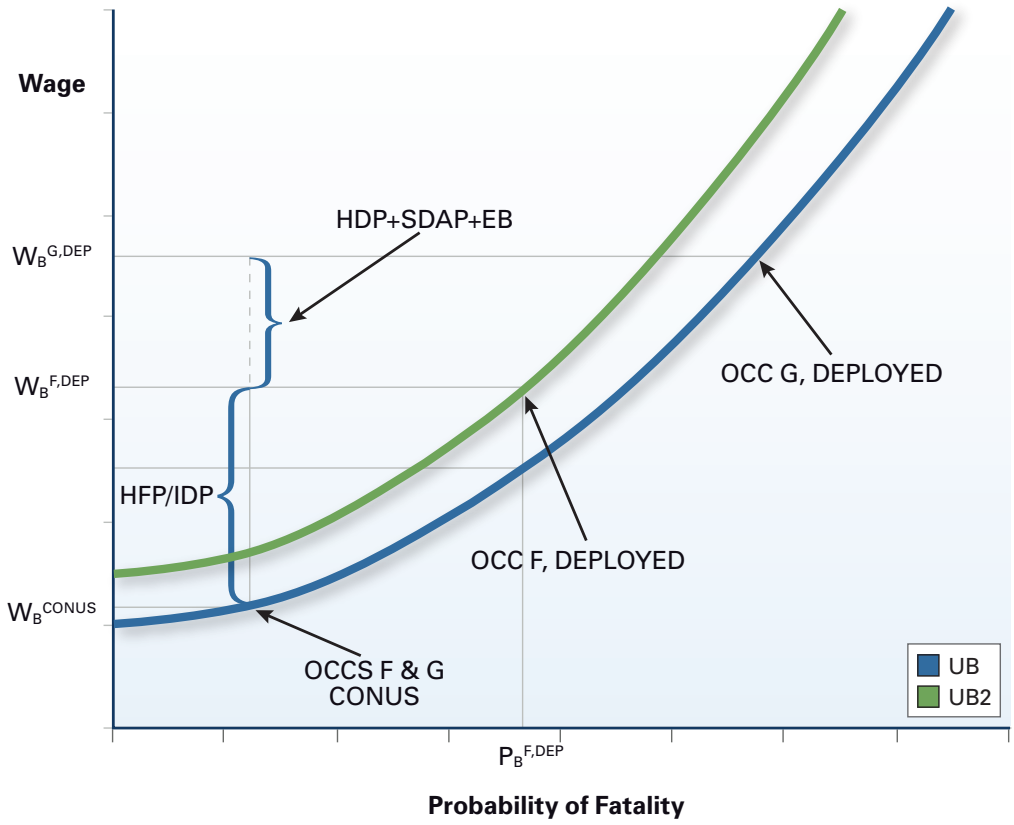


Figure 4. Overcompensation of Individuals in Less Risky Deployments

There are three undesirable consequences of overpaying HFP/IDP. First, DoD is not accomplishing the mission at the lowest possible cost to the taxpayer. Second, if all individuals were given the option of deploying in their choice of occupation, F or G, no one will want to deploy in occupation G. By overcompensating individuals deployed in occupation F, utility is higher than utility in either F or G in CONUS, and higher than being deployed in occupation G. The third consequence of overpaying HFP/IDP concerns the issue of fairness. The U.S. military does not give individuals the option of freely choosing their occupation at each point in time. When all individuals who deploy to a designated combat zone receive the same level of HFP/IDP, it is not possible to ensure that individuals would not prefer to switch to the safer occupation when deployed.[16]

16. An important part of military training is getting individuals to establish an identity, and resist the temptation to make interpersonal comparisons or engage in counterfactual exercises such as the one being carried out here. For example, the military might want to endow personnel with a utility function that would suffer a loss if an individual trained in occupation G were to opt for occupation F when deployed, even if given the choice. This amounts to saying that the indifference curve of such switchers would

D. Heterogeneity in Individual Types

Suppose now that individuals of type A, who are relatively less averse to risk than individuals of type B, become available for service. It is assumed that Type A individuals are so rare in the population that the military cannot solely recruit volunteers from this group. Figure 5 shows that the most cost-effective way to employ such individuals is in relatively dangerous missions such as deployments in occupation G. The reason is that the wage is determined by the most risk-averse individual employed in the occupation. As can be seen, the military must continue to pay sufficient HFP/IDP in order to entice individuals of type B to deploy in occupation F. However, the amount of HDP, SDAP, and EB necessary to compensate for the risks of deployment in occupation G is smaller for individuals of type A than for individuals of type B.

The military may have difficulty filling occupation G entirely with individuals of type A. It can then assign some type B individuals to deploy in occupation G

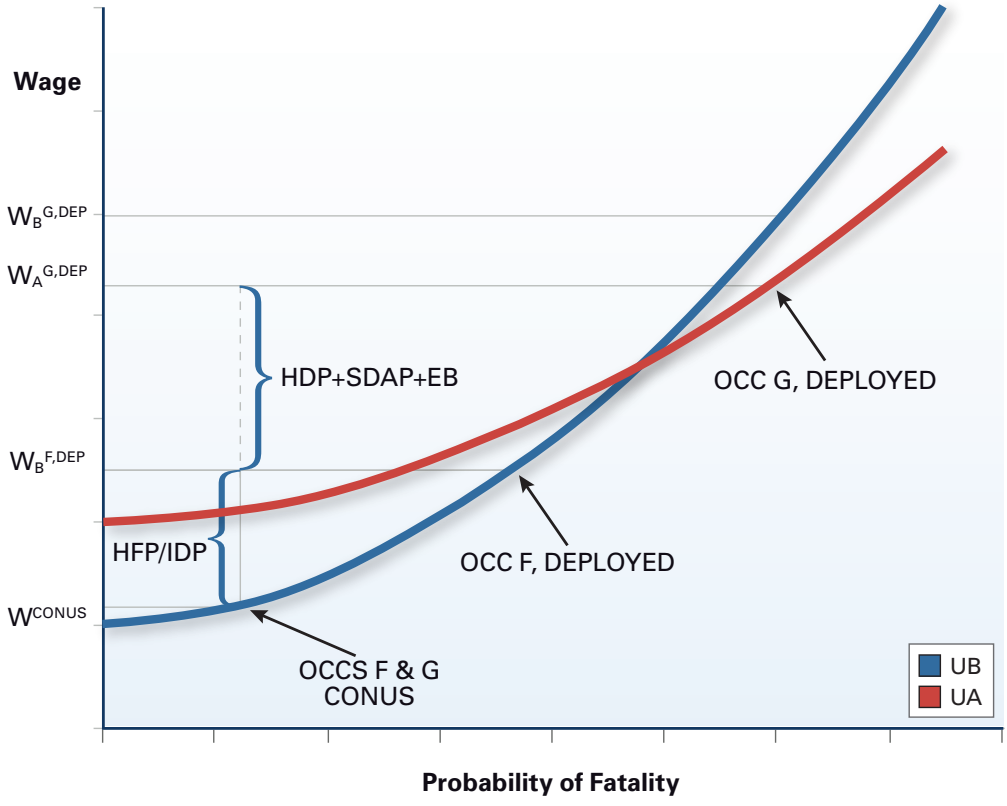


Figure 5. Individuals Least Averse to Risk Should be Assigned to the Most Dangerous Deployments

actually lie below and to the right of the blue indifference curve. Hosek, Kavanagh, and Miller (2006, 15ff.) review the sociological literature on combat motivation, and, in particular, the importance of group cohesion.

when they would prefer to be in occupation F.[17] Alternatively, some other means can be adopted to encourage individuals who would prefer to be in occupation F to deploy in occupation G. For example, the Services have used enlistment bonuses and college funds to attract individuals into hard-to-fill occupations. Such tools are not used in all cases. Recruiters are less likely to have to resort to such "deal-closers" for individuals of type A than they are for individuals of type B, thus generating a degree of inequity in compensation across individuals within an occupation.

The presence of individual heterogeneity poses difficulties for studying the relationship between compensation and combat risk, especially because occupations differ in characteristics other than combat risk. If individuals of type A have a preference for occupation G independently of wages and risk, they may be willing to enter occupation G even if the probability of being killed is higher and the wage lower than in occupation F. The model illustrated in Figure 1 through Figure 5 assumes that no such element enters preferences.

Absent occupational characteristics beyond wages and risk, and assuming that the military tries to employ individuals in their preferred occupations, the model presented in this section leads one to expect a positive relationship between total compensation and combat risk. To be sure, the magnitude of this relationship will reflect the preferences of servicemembers. Strong occupational preferences could attenuate (or exacerbate) the relationship. A strong patriotic response to a crisis could even eliminate it. It is, therefore, an empirical question as to whether this relationship can be detected using simple statistical techniques.

4. Measuring Combat Risk

This section presents evidence on the magnitude of combat risk across Services, occupations, ranks, and countries.

17. Random assignment of personnel across assignments with different risk levels compounds inefficiency when personnel are risk-averse. As of the early 2000s, the services tended to employ a "share the pain, share the gain" approach to filling assignments (Hogan and Mackin 2003, 1). For example, prior to the implementation of its AIP system, the Navy used a sea-shore rotation policy in which a ship-board tour—a bad assignment—would be followed by a shore-based (good) assignment. Hogan and Mackin (7) compare the compensation necessary to staff the force under two systems: random assignment and voluntary assignment. They demonstrate that an incentive system such as AIP enhances efficiency by better matching individuals of heterogeneous tastes to jobs at the lowest possible cost to the Navy. A random assignment system requires that the Navy pay an expected wage sufficient to attract all individuals—say, those with lower and higher aversion to sea-based assignments. The uncertainty over assignments is costly to the Navy. Because individuals are likely to be risk-averse, the incremental compensation necessary exceeds the probability-weighted premium demanded if they were to receive assignments with certainty.

A. Data Sources

Data are drawn from two sources: "event" information from the period FY 2003–2009 and calendar-year payroll records for the same period. The information on combat killed and wounded is taken from individual-level "event" information covering the period FY 2003–2009. For each event that occurs—killed, very seriously wounded, seriously wounded, or not seriously wounded—information is available on the individual's service, the fiscal year and country in which the event occurred, and the individual's occupation. The number of events of each type is summed for each combination of service, fiscal year, event country, and DoD occupation group. The resulting figures become numerators used to calculate the probability of being killed or wounded.

The probability of being killed or wounded in a country is equal to the number killed or wounded divided by the number of individuals at risk. The information on deployment and time in the combat zone was collected from calendar-year payroll observations that included every individual who deployed at any time between 2003 and 2009 to a combat zone. Each individual record contained up to three deployments, and included information on deployment country, deployment start date, and deployment end date. The information on start date and end date was used to convert the calendar year information on time served and deployed into fiscal years. When a single deployment included time spent in more than one country, the time deployed was calculated separately for each country, when possible.

Although the probability of being killed in a year of deployment is informative about the relative risks of various assignments, estimating the relationship between compensation and risk requires measuring each variable over the same time period. Because compensation is reported as a calendar year total, it is therefore necessary to know the probability that an individual is killed or wounded during a year of service. Although both the payroll and casualty data identify whether the individual is serving in an Active, Reserve, or Guard component, information on time served on active duty (as opposed to time deployed) is not available for Reservists. Therefore, information on the probability of being killed or wounded per year of service is calculated only for Active component (AC) personnel. The probability of being killed or wounded in a given country, service, year, and occupation cell is calculated as the number of individuals in that cell who were killed or wounded divided by the person-years served by individuals in that cell at some time in the fiscal year. The denominator will be referred to as years served.

To summarize, all our econometric analyses are based on casualty rates and compensation for individuals in specific calendar years, which are referred to as

years served. In many cases individuals were deployed for only part of a year. We have information on casualties, but not compensation, per year deployed. Some of the following tables and figures present information on both casualties per year served (only for AC personnel) and casualties per years deployed (for both AC and Reserve personnel).

Information on cash compensation information includes basic pay, total pay, total bonuses, HFP/IDP, HDP, and SDAP.[18] The value of the CZTE was estimated based on cash compensation and number of dependents. Because the information on pay is valid as of December 31 of each calendar year, the various pays are allocated across deployment locations according to the fraction of time spent in each.

B. Overview of Combat Risk

Table 1 summarizes the total numbers of observations and events in the data. The data cover only enlisted personnel because data on service and deployment times for officers were not available. The data set contained a total of 8,694,822 service-year observations and 3,743,253 deployment-year observations. In total, 5,101 individuals were killed, 4,856 of them in a combat zone between 2003 and 2009. Another 5,027 individuals were seriously or very seriously wounded, 4,898 of them in combat zones.[19]

Table 2 shows the probability of being killed or seriously wounded, expressed as expected values per 1,000 servicemembers in a year. The probability of being killed per year deployed is calculated to be 1.447 per 1,000 servicemembers, and per year deployed in a combat zone, 3.679 per 1,000. The probability of being killed per year served averages 0.433 per 1,000 servicemembers: 0.014 per 1,000 servicemembers who deployed only in non-combat zone assignments in a year and 1.164 per 1,000 servicemembers who deployed at some time during the year in a combat zone.

Data from Viscusi (2004, 33) help put these estimates into perspective. Referring to Viscusi's Table 1, for example, the probability of being killed in manufacturing is 0.03 per year per 1,000 full-time workers across all occupations, and ranges from a high of 0.16 per 1,000 for transportation and material mover occupations to a low of 0.006 per 1,000 for clerical and administrative support occupations. The most dangerous industry-occupation cell is handlers, equipment cleaners, helpers, and laborers within the mining industry, at 0.46 per 1,000.

18. The data also included information on Family Separation Allowance and Basic Allowance for Housing, which are not used in this analysis.

19. The data on wounded includes those seriously or very seriously wounded, and excludes those not seriously wounded. For the sake of exposition, the data are referred to as "seriously wounded."

Table 1. Numbers of Observations and Events

		Observations		Event Data		
	Combat Zone	Served	Deployed	Killed (K)	Seriously Wounded (SW)	Both (KSW)
		8,694,822	3,743,253	5,101	5,027	10,128
	No	5,526,426	574,846	245	129	374
	Yes	3,168,397	3,168,407	4,856	4,898	9,754
Service						
Army	Yes	2,034,258	2,034,267	3,533	2,731	6,264
Coast Guard	Yes	4,093	4,093	-	-	-
Air Force	Yes	479,515	479,516	78	314	392
Marines	Yes	446,918	446,918	1,121	1,492	2,613
Navy	Yes	203,613	203,613	124	361	485
Fiscal Year						
2003	Yes	313,946	313,947	433	581	1,014
2004	Yes	439,999	440,002	778	1,037	1,815
2005	Yes	443,798	443,799	812	615	1,427
2006	Yes	483,338	483,339	775	688	1,463
2007	Yes	470,742	470,743	904	700	1,604
2008	Yes	502,977	502,978	390	391	781
2009	Yes	513,598	513,599	378	319	697
DoD Occ						
Combat	Yes	866,521	866,525	2,908	2,457	5,365
Eeq_Repair	Yes	172,512	172,512	53	76	129
Comint	Yes	288,040	288,040	426	361	787
Health	Yes	150,912	150,913	172	231	403
Techn	Yes	93,301	93,302	91	124	215
Supp	Yes	437,433	437,435	158	247	405
Meq_Repair	Yes	514,479	514,482	273	249	522
Craft	Yes	144,810	144,810	78	130	208
Supply	Yes	456,632	456,632	399	433	832
Other	Yes	43,756	43,756	283	118	401

Table 2. Expect Number of Individuals Killed or Seriously Wounded per Year per 1,000 Personnel

		Expected Number per 1,000			
		Killed Per Year		Killed or Seriously Wounded per Year	
	Combat Zone	Deployed	Served (AC)	Deployed	Served (AC)
		1.447	0.433	4.411	0.799
	No	0.167	0.014	2.975	0.030
	Yes	3.679	1.164	6.917	2.139
Service					
Army	Yes	4.002	1.305	6.785	2.209
Coast Guard	Yes	-	-	-	-
Air Force	Yes	0.432	0.124	2.223	0.508
Marines	Yes	6.692	1.976	12.987	3.819
Navy	Yes	1.565	0.444	6.110	1.635
Fiscal Year					
2003	Yes	3.079	1.175	6.146	2.403
2004	Yes	5.719	1.415	11.767	2.909
2005	Yes	4.478	1.246	7.706	2.119
2006	Yes	4.338	1.373	7.897	2.407
2007	Yes	4.589	1.741	8.097	2.967
2008	Yes	1.877	0.675	3.739	1.334
2009	Yes	1.920	0.625	3.659	1.112
DoD Occ					
Combat	Yes	8.299	2.653	14.952	4.762
Eeq_Repair	Yes	0.743	0.250	1.657	0.534
Comint	Yes	3.362	1.170	6.003	2.059
Health	Yes	2.502	0.830	5.912	1.925
Techn	Yes	2.187	0.666	5.577	1.610
Supp	Yes	0.842	0.211	2.215	0.539
Meq_Repair	Yes	1.173	0.368	2.343	0.662
Craft	Yes	1.210	0.188	3.311	0.562
Supply	Yes	2.001	0.526	4.073	1.092

Note: Figures per year served are for active duty personnel only.

Clearly, military service is a relatively dangerous way of life, particularly when deployed in a combat zone. The mean estimates of risk are generally orders of magnitude higher than in the civilian sector on average, but vary widely across geographic space and time. For example, Figure 6 shows that within combat zones, the probability of fatality per location year deployed varied between about 2 per 1,000 to nearly 6 per 1,000. The probability of being killed per year served varied from a low of about 0.6 per 1,000 individuals in FY 2008 and a high of 1.4 in FY 2004. Recall that casualties per year served reflect events that occurred during a year in which there was some deployment; casualties per year deployed reflect events per twelve months of time actually deployed.

The risk of being killed per year served also varied across the services. The probability of being killed per year served ranged from 0.124 per 1,000 in the Air Force to 1.976 per 1,000 in the Marine Corps. The figures for the Army and Navy are 1.305 and 0.444 per 1,000. Figure 7 shows how the probabilities varied over time in each of the four Services. The risk of being killed in the Marine Corps was especially high in FY 2004, and in the Army in FY 2007.

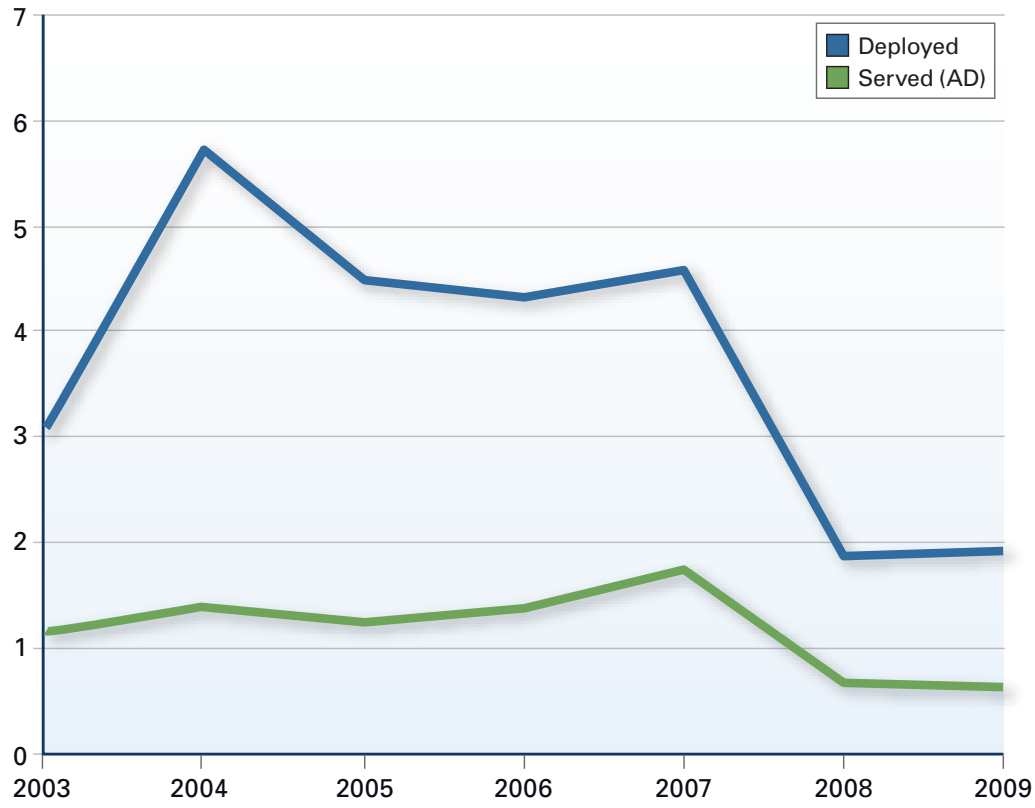


Figure 6. Expected Number of Individuals Killed per Year per 1,000 Personnel

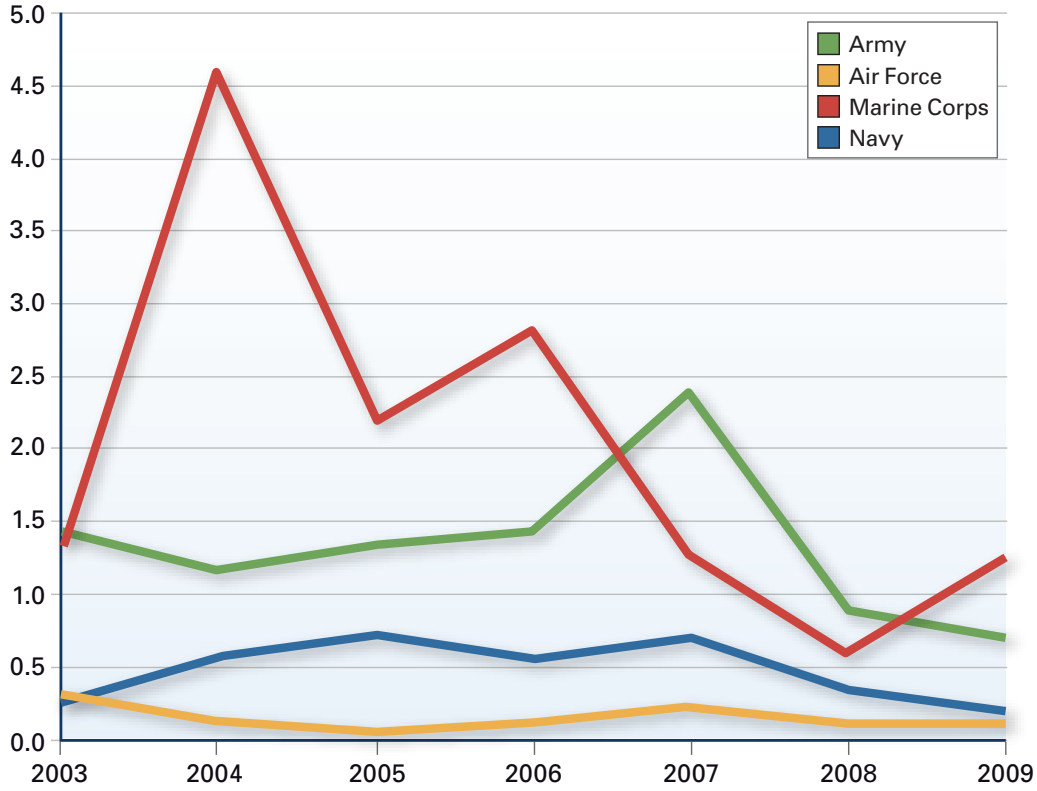


Figure 7. Expected Number of Individuals Killed per Year per 1,000 Personnel: By Service

Figure 8 shows how the probability of being killed varies across two-digit DoD occupation groups. The risk of death per year served is highest in combat arms occupations (DoD occupation group 10) at 2.653 per 1,000. The lowest level of risk is found in craft occupations (DoD occupation group 17), at 0.188 per 1,000. Comparing these figures with those in Viscusi (2004), within a combat zone, the safest DoD occupation group is slightly more dangerous than the most dangerous occupational group in the manufacturing sector (transportation and material movers), and the most dangerous DoD occupation is about 30 times as dangerous as the most dangerous industry-occupation cell (handlers in mining).

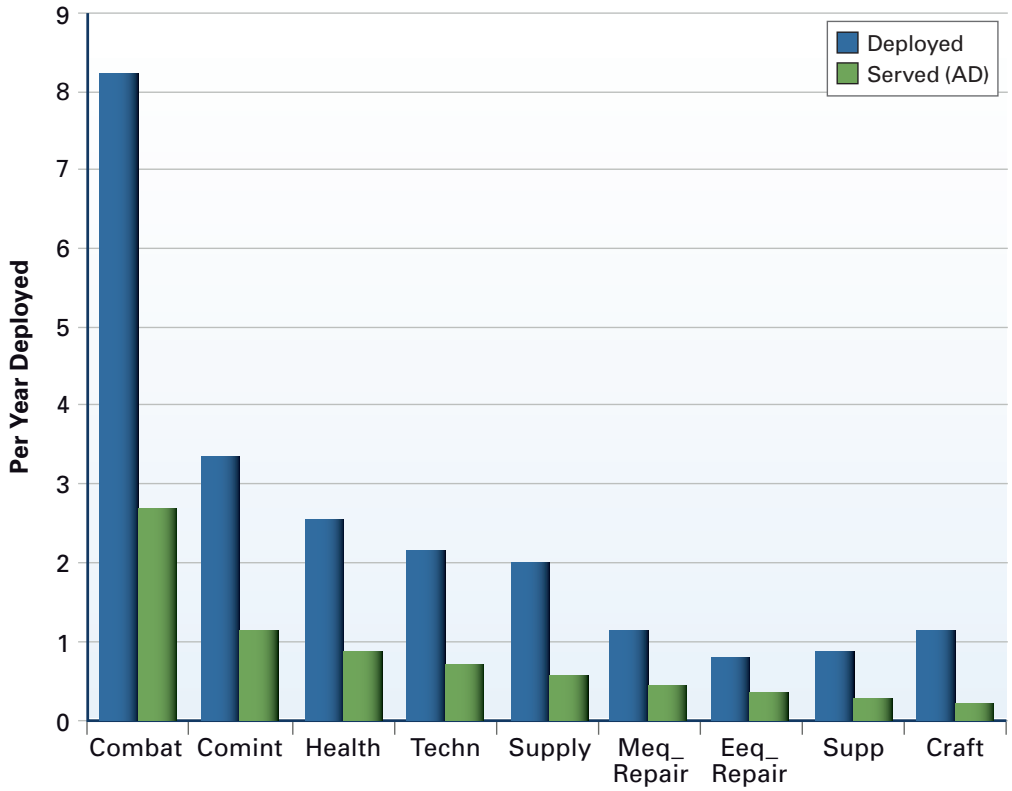


Figure 8. Expected Number of Individuals Killed per Year per 1,000 Personnel: By DoD Occupation

Table 3 shows how combat risk varied over countries in the sample. The countries listed are limited to combat zones in which at least 1,000 individuals served over the FY 2003–2009 period. The data have been sorted by the probability of being killed per year deployed, from high to low.[20] However, the risk of combat is arguably better measured by the probability of being killed or seriously wounded, conditional on deployment. Deployments to Iraq and Afghanistan are clearly most dangerous, with an estimated 6.72 and 5.47 personnel killed per 1,000 servicemembers per year deployed, and an estimated 12.49 and 9.81 personnel per 1,000 killed or seriously wounded per year deployed.

Finally, Table 4 shows how combat risk varied across ranks. From E2 through E9, the risk of being killed or severely wounded generally declined with rank.

20. Because servicemembers typically deploy for periods of less than a year, and because those deployments may overlap fiscal years, the probability of being killed during a given 365-day period is distinct from the probability of being killed during a year-long deployment to that country.

Table 3. Expected Number of Individuals Killed or Seriously Wounded per Year per 1,000 Personnel, by Country

Country	Expected Number per 1,000			
	Killed Per Year		Killed or Seriously Wounded per Year	
	Deployed	*Served (AC)*	*Deployed*	*Served (AC)*
Iraq	6.72	2.13	12.49	3.87
Afghanistan	5.47	1.81	9.81	3.22
Philippines	0.97	0.25	1.11	0.30
Bahrain	0.43	0.16	0.89	0.35
Djibouti	0.34	0.00	1.78	0.28
United Arab Emirates	0.32	0.09	1.25	0.27
Qatar	0.16	0.02	0.66	0.12
Kuwait	0.13	0.02	0.42	0.09
Saudi Arabia	0.10	0.06	0.58	0.29
Jordan	0.00	0.00	0.00	0.00
Kyrgyzstan	0.00	0.00	1.07	0.22
Oman	0.00	0.00	0.46	0.00
Pakistan	0.00	0.00	2.37	0.44
Turkey	0.00	0.00	0.00	0.00
Uzbekistan	0.00	0.00	1.01	0.26

Table 4. Expect Number of Individuals Killed or Seriously Wounded per Year per 1,000 Personnel, by Pay Grade

	Expected Number per 1,000			
	Killed Per Year		Killed or Seriously Wounded per Year	
Rank	*Deployed*	*Served (AC)*	*Deployed*	*Served (AC)*
E1	4.29	1.75	7.86	3.19
E2	10.59	3.77	19.42	7.10
E3	6.38	2.14	11.64	3.75
E4	3.48	1.07	6.23	1.91
E5	2.76	0.83	5.54	1.61
E6	3.26	1.02	6.15	1.88
E7	2.10	0.59	4.47	1.27
E8	1.91	0.52	3.89	0.91
E9	1.81	0.54	3.76	1.13

Note: Data are for individuals who deployed to a combat zone at some time during a calendar year.

5. Combat Risk and Compensation

A. Are Total Pay and Risk per Year Served Related?

This section presents estimates of the relationship between compensation and risk. To facilitate the empirical analysis, it was decided to analyze data averaged by Service, country, DoD two-digit occupation groups (10 through 18), grade (E1 through E9), and fiscal year cell. The following regression model is specified:

$$W_c = \alpha + \beta_r Risk_c + YOS_C + Service + Pay\ Grade + OCC_{DOD} + CYear + \varepsilon_c \quad (1)$$

where W_c is annual mean total pay, YOS_C is average years of service, $Risk_C$ is a measure of the probability of being killed, *Service, Pay Grade, CYear* (calendar year), and Occ_{DOD} represent vectors of those factors, and ε_c is a random error term, all in cell *c*, where cells are defined by country, Service, year, occupation, and pay grade.[21] The regressions are estimated for the Army, Air Force, Marine Corps, and Navy.[22] Reserve Component personnel are not included because some key data for them were not available.

The coefficient β_r is an estimate of *Additional Compensation per Fatality* (ACF).[23] It is the additional compensation received by those whose service involved higher risk. More precisely, it is the total additional amount received by 1,000 people, each of whom faced an added chance in a thousand of being killed during a year that involved service in a combat zone.

The risk variable is meant to reflect workers' expected probability of being killed. The measure chosen here assumes that members of the U.S. military are relatively well informed about the relative risks faced as a function of Service, country, occupation, and pay grade.[24] This measure varies by Service, country, occupation, and pay grade. Use of measures that vary only at higher levels of aggregation—for example, only by Service and occupation—ignores valuable information on variation across occupations and pay grade that servicemembers themselves would be expected to

21. Appendix A contains a brief review of the empirical literature. Equation (1) departs from this literature by specifying the dependent variable in levels rather than as a natural log. The reason is that most military pays are defined in dollars per month rather than in percentage terms. For example, HFP/IDP is $225 per month (or part of month) spent in a combat zone.
22. Casualty data for the Coast Guard were not available. Unfortunately, the casualty data classified a sizeable number of individuals in DoD occupation group 19—a catch-all group—but very few such individuals were so classified in the pay record data.
23. Because of the timing of payments, especially enlistment and reenlistment bonuses, it is possible that some compensation for combat risk is received while not deployed. The estimates here may therefore underestimate the ACF.
24. The review of the literature in Appendix A discusses at some length the issue of how to measure risk.

use in their forecast of risk. It was decided not to allow the measure of risk to vary over time because it does not seem reasonable that servicemembers would be able to forecast accurately variation in combat risk that is a function of factors beyond their ken and scope, especially in light of how much risk can vary from one day or hour to the next.

Pleeter et al. (2011) found that the CZTE was the dominant component of combat compensation and was not related to variations in risk within the combat zone. Unfortunately, precise information on the value of the CZTE is not available for the individuals in the payroll data set. Instead, CZTE was accounted for by assigning a federal tax liability using the tax tables in effect each year, and a state tax liability based on averages computed from the Current Population Surveys. The federal tax liability was assigned assuming that individuals used the standard deduction, and exemptions were assigned based on the number of dependents reported on the payroll records. No allowance was made for the possibility of a working spouse, and no attempt was made to incorporate the Earned Income Credit. Because these calculations are necessarily rough, and one can imagine biases operating in both directions—for example, the CZTE could be worth less than computed here if individuals itemize, or more if the spouse works—results are reported both including and excluding the calculated value of the CZTE in the dependent variable.

Our work extends that of Pleeter et al. (2011) by including compensation related to special pays and bonuses. Also, this paper incorporates variation in risk and compensation between deployed personnel and those in CONUS. Near the end of the paper, the analysis focuses on deployed personnel specifically, a closer parallel to the earlier work.

Table 5 reports the regression results. To reduce clutter, only the estimated coefficients on the risk variables are presented. The means and standard deviations of total cash compensation are shown in the first two rows to help put the estimated effects in perspective. The first column reports regression estimates of the additional compensation per fatality for the sample as a whole. Excluding the value of the CZTE, the estimated compensation associated with an increase in risk of death of one per thousand personnel is $292. The table shows an estimated ACF of just over $292,000. Including the value of the CZTE, the estimated ACF is equal to $551,341.[25]

The estimated ACF varies considerably across services. For example, the estimated ACF in the Army is $357,236 excluding the value of CZTE, and $656,889 including

25. The standard errors are $111,289 and $211,201, respectively, indicating that both estimates are statistically significant at conventional levels. Further references to the standard errors, reported in the tables in parentheses underneath the estimated coefficients, are left to the reader. Note, too, that the figures that include the value of CZTE are shown only for those who served in a combat zone at some time during the year.

Table 5. Estimated Additional Compensation per Fatality

		By Service				By Pay Grade			
	All Services	Army	Air Force	Marine Corps	Navy	E2–E3	E4–E5	E6–E7	E8–E9
Mean Annual Cash Pay									
CZTE Excluded	$29,608	$29,718	$31,068	$26,055	$30,239	$19,690	$26,962	$39,653	$52,810
Standard Deviation	($9,110)	($8,747)	($9,173)	($9,113)	(9,438)	($2,522)	($3,925)	($4,345)	($6,116)
CZ only, CZTE Included	$31,988	$32,534	$32,228	$28,476	$33,736	$22,569	$29,379	$43,580	$58,920
Standard Deviation	($9,198)	($8,923)	($9,462)	($9,076)	($9,816)	($2,436)	($4,221)	($5,129)	($6,808)
Additional Compensation per Fatality									
CZTE Excluded	$292,614	$357,236	$1,996,771	$247,470	$58,005	$123,743	$287,625	$215,763	$230,767
Standard Error	($111,289)	($132,680)	($318,792)	($79,090)	($30,002)	($62,683)	($132,407)	($177,282)	($41,001)
CZTE Included	$551,341	$656,889	$3,633,864	$442,044	$207,684	$224,870	$679,554	$766,765	$982,278
Standard Error	($211,201)	($258,349)	($856,362)	($127,303)	($74,392)	($109,532)	($288,681)	($326,773)	($315,668)
Observations	8,782	2,656	2,769	1,425	1,932	1,725	3,129	2,538	1,045

Note: The entries in this table are derived from the estimated coefficients on risk variables that measure the probability of being killed averaged over the period FY 2003–2009. The dependent variable is mean total compensation in a calendar year in a given country, service, occupation, pay grade, and year cell. The risk variable is the number of fatal casualties in that cell per thousand personnel. The estimated coefficients reflect the increase in compensation associated with an increase in risk of death of one per thousand personnel. The additional compensation per fatality (the numbers in this table and subsequent similar tables) is the estimated coefficient times one thousand. All regressions control (when relevant) for service, two-digit DoD occupation, years of service, and fiscal year. Standard errors clustered on country are shown in parentheses. The regressions are weighted by the number of individuals serving in each cell. Cells with fewer than 25 individuals are excluded from the regressions.

the value of CZTE. By contrast, the figures for the Air Force are $1.996 million and $3.66 million. The estimates for the Marine Corps are slightly lower but of the same magnitude as those for the Army—$247,470 and $442,044 excluding and including the CZTE, while those for the Navy are markedly lower—$58,005 and $207,684. Further analysis revealed that the estimated ACF for the Navy was sensitive to the inclusion of relatively small cells. For example, when we focus on cells that contained at least 125 individuals (results not shown to reduce clutter), the estimated ACFs for the Navy rise to $354,469 and $1.2 million. The estimates for the Army and Marine Corps, by contrast, are relatively unaffected by smaller cells. It is also important to keep in mind that the Navy accounted for a relatively small number of casualties compared with the Army and Marine Corps. It is not evident why the Air Force estimates are so much higher than those for the other Services.

The estimated ACF also varies by pay grade, from a low of $123,743 for E2s and E3s to a high of $287,625 for E4s and E5s, excluding the value of CZTE, and from a low of $224,870 for E2s and E3s to a high of $982,278 for E8s and E9s, including the value of CZTE.

B. Allowing for a Non-Linear Relationship between Compensation and Risk

In this section, the model in equation (1) is augmented to include the risk variable raised to the second power. This is done because the literature leads us to expect it to enter positively: the additional compensation for a unit of risk is expected to be greater at higher risk levels. Table 6 reports the estimated coefficients on the linear and quadratic risk terms for the same groups as in Table 5. In every case, the estimated coefficient on the linear risk term is positive and the estimated coefficient on the quadratic risk term is negative, indicating that compensation rises at a decreasing rate as a function of the risk of being killed, contrary to theoretical expectations.

To put the estimates in perspective with those in Table 5, the ACF has been calculated for two values of risk: the mean probability of being killed per year in a combat zone of 1.164 per 1,000 (fifth column from the left, third line of Table 2) and the mean probability of being killed in Iraq of 2.13 per 1,000 (fourth column, first line of Table 3). Focusing on the results that include the value of CZTE, the estimated ACF at the overall combat zone sample mean is $831,757, while the estimated ACF at the mean for Iraq is equal to $765,615, a difference of $64,142. The estimates for the Army show a greater difference: $1.057 million versus $755,634, a difference of more than $300,000.[26]

26. These findings do not mean that total cash compensation declines with combat risk in the relevant range. Compensation is maximized at the value for which ACF=0, which occurs at 1.3 per *hundred* (0.013) for the sample as a whole, and at values of 0.0046, 0.0015, 0.0102, and 0.0261 for the Army, Air Force, Marines, and Navy, respectively.

Table 6. Estimated Additional Compensation per Fatality: Quadratic Model

	By Service					By Pay Grade			
	All Services	Army	Air Force	Marine Corps	Navy	E2–E3	E4–E5	E6–E7	E8–E9
Estimated Coefficients on Risk in Quadratic Model									
CZTE Excluded									
Linear risk term	$427,743	$769,079	$3,421,525	$516,945	$174,143	$371,218	$1,883,334	$1,742,786	$1,534,257
	($142,120)	($342,130)	($551,955)	($126,946)	($76,512)	($151,328)	($867,324)	($554,882)	($410,579)
Quadratic risk term	-$15,700,000	-$83,900,000	-$1,080,000,000	-$24,700,000	-$3,469,889	-$11,400,000	-$310,000,000	-$202,000,000	-$64,400,000
	($6,513,058)	($47,200,000)	($254,000,000)	($6,000,218)	($13,100,000)	($6,019,721)	($174,000,000)	($102,000,000)	($17,400,000)
Additional Compensation per Fatality evaluated at:									
Sample mean of 1.164 per 1,000	$391,193	$573,759	$907,285	$459,443	$166,065	$344,678	$1,161,654	$1,272,530	$1,384,334
Iraq mean of 2.13 per 1,000	$360,861	$411,665	-$1,179,275	$411,723	$159,362	$322,654	$562,734	$882,266	$1,259,913
Estimated Coefficients on Risk in Quadratic Model									
CZTE Included									
Linear risk term	$909,047	$1,420,194	$6,549,759	$948,786	$574,778	$371,218	$1,883,334	$1,742,786	$1,534,257
	($232,040)	($646,607)	($1,370,461)	($212,782)	($204,047)	($151,328)	($867,324)	($554,882)	($410,579)
Quadratic risk term	-$33,200,000	-$156,000,000	-$2,210,000,000	-$46,400,000	-$11,000,000	-$11,400,000	-$310,000,000	-$202,000,000	-$64,400,000
	($13,100,000)	($86,500,000)	($581,000,000)	($10,900,000)	($5,516,606)	($6,019,721)	($174,000,000)	($102,000,000)	($17,400,000)
Additional Compensation per Fatality evaluated at:									
Sample mean of 1.164 per 1,000	$831,757	$1,057,026	$1,404,879	$840,767	$549,170	$344,678	$1,161,654	$1,272,530	$1,384,334
Iraq mean of 2.13 per 1,000	$767,615	$755,634	-$2,864,841	$751,122	$527,918	$322,654	$562,734	$882,266	$1,259,913

Note: The entries in this table are derived from the estimated coefficients on risk variables that measure the probability of being killed averaged over the period FY 2003–2009. The dependent variable is mean total compensation in a calendar year in a given country, service, occupation, pay grade, and year cell. The risk variable is the number of fatal casualties in that cell per thousand personnel. The estimated coefficients reflect the increase in compensation associated with an increase in risk of death of one per thousand personnel. The additional compensation per fatality (the numbers in this table) is the estimated coefficient times one thousand. All regressions control (when relevant) for service, two-digit DoD occupation, years of service, and fiscal year. Standard errors clustered on country are shown in parentheses. The regressions are weighted by the number of individuals serving in each cell. Cells with fewer than 25 individuals are excluded from the regressions.

C. Estimates Using Combat Zones Only

The finding of a positive relationship between compensation and combat risk may at first appear to contradict the findings in Pleeter et al. (2011), which found no such relationship. There are two key differences between the present study and the earlier one. First, in contrast to the earlier study, which focused on the role of CZTE, compensation here includes special pays (HDP, SDAP), as well as enlistment and reenlistment bonuses. Second, the earlier study focused on variation within combat zones. By contrast, the estimates in Table 5 and Table 6 use information on observations both inside and outside combat zones.

To see the importance of non-combat zone observations, the models were re-estimated using information only for countries within a combat zone. The results are reported in Table 7. Focusing on the results including CZTE, the estimated ACF for the sample as a whole is $65,835. The estimated ACFs estimated on the combat zone subsample vary widely across Services and ranks. For example, the estimated ACF is $88,789 for the Army, $772,579 for the Air Force, and *negative* for the Marine Corps and Navy at -$63,642 and -$63,433. Notice, too, that the estimates of ACF are negative for individuals in all but the highest pay grades.

The results in Table 7 lead to two important conclusions. First, the positive estimated relationship between compensation and risk seen in Table 5 and Table 6 is nearly entirely due to the contrast between combat zone and non-combat zone countries. Second, the conclusions of Pleeter et al. (2011) are largely reinforced;

Table 7. Estimated Additional Compensation per Fatality: Combat Zone Observations Only

		By Service				By Pay Grade			
	All Services	Army	Air Force	Marine Corps	Navy	E2–E3	E4–E5	E6–E7	E8–E9
CZTE Excluded	$22,324	$92,848	$772,579	–$64,566	–$63,433	–$11,026	–$32,269	–$80,486	$74,098
	($45,740)	($34,850)	($124,159)	($27,614)	($9,803)	($26,538)	($85,486)	($207,220)	($169,614)
CZTE Included	$65,835	$88,789	$772,579	–$63,242	–$63,433	–$11,683	–$40,063	–$81,096	$76,115
	($23,217)	($32,561)	($124,159)	($26,688)	($9,803)	($25,776)	($84,809)	($203,297)	($167,554)
Observations	6,401	1,874	2,220	930	1,377	1,209	2,494	1,986	580

Note: The entries in this table are derived from the estimated coefficients on risk variables that measure the probability of being killed averaged over the period FY 2003–2009. The dependent variable is mean total cash compensation in a calendar year in a given country, service, occupation, pay grade, and year cell. The risk variable is the number of fatal casualties in that cell per thousand personnel. The estimated coefficients reflect the increase in compensation associated with an increase in risk of death of one per thousand personnel. The additional compensation per fatality (the numbers in this table) is the estimated coefficient times one thousand. All regressions control (when relevant) for service, two-digit DoD occupation, years of service, and fiscal year. Standard errors clustered on country are shown in parentheses. The regressions are weighted by the number of individuals serving in each cell. Cells with fewer than 25 individuals are excluded from the regressions.

accounting for the role of special pays and enlistment and reenlistment bonuses, the estimated relationship between compensation and risk is small and often tenuous across deployments of widely varying levels of risk.

D. Estimates that Correct for Differences in Preference Toward Risk

Differences in preferences toward risk can attenuate the estimated relationship between compensation and risk. One way to control for such differences is to estimate the model using data on individuals within two-digit DoD occupations, who presumably have similar occupational tastes. These estimates are contained in Table 8. As can be seen, the pattern found in Table 6 persists: total cash pay increases with combat risk at a decreasing rate. Table 8 also shows estimates of the ACF evaluated at the overall sample mean of 1.164 fatalities per 1,000 and the occupation-specific means from Table 2, reproduced for convenience in the first row. Evaluating the ACF at different levels of combat risk has a relatively minor impact for combat arms personnel, estimated to be equal to $584,726 using the sample mean risk versus $523,525 using their own mean of 2.653 per 1,000. However, for support personnel, the difference is substantial: $1.29 million versus $5.8 million, accounted for by the fact that the mean fatality risk for this group is just 0.2 per 1,000. The estimated own-risk ACFs are also larger than those estimated at the mean risk for mechanical repair, craft, and supply personnel, the differences ranging from $1.8 to $3.6 million.

E. Relationship between ACF and VSL

The estimated effect of mortality risk on military pay is generally far lower than the $6–$10 million estimates of VSL for the civilian sector. The ACF would be equal to the VSL if it were certain that we were observing wage-risk combinations along individuals' indifference curves. However, there are reasons to doubt that this is what is being observed; first, because the estimates indicate that compensation rises at a decreasing rate with the probability of being killed—the convex shape of the indifference curve suggests that compensation should increase at an increasing rate—and second, because estimates using data only on individuals deployed to a combat zone were small, imprecise, and often negative.

Another complication in estimating VSL is suggested in recent work by RAND (see Tanielian and Jaycox 2008), which indicates that major depression and post-traumatic stress disorder (PTSD) are highly associated with combat exposure. In statistical analyses, variables such as having been shot at and knowing someone who was killed (among others) were "consistently associated with increased likelihood of screening positive for PTSD." Indeed, exposure "to specific combat traumas was

Table 8. Estimated Additional Compensation per Fatality: By Two-Digit DoD Occupation

	Combat	Elect. Repair	COMINT	Health	Technical	Support	Mech. Repair	Craft	Supply
CZTE Excluded									
Linear risk term	$332,686	$1,530,347	$714,012	$964,996	$1,179,903	$3,471,990	$2,300,177	$3,567,116	$2,272,008
	($88,746)	($696,531)	($258,213)	($410,188)	($236,433)	($1,338,356)	($946,835)	($1,249,516)	($924,658)
Quadratic risk term	-$11,400,000	-$119,000,000	-$65,400,000	-$125,000,000	-$41,700,000	-$1,250,000,000	-$669,000,000	-$1,090,000,000	-$684,000,000
	($3,790,016)	($59,600,000)	($29,900,000)	($70,100,000)	($17,200,000)	($491,000,000)	($345,000,000)	($380,000,000)	($286,000,000)
Expected Number Killed per Thousand	2.653	0.250	1.170	0.830	0.666	0.211	0.368	0.188	0.526
Additional Compensation per Fatality evaluated at:									
Sample mean of 1.164 per 1,000	$306,147	$1,253,315	$561,760	$673,996	$1,082,825	$561,990	$742,745	$1,029,596	$679,656
Own mean	$272,198	$1,470,847	$560,976	$757,496	$1,124,359	$2,944,490	$1,807,793	$3,157,276	$1,552,440
CZTE Included									
Linear risk term	$631,767	$2,841,498	$1,502,262	$2,066,312	$2,132,897	$6,833,751	$4,207,626	$6,390,799	$4,475,051
	($190,673)	($1,284,413)	($581,466)	($769,144)	($525,243)	($2,565,972)	($1,729,018)	($2,165,744)	($1,743,287)
Quadratic risk term	-$20,400,000	-$215,000,000	-$162,000,000	-$328,000,000	-$94,600,000	-$2,380,000,000	-$1,260,000,000	-$1,850,000,000	-$1,420,000,000
	($8,097,082)	($109,000,000)	($76,500,000)	($142,000,000)	($37,400,000)	($930,000,000)	($637,000,000)	($634,000,000)	($550,000,000)
Additional Compensation per Fatality evaluated at:									
Sample mean of 1.164 per 1,000	$584,276	$2,340,978	$1,125,126	$1,302,728	$1,912,668	$1,293,111	$1,274,346	$2,083,999	$1,169,291
Own mean	$523,525	$2,733,998	$1,123,182	$1,521,832	$2,006,890	$5,829,391	$3,280,266	$5,695,199	$2,981,211
Observations	1,342	877	947	674	698	1,231	1,181	831	1,001

Note: The entries in this table are derived from the estimated coefficients on the probability of being killed averaged over the period FY 2003–2009, where the probability is measured at the country x service x occupation x pay grade level. The dependent variable is mean total compensation in a calendar year in a given country, service, occupation, pay grade, and year cell. The risk variable is the number of fatal casualties in that cell per thousand personnel. The estimated coefficients reflect the increase in compensation associated with an increase in risk of death of one per thousand personnel. The additional compensation per fatality (the numbers in this table) is the estimated coefficient times one thousand. All regressions control (when relevant) for service, years of service, and fiscal year. Standard errors clustered on country are shown in parentheses. The regressions are weighted by the number of individuals serving in each cell. Cells with fewer than 25 individuals are excluded from the regressions.

the single-best predictor for both PTSD and major depression." Because higher combat risk raises the probability of becoming psychologically impaired, the estimated ACFs will tend to overstate the true VSL in the military, increasing the apparent difference between military VSL and civilian VSL.

The estimated ACFs could understate the true VSL if military personnel derive satisfaction from other characteristics of the job that are not measured and hence left out of the statistical model of wage determination. It is also possible that the compensation for low-risk military positions is above the level of compensation for similar civilian positions. This would mean that the additional compensation associated with riskier military jobs need not be as high as is implied by the civilian VSL literature.

6. Summary

This paper has examined combat pays within the framework of hedonic wage theory. Because U.S. military personnel currently receive $225 HFP/IDP per month served in a combat zone independent of the level of combat risk, members who face low levels of risk may be overcompensated. However, because overall compensation must be sufficient to attract volunteers who undertake high levels of risk, it is appropriate to examine the relationship between combat risk and total cash compensation. In an economically efficient combat compensation scheme, total compensation should rise with combat risk. Using data on enlisted personnel for the period 2003–2009, compensation is estimated to rise by $551 per individual per year when there is an increase in risk of death of one per thousand personnel—a figure far smaller than the figure of $6,000–$10,000 found in studies of civilian labor markets. In addition, compensation is estimated to rise at a decreasing rate in combat risk, a pattern that persists even when the model is estimated separately for individuals who might be expected to have similar preferences toward combat risk.

When the relationship between compensation and risk was estimated using data only from combat zone observations, the relationship was smaller, less precise, and often negative. This reinforces the conclusion of Pleeter et al. (2011) that combat-related compensation within the combat zone does not systematically vary with the degree of risk faced.

Appendix A. Pitfalls in Estimating VSL

The most common way to estimate VSL is using hedonic wage regression, in which the dependent variable, the log wage, is regressed on a vector of individual and job characteristics, including the probability of fatal or nonfatal injury.[27] In their review of the empirical literature, Cropper et al. (2011) present and discuss the prototypical hedonic wage equation used to estimate the VSL as

$$lnW_i = \alpha + \sum_m \beta_m x_{im} + \gamma_0 r_i + \gamma_1 q_i + \gamma_2 q_i WC_i + u_i \quad (1)$$

where W_i is the worker's wage rate, α is a constant, the β_m are slope coefficients on various worker characteristics (e.g., age, race, education, years of job experience, union status) χ_m, r_i is the probability of a fatality, q_i is the probability of non-fatal job risk, WC_i is the level of worker's compensation, and u_i is a random error term, all for worker *i*. If wages are measured at an annual frequency, γ_0 multiplied by the average wage measures VSL.

Obtaining an unbiased and consistent estimate of VSL in equation (1) requires that the random error term be uncorrelated with all of the right-hand-side variables. This condition can fail for a number of reasons, including measurement error in fatal job risk, omitted variables, unobserved heterogeneity in the population, and bias in risk perceptions.

Measurement Error in Fatal Job Risk

Estimates of VSL in studies carried out prior to 2000 relied on measures of risk that varied only by industry. To the extent that this introduces classical measurement error into this variable, estimates of VSL will tend to be biased downward (that is, toward zero).[28] Newer studies use improved measures of job risk available in the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), which distinguishes risks by occupation as well as by industry. The CFOI is a census rather than a sample and is based on a comprehensive review of multiple records, including death certificates and workers' compensation reports.[29]

27. Other techniques for measuring VSL exist. For example, Ashenfelter and Greenstone (2004) used evidence on driver behavior in the presence of mandated speed limits to infer the VSL. Contingent valuation (stated willingness to pay) is also used; see Albinini (2005) for a review of this literature. Using contingent valuation, Hammitt and Haninger (2010) estimate a willingness to pay off $6–$10 million per adult life and $12–$15 million for children, very close to contemporary estimates based on the hedonic method.

28. Most studies prior to 2000 used data from either the Bureau of Labor Statistics (BLS) Survey of Occupational Injuries, reporting deaths by three-digit industry classification, or the National Institute of Occupational Safety and Health (NIOSH), reporting risks by one-digit industry and state. See Cropper et al. (2011) for details.

29. Most studies after 2000 use CFOI data on 3-year averages of death risk for 10 occupations and 72 two-digit industries (Cropper et. al. 2011, 8).

Omitted Variable Bias

Earlier studies failed to control for important worker or job characteristics that are correlated with job risk, and thus render estimates of the coefficient on job risk in hedonic wage regressions biased and inconsistent (Cropper et al. 2011, 8). The importance of selectivity has been paramount in researchers' minds for many years. For example, Viscusi and Hersch (2001, 279) found that smokers select riskier jobs but receive lower total wage compensation for risk than do nonsmokers.[30] More recently, DeLeire and Levy (2004) used family structure as a proxy for willingness to trade safety for wages to test the proposition that workers with strong aversion to this risk sort into safe jobs. They estimated conditional logit models of occupation choice as a function of injury risk and other job attributes (925). They found that single mothers and fathers were more averse to risk than their married counterparts (926). They also found that the effect of children on those who are married is larger for women than for men, which suggests that mothers view their contribution to raising children as more difficult to replace than do fathers (946).[31]

Other researchers try to control for omitted variables by including industry and occupation dummy variables among the χ_m in equation (1). Because earlier data on the probability of fatality were not well measured, estimates that included such controls tended to yield lower estimates of the VSL (Cropper et al. 2011, 9). Including these dummy variables often had the effect of washing out the effect of the risk variables because of the resulting reliance on within-industry or within-occupation variation in risk to identify VSL.

Still another way to control for omitted characteristics is to rely on panel data and use first-differences or worker fixed effects in equation (1). Such estimates control effectively for factors that are either fixed or change slowly for a given worker over time. This is the approach taken in Kniesner et al. (2010). Because most of the variation in job risk over time comes from job changes, the within-worker variation in panel data sets such as the Panel Study of Income Dynamics allows reasonably precise estimation of the VSL.

Heterogeneity in VSL

It has already been noted that some individuals (smokers or single, single men without children) have lower aversion to taking on risk than others. As Viscusi (2010,

30. Their findings suggest that smokers are not only more willing to incur risk, but are less efficient in the production of safety.

31. Evidence of sorting applies to characteristics of jobs other than the risk of fatality or injury. For example, Krueger and Schkade (2008, 4) found evidence that workers who are more gregarious as revealed by their behavior when they are not working are more likely to be in jobs that involve higher levels of social interaction.

1) put it in his introduction and overview of a recent special issue of the *Journal of Risk and Uncertainty*, VSL is not "a natural constant." Economic theory suggests that VSL should vary with other characteristics, as well.

For example, because safety is a normal good, workers with higher income levels will have higher VSL levels and will tend to choose jobs with lower risk levels (Kniesner et al. 2010, 16). Based on quantile regression estimates of the VSL using panel data, Kniesner et al. (2010) estimate a VSL of $7.5 million for individuals at the median of the wage distribution, compared with $4.9 million for individuals at the 25th percentile and $14.5 million for individuals at the 75th percentile. Viscusi (2010, 2) notes that this implies that VSL should rise over time along with incomes. Another example is age. Because individuals' life expectancies decline with age, a given reduction in risk gives rise to smaller increases in expected lifetimes (Viscusi and Aldi 2007, 243). In fact, though, recent estimates suggest that the VSL exhibits an inverted U-shaped relationship, mirroring the path of lifetime consumption (Viscusi 2010, 4). The extent to which such variation in VSL should be accounted for in public policy is an important question. For example, it is not clear that policy makers should value the lives of the wealthy more than the lives of those less well off (Kniesner et al. 2010, 16–17).[32]

Bias

Harrison and Rutström (2006, 326) note that objective measures of risk are only proxies for subjective ones. That is, individuals receive compensation not in return for true measures of risk, but for the ones that they perceive. Economic agents who act on the basis of misperceived risks can misallocate resources and induce lower levels of welfare as a result. For example, overestimation of the probability of death or injury by servicemembers could force the military to pay higher wages than otherwise.[33] Conversely, underestimation of the probability of death or injury by servicemembers could also lead them to make decisions that they otherwise would not.

Interestingly, the father of the theory of compensating wage differentials, Adam Smith (1776, I:125), believed that individuals were prone to systematic error in assessing probabilities of events with uncertain outcomes.

32. Indeed, legislation has been proposed that would ban "all recognitions of heterogeneity that reduced the VSL, as the SL can never be decreased 'based on age, income, race illness, disability, date of death, or any other personal attribute or relativistic analysis of the value of life' " (Viscusi 2010, 3).

33. See Fraser (1995), particularly the references in his note 2 (98). Fraser (1995) considers the role of worker learning from the experience of others in the context of a hazardous industry that might be competitive or monopolistic. He shows that the welfare changes in the information environment depend on market structure. His proposition (3) shows that a sharpening of priors regarding the probability of a hazard occurring can actually reduce welfare because loser priors lead to lower costs and hence higher output and social welfare.

> The over-weening conceit which the greater part of men have of their own abilities, is an antient evil remarked by the philosophers and moralists of all ages. … The chance of gain is by every man more or less over-valued, and the chance of loss is by most men under-valued, and by scarce any man, who is in tolerable health and spirits, valued more than it is worth.

Smith (1776, I:126) doubted, in particular, the judgmental capacities of young men of military age.

> The contempt of risk and the presumptuous hope of success, are in no period of life more active than at the age at which young people choose their professions. How little the fear of misfortune is then capable of balancing the hope of good luck, appears still more evidently in the readiness of the common people to enlist as soldiers, or to go to sea.

One of the most influential papers that supports Smith's (1776) concern is Lichtenstein et al. (1978, 551). They carried out a series of experiments to study how well people were able to estimate the frequency of death from various causes. They interpreted their findings as indicating that individuals tended to overestimate small frequencies and underestimate larger ones. In addition, they reported a tendency of individuals to "exaggerate the frequency of some specific causes" while underestimating the frequency of others.[34]

Benjamin and Dougan (1997) reinterpreted Lichtenstein et al.'s (1978) findings and suggest that their conclusions, rather than supporting the hypothesis of bias, merely indicate that individuals tend to be better informed about risks that are most relevant to their demographic, in particular, their age group. Lichtenstein et al. (1978) studied subjects drawn from two groups: college students and members of the League of Women Voters. Benjamin and Dougan (1997) argued that a re-examination of the evidence in Lichtenstein et al. (1978) reveals instead a lack of "salience." For example, causes that kill large numbers of people tend to kill older people (Benjamin and Dougan 1997, 123). The fact that college students did a poor job of predicting such risks reflects merely the "optimal acquisition of costly information" (129). As Benjamin, Dougan, and Buschena (2001, 36) state in a follow-on study, "young people who are aware that death from falling is a remote possibility for them know enough to know that they face a very low rate of return on investing in detailed information about the causes of falling."

34. Ironically (in light of the subject of this paper), Lichtenstein et al.'s (1978) research was supported by the Advanced Research Projects Agency of the Department of Defense and monitored by the Office of Naval Research.

Benjamin, Dougan, and Buschena (2001, 39) administered a survey to students that asked them to estimate death rates by cause among members of their own age groups. The results of their survey data are consistent with the hypothesis that people acquire and use information rationally. Although their respondents formed "extraordinarily biased" estimates of *population* death rates, "they made remarkably unbiased estimates of the death rates most relevant to them: those of their own age groups" (44, italics in original).

Following up on the results of Benjamin and Dougan (1997) and Benjamin, Dougan, and Buschena (2001), Harrison and Rutström designed a survey instrument to "differentiate the beliefs that subjects have about mortality risks of people in their own age group from those of other age groups." Their evidence is also consistent with the hypothesis that individuals have "better information about mortality risks that are relevant to them, such as those for their own age group" (2006, 342).

Hakes and Viscusi (1997) embed the insights of Benjamin and Dougan (1997) into a model that allows for the possibility that individuals use data from multiple sources to form their perceptions. They formulate a simple Bayesian model containing four independent sources of information in which the probabilities can be characterized by the beta distribution of prior beliefs, which can assume both skewed and symmetric shapes (136–7). Their results suggest that "individuals use three sources of information: the actual death risk, the discounted lost life expectancy associated with the cause of death, and to a lesser extent the age-specific hazard rate" (149). Hakes and Viscusi (149) find that the various risk variables were less helpful in predicting individuals' perceptions at lower levels of risk. They suggest that the various sources of information may not be as useful at lower risk levels.

The results of Hakes and Viscusi (1997) are particularly important in the case of combat risk because those risks are highly variable across Services, countries (and smaller units of geography), and time. Although the results of Benjamin and Dougan (1997), Benjamin, Dougan, and Buschena (2001), and Harrison and Rutström (2006) suggest that individuals are well-informed about the risks that affect them most, Hakes and Viscusi (1997) find that even within a demographic group, individuals do not appear to ignore information from other demographic groups. Put differently, although it is rational for individuals to collect information about risks that are most salient, it is not rational for individuals to ignore all other sources of information.

References

Albernini, Anna. 2005. "What is a life worth? Robustness of BVSL values from contingent value surveys." *Risk Analysis: An International Journal* 25: 783–800.

Asch, Beth, James Hosek, Michael Mattock, and Christina Panis. "Assessing Compensation Reform: Research in Support of the 10th Quadrennial Review of Military Compensation." RAND Monograph MG764 (2008).

Ashenfelter, Orley and Michael Greenstone. 2004. "Using mandated speed limits to measure the value of a statistical life." *Journal of Political Economy* Supplement. S226–67.

Bommier, Antoine and Bertrand Villeneuve. October 2010. "Risk aversion and the value of risk to life." *The Journal of Risk and Insurance*.

Carrell, Scott E. 2007. "The national internal labor market encounters the local labor market: Effects on employee retention." *Labour Economics* 14:774–87.

Carrell, Scott E. and James E. West. 2005. "Optimal Compensating Wages for Military Personnel." *Journal of Policy Analysis and Management* 24: 803–22.

Cohen, Mark A. and Ted R. Miller. 2003. "Willingness to award' nonmonetary damages and the implied value of life from jury awards." *International Review of Law and Economics* 23: 165–81.

Cropper, Maureen, James I. Hammitt, and Lisa A. Robinson. March 2011. "Valuing Mortality Risk Reductions: Progress and Challenges." Discussion paper Rff Dp 11-10, Resources for the Future.

Cummings, Michael G. 2011. "I didn't deserve my combat pay." *Washington Post*, March 18. http://www.washingtonpost.com/opinions/i-didnt-deserve-my-combat-pay/2011/03/07/ABb6iqm_story.html.

DeLeire, Thomas and Helen Levy. 2004. "Worker sorting and the risk of death on the job." *Journal of Labor Economics* 22: 925–53.

Dunn, Lucia F. 2003. "Is combat pay effective? Evidence from Operation Desert Storm." *Social Science Quarterly* 84: 344–58.

Fraser, Clive. 1995. "Misperceived job hazards and welfare." *Journal of Public Economics* 56: 97–123.

Gould, Brandon R. and Stanley A. Horowitz. August 2011. "History of Combat Pay." IDA Paper P-4765. Alexandria, VA: Institute for Defense Analyses.

Government Accountability Office (GAO). 2010. "Military Personnel: Military and Civilian Pay Comparisons Present Challenges and are One of Many Tools in Assessing Compensation." GAO-10-561R. Washington, DC.

Grazier, S. and P. J. Sloane. 2008. "Accident risk, gender, family status and occupational choice in the UK." *Labour Economics* 15: 938–57.

Hakes, Jahn K. and W. Kip Viscusi. 1997. "Mortality risk perceptions: A Bayesian reassessment." *Journal of Risk and Uncertainty* 15:135–50.

Hakes, Jahn Karl and W. Kip Viscusi. 2004. "Dead Reckoning: Demographic determinants of the accuracy of mortality perceptions." *Risk Analysis* 24: 651–64.

Hammitt, James K. and Kevin Haninger. 2010. "Valuing fatal risks to children and adults: Effects of disease, latency, and risk aversion." *Journal of Risk and Uncertainty* 40: 57–83.

Harrison, Glenn W. and E. Elisabet Rutström. 2006. "Eliciting Subjective Beliefs about mortality risk." *Environmental and Resource Economics* 33: 325–46.

Hogan, Paul F. and Patrick C. Mackin. 2003. "Voluntary Assignments and Economic Efficiency." Paper presented at the 78th Annual Conference of Western Economic Association International.

Hosek, James, Jennifer Kavanagh, and Laura Miller. 2006. "How Deployments Affect Service Members." RAND Report MG432.

Hosek, James R. and Mark E. Totten. 2004. "The Effect of Deployment on First- and Second-term Re-enlistment in the US Active Duty Force." *Defence and Peace Economics* 15 (5): 433–51.

Kapp, Lawrence. 2003. "Military pay: Controversy over Hostile Fire/Imminent Danger Pay and over Family Separation Allowance rates." CRS Report for Congress RS21632.

Kniesner, Thomas J., W. Kip Viscusi, and James P. Ziliak. 2010. "Policy Relevant Heterogeneity in the Value of Statistical Life: New Evidence from Panel Data Quantile Regressions." *Journal of Risk and Uncertainty* 40: 15–31.

Koopman, Martha E. and Anita U. Hattaingadi. 2002. "Do the Services Need Deployment Pay?" Ninth Quadrennial Review of Military Compensation, Chapter IV. Washington, DC.

Krueger, Alan B. and David A. Schkade. 2008. "Sorting in the Labor Market: Do Gregarious Workers Flock to Interactive Jobs? *Journal of Human Resources* 43: 859–83.

Lalive, Rafael. 2000. "Did We Overestimate the Value of Health?" University of Zurich Working Paper ISSN 1424–0459.

Lewis, Frank D. 1989. "Dependents and the Demand for Life Insurance." *American Economic Review* 79: 452–67.

Lhakani, Hyder and Elissa T. Abod. 1997. "The Effectiveness of Economic Incentives for Career Commitment of Peacekeepers in the Sinai." *Armed Forces and Society* 23: 391–414.

Lichtenstein, Sarah, Paul Slovic, Baruch Fischoff, Mark Layman, and Barbara Combs. 1978. "Judged frequency of lethal events." *Journal of Experimental Psychology: Human Learning and Memory* 4: 551–78.

Nagin, Daniel S., James B. Rebitzer, Seth Sanders, and Lowell J. Taylor. 2002. "Monitoring, Motivation, and Management: The Determinants of Opportunistic Behavior in a Field Experiment." *American Economic Review* 92: 850–73.

Pleeter, Saul, Alexander O. Gallo, Brandon R. Gould, Stanley A. Horowitz, Maggie X. Li, Shirley H. Liu, Curtis J. Simon, and Carl F. Witschonke. August 2011. "Risk and Combat Compensation." Paper P-4747. Alexandria, VA: Institute for Defense Analyses.

Rosen, Sherwin. 1986. "The Theory of Equalizing Differences." In *Handbook of Labor Economics*, Vol. I, edited by Orley Ashenfelter and Richard Layard, 12: 641–92. Amsterdam, Netherlands: North Holland Publishing Co.

Shogren, Jason F. and Tommy Stamland. 2002. "Skill and the Value of Life." *The Journal of Political Economy* 110: 1168–73.

Simon, Curtis J. and John T. Warner. 2010. "Army Re-enlistment During OIF/OEF: Bonuses, Deployment, and Stop-Loss." *Defence and Peace Economics* 21 (5-6): 507–27.

Simon, Curtis J. and John T. Warner. 2009. "The Supply Price of Commitment: Evidence from the Air Force Enlistment Bonus Program." *Defence and Peace Economics* 20 (4): 269–86.

Smith, Adam. 1976. *An Inquiry into the Nature and Causes of the Wealth of Nations*. Edited by R. H. Campbell, A. S. Skinner, and W.B. Todd. Indianapolis: Liberty Classics. Originally published in 1776.

Tanielian, Terri. E. and Lisa H. Jaycox. 2008. "Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery." Santa Monica: RAND Corporation.

Viscusi, W. Kip. 1999. "How Do Judges Think about Risk?" *American Law and Economics Review* 1: 26–62.

Viscusi, W. Kip. 2001. "Jurors, Judges and the Mistreatment of Risk by the Courts." *The Journal of Legal Studies* 30: 107–42.

Viscusi, W. Kip. 2004. "The Value of Life: Estimates with Risks by Occupation and Industry." *Economic Inquiry* 42: 29–48.

Viscusi, W. Kip. 2010. "The Heterogeneity of the Value of Statistical Life: Introduction and Overview." *Journal of Risk and Uncertainty* 40:1–13.

Viscusi, W. Kip and Joseph E. Aldy. 2007. "Symposium: Mortality-Risk Valuation and Age." *Review of Environmental Economics and Policy* 1: 241–60.

Viscusi, W. Kip and Joni Hersch. 2001. "Cigarette Smokers as Job Risk Takers." *The Review of Economics and Statistics* 83: 269–80.

Warner, John and Matthew S. Goldberg. 1984. "The Influence of Non-Pecuniary Factors on Labor Supply: The Case of Navy Enlisted Personnel." *Review of Economics and Statistics* 66:25–35.

Part IV

Wounded Warriors and Survivors

Chapter 11

Compensating Wounded Warriors

An Analysis of Injury, Labor Market Earnings, and Disability Compensation Among Veterans of the Iraq and Afghanistan Wars

Paul Heaton
David S. Loughran
Amalia R. Miller

Summary

Nearly a decade of operational combat in Iraq and Afghanistan has focused attention on meeting the needs of military service members, especially those injured in combat, following deployment. Two recent commissions—the President's Commission on Care for America's Returning Wounded Warriors (2007) and the Veterans' Disability Benefits Commission (2007)—have recommended fundamental changes in how DoD and the VA evaluate, treat, compensate, and otherwise support injured service members and their families. To address this continuing issue, the President directed the Secretary of Defense to examine compensation benefits available to wounded warriors, caregivers, and survivors of those fallen service members as part of the 11th QRMC. In response to a request from the 11th QRMC, RAND performed the first comprehensive, quantitative assessment of how injury sustained while deployed in support of OEF/OIF affects subsequent labor market outcomes and the extent to which retirement and disability payments received from DoD, the VA, and SSA compensate for earnings losses attributable to injury. The findings of that assessment are presented in this monograph.

Study Design

The study employs data on injury, labor market earnings, and disability compensation for a large sample of Active Component (AC) and RC members deployed

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

to Iraq and Afghanistan between September 11, 2001, and December 2006. These longitudinal, largely administrative data were obtained from DoD, the VA, and SSA and were linked by Social Security numbers. The resulting database tracks labor market earnings and disability compensation, reported in 2010 dollars, between 1998 and 2010 for nearly 700,000 service members and their spouses.

Each service member in the sample is categorized according to available self-reported and administrative data on the incidence and severity of injury sustained while deployed, as follows:

- Uninjured.
- Health worsened: The service member reported on the Post-Deployment Health Assessment (PDHA) that his or her health worsened during deployment, but the member was not referred for follow-up care.
- Referred: The service member reported on the PDHA that his or her health worsened during deployment, and the PDHA indicates that the member was referred for follow-up care.
- Non-serious casualty: The service member sustained a non–life-altering combat injury, according to official casualty data.
- Serious casualty: The service member sustained a life-altering combat injury, according to official casualty data.
- Very serious casualty: The service member sustained a life-threatening combat injury, according to official casualty data.

Approximately 18 percent of the service members in the sample reported that their health worsened during deployment; 2.7 percent sustained a non-serious combat injury; 0.2 percent sustained a serious combat injury; and 0.1 percent sustained a very serious combat injury.

We compared the labor market earnings of injured service members and their spouses in the years following deployment with the labor market earnings of uninjured service members and their spouses. Since the incidence of injury is likely to be correlated with characteristics of service members that could themselves be correlated with labor market outcomes (e.g., pay grade, military occupation, risk-taking behavior), we controlled for a rich array of individual-level characteristics, including labor market outcomes prior to deployment (i.e., we estimated such correlations in first differences). This approach eliminated the potentially confounding influence of fixed unobservable characteristics of individuals correlated with the incidence of injury and labor market outcomes, increasing the likelihood that our results can be

interpreted as the causal effect of injury on earnings. However, these controls are imperfect, and the estimated correlation between injury and post-deployment labor market outcomes reported here could reflect, in part, time-varying unobserved characteristics of service members, which would undermine such a causal interpretation.

Labor Market Earnings Effects

Figure S.1 shows the estimated effect of injury on service member labor market earnings by year since the end of deployment and component. The figure demonstrates that (1) the estimated effect of less-serious injury (health worsened, referred, non-serious combat injury) on service member earnings is small, ranging from –$2,079 to –$6,080 four years following deployment (representing from 3 to 10 percent of service member earnings), whereas the estimated effect of serious and very serious combat injury on service member earnings is quite large, ranging from –$11,943 to –$26,261 four years following deployment (between 19 and 41 percent of service member earnings); (2) the estimated negative effect of injury on earnings increases markedly over the first four years following injury; and (3) patterns of estimated earnings loss of AC and RC members are broadly similar. We can observe earnings effects as many as seven years following deployment for a part of our sample, and estimates including those service members suggest that earnings losses do not change significantly between years 4 and 7.

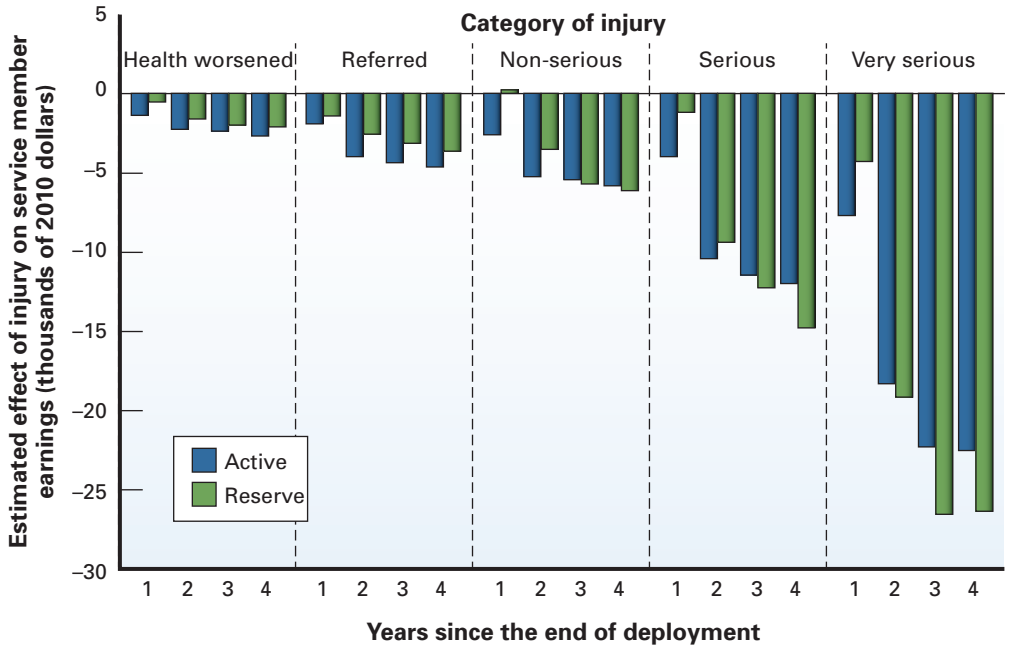


Figure S.1. Estimated Effect of Injury on Service Member Labor Market Earnings, by Injury Type, Years Since Deployment, and Component

A significant driver of loss of labor market earnings among injured service members is a decline in earnings resulting from military separation. Figure S.2 shows that injured service members in all categories are substantially more likely to separate from the military in the years following the end of deployment and that this differential grows over time. By year 4, injured service members are estimated to be from 5 to 45 percentage points more likely to have separated from the military than uninjured service members. Thus, we believe that earnings losses increase over the first four years following deployment not because the injury itself worsens over time, but because injury eventually leads to separation from the military and such separation leads to lower labor market earnings. However, our estimates imply that serious and very serious combat injury results in substantial losses in labor market earnings from civilian sources as well, especially among reservists.

The financial impact of injury may extend to the spouses of injured service members who must curtail their labor supply in order to provide care or, conversely, might increase their labor supply in an effort to offset earnings losses experienced by their injured spouses. Figure S.3 shows that serious and very serious combat injuries lower spousal labor market earnings, but the effect is quite small relative to the effect of injury on the service member's own labor market earnings (and frequently is not

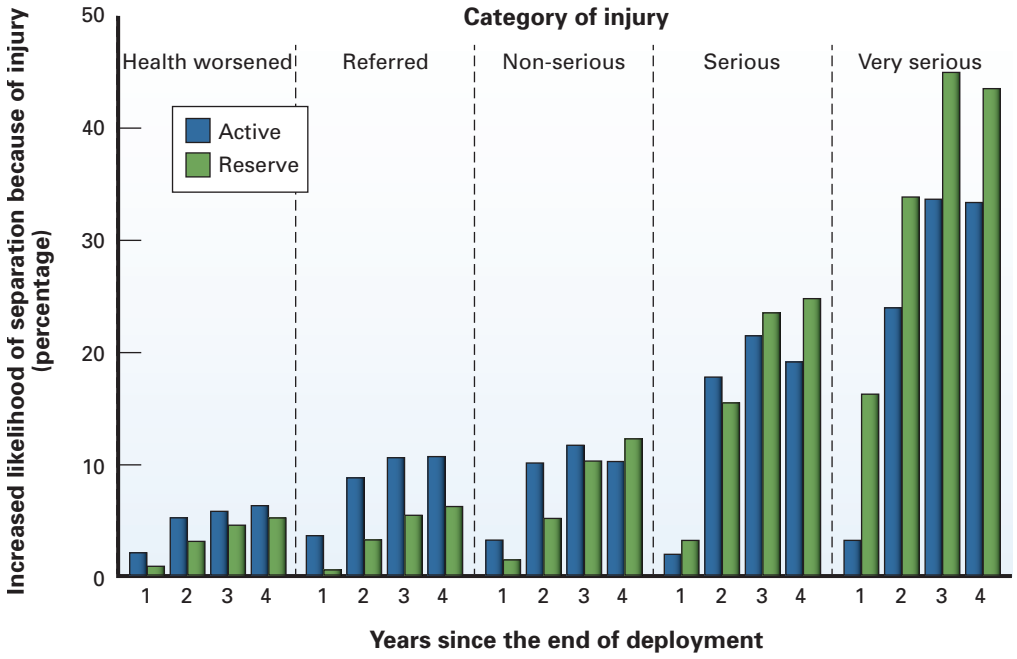


Figure S.2. Estimated Effect of Injury on Military Separation, by Injury Type, Years Since Deployment, and Component

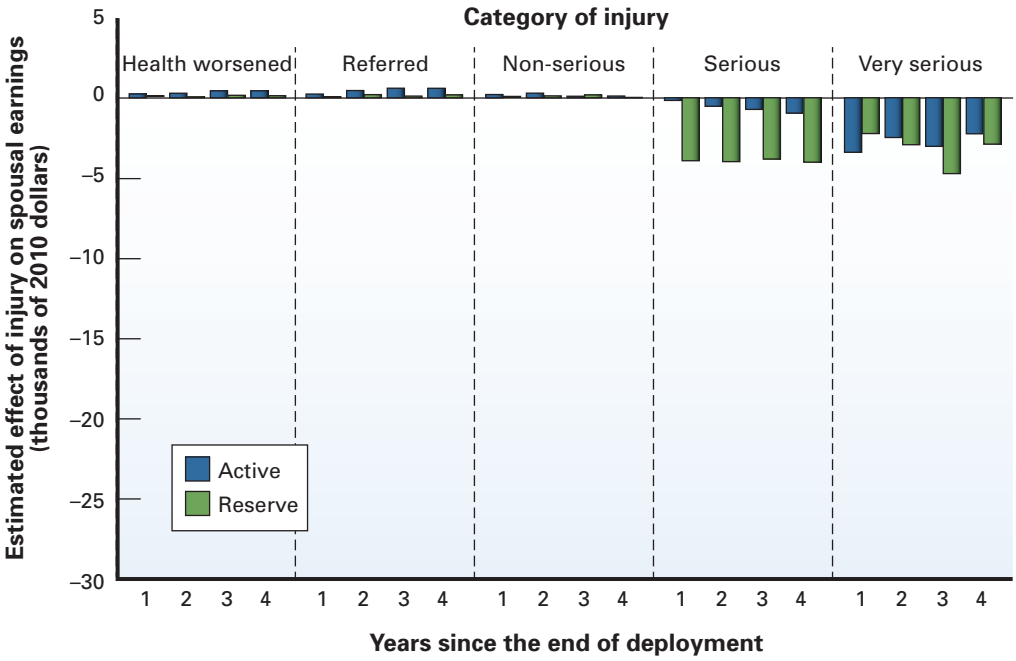


Figure S.3. Estimated Effect of Injury on Spousal Labor Market Earnings, by Injury Type, Years Since Deployment, and Component

statistically distinguishable from zero). Very serious combat injury lowers spousal earnings by between $2,144 and $2,755 four years following deployment (from 14 to 18 percent of earnings). Point estimates imply a positive effect of less-serious injury on spousal earnings, but these estimates are small and, for the most part, statistically indistinguishable from zero.

Estimated Income Replacement Rates

Injured service members can potentially receive disability compensation from a number of sources, including DoD disability retired pay, VA disability pay, Combat-Related Special Compensation (CRSC), and Social Security Disability Insurance (SSDI). In addition, some injured service members are eligible to receive one-time payments from the Traumatic Servicemembers Group Life Insurance (TSGLI) program. Many of these disability payments are received tax free, which we account for in our estimates. Figure S.4 shows that, on average, these sources of compensation fully, if not more than fully, offset the estimated effect of injury on labor market earnings. The estimated effect of injury on total household income—by which we mean the sum of service member and spousal labor market earnings and disability

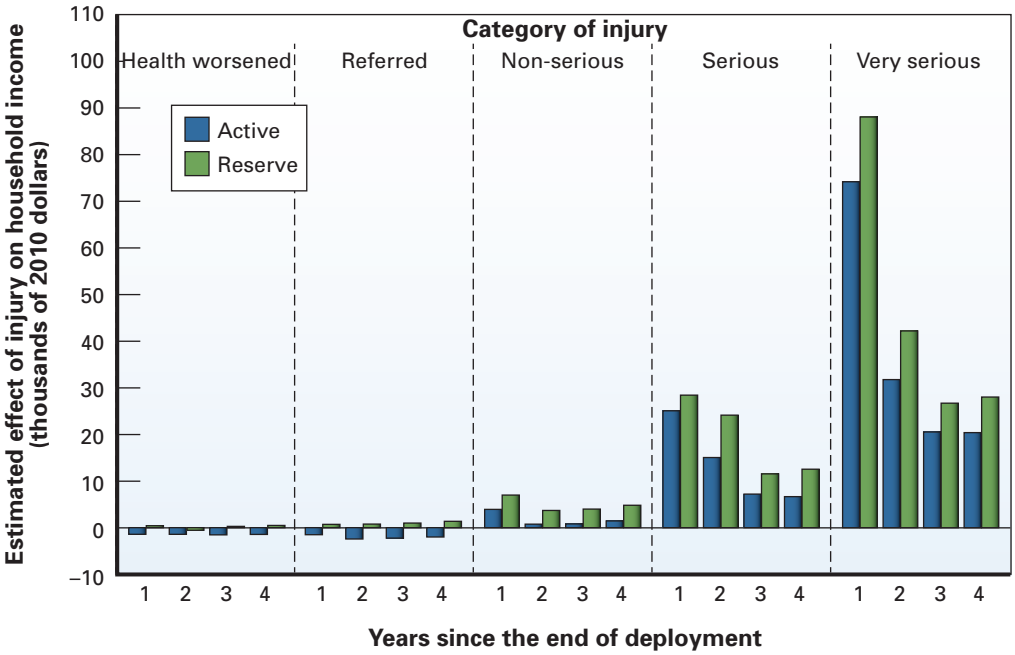


Figure S.4. Estimated Effect of Injury on Household Income Including Disability Compensation, by Injury Type, Years Since Deployment, and Component

compensation—in the fourth year following deployment is always positive among RC members (ranging from $167 to $27,780) and is positive for all but the less seriously injured AC members (from –$1,354 to $19,976). The decline in the positive effect of injury on household income between years 1 and 2 reflects the fact that one-time TSGLI payments, which range from $25,000 to $100,000, are typically made in the first year following deployment.

Table S.1 shows actual household earnings including disability payments as a percentage of expected household earnings (the replacement rate), by component, injury type, and years since deployment. Estimated replacement rates in the fourth year following deployment range from 98 to 154 percent among injured AC members and from 107 to 183 percent among injured RC members. The higher replacement rates among injured reservists reflect their somewhat higher propensity to receive VA disability compensation and SSDI. Replacement rates are generally higher in years 1 and 2, reflecting the influence of lump-sum TSGLI payments made in those years.

Table S.1. Estimated Replacement Rates, by Injury Type, Type of Disability Compensation, and Component

Item	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
			AC		
Household earnings loss in year 4 (2010 dollars)	2,693	4,651	5,787	11,943	22,555
Percentage of of average earnings	4	7	9	19	36
Replacement rate (percentage)					
Year 1	101	100	114	165	280
Year 2	100	97	105	146	181
Year 3	99	98	105	124	159
Year 4	99	98	105	122	154
			RC		
Household earnings loss in year 4 (2010 dollars)	2,079	3,614	6,080	14,755	26,261
Percentage of of average earnings	3	4	10	22	41
Replacement rate (percentage)					
Year 1	101	110	128	186	442
Year 2	97	108	115	188	213
Year 3	107	109	113	142	182
Year 4	107	109	114	143	183

Discussion

Among the many hardships of military deployment is the possibility of injury; 18 percent of deployed service members in our sample returned home feeling that their health worsened over the course of deployment, and another 3 percent were wounded in combat. This study found that combat injuries, about half of which, in our sample, resulted in a VA disability rating, decrease household labor market earnings by an average of 11 percent four years following deployment. Although estimated earnings losses are considerably lower among the less seriously injured (health worsened/referred), about 5 percent, the large numbers of service members with such injuries add significantly to the social cost of conducting the wars in Iraq and Afghanistan. Service members in our sample deployed to Iraq and Afghanistan between 2001 and 2006 and returning home with these less-serious injuries experienced aggregate labor market earnings losses of $1.6 billion through 2010. Official casualties, by

comparison, experienced $556 million in aggregate earnings losses, according to our estimates.[1] Disability compensation paid to injured service members (over and above that paid to uninjured service members) in our sample over this same period totaled $2.3 billion—107 percent of estimated lost household earnings.

We have not attempted to answer the difficult normative question of whether the replacement rates reported here, which are well above 100 percent for those with serious combat injuries, are appropriate. Disability compensation can be viewed as a form of insurance against the possibility of injury, and elementary economic models suggest that risk-averse individuals demand full insurance for potential losses, which would argue for a 100-percent replacement rate. But injured service members potentially lose more than just capacity in the labor market; they may incur considerable out-of-pocket costs in adapting to their injuries, and nonpecuniary losses such as pain and suffering or loss of consortium can be significant. Economic theory also suggests that replacement rates above 100 percent can be justified for occupations in which calculated risk-taking is desirable (e.g., policing, firefighting, military service). In addition, individuals typically enjoy real wage growth, particularly early in their careers, while disability payments are indexed for inflation but typically do not otherwise increase over time. Taking a life-cycle perspective, it may be logical to provide benefits above full replacement initially to account for the fact that those with permanent disability will not enjoy the earnings growth their uninjured peers can expect.

1. Introduction

Nearly a decade of operational combat in Iraq and Afghanistan has focused attention on meeting the needs of military service members, especially those injured in combat, following deployment. Two recent commissions—the President's Commission on Care for America's Returning Wounded Warriors (2007) and the Veterans' Disability Benefits Commission (2007)—have recommended fundamental changes in the way the Department of Defense (DoD) and the Department of Veterans Affairs (VA) evaluate, treat, compensate, and otherwise support injured service members and their families. To address this continuing issue, the President directed the Secretary of Defense to examine compensation benefits available to wounded warriors, caregivers, and survivors of those fallen service members as part of the 11th Quadrennial Review of Military Compensation

1. We compute aggregate household earnings loss by multiplying model parameter estimates by number of observations in the corresponding injury, post-deployment year, and component cell and summing over components and post-deployment years. It is important to recognize that estimated aggregate earnings losses are almost certainly a lower limit on the actual aggregate earnings losses. Although our sample is large and comprehensive, it probably omits some fraction of the individuals who were injured while deployed to Iraq and Afghanistan; thus our aggregate analysis will omit their income losses from the totals.

(QRMC). In response to a request from the 11th QRMC, RAND performed the first comprehensive, quantitative assessment of how injury sustained while deployed in support of Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) affects subsequent labor market outcomes and the extent to which retirement and disability payments received from DoD, the VA, and the Social Security Administration (SSA) compensate for earnings losses attributable to injury.

According to official casualty statistics, some 43,100 U.S. military service members had been non-fatally wounded during OEF/OIF as of April 2011.[2] Many more deployed service members have incurred mental and physical injuries that are not recorded in casualty statistics but nonetheless have the potential to profoundly impact future health and well-being. Tanielian and Jaycox (2008), for example, estimate that as many as 30 percent of service members deployed in support of OEF/OIF return home suffering from post-traumatic stress disorder (PTSD), depression, and/or traumatic brain injury. Heaton and Loughran (2011) find that 8 percent of reservists deployed in support of OEF/OIF reported being hospitalized during their deployment, more than one-third complained of back pain, and nearly one-quarter reported that their health had worsened during deployment.

While recent data-collection efforts have greatly improved our understanding of the types and frequencies of injuries service members have sustained while deployed in support of OEF/OIF,[3] we know relatively little about how these injuries impact subsequent well-being. This is especially true with respect to labor market outcomes, such as employment and earnings, which anecdotal evidence, but not necessarily rigorous research, suggests are likely to be negatively impacted by injuries sustained during deployment. Loughran and Klerman (2011) find that deployment reduces the civilian labor market earnings of military reservists by about 2 percent, on average, in the year following deployment, but this negative effect turns positive in subsequent years. Heaton and Loughran (2011) show that military reservists symptomatic of PTSD at the end of deployment experience an additional 6-percent decline in labor market earnings four years following deployment and that much of this decline is attributable to higher rates of military separation among those symptomatic of PTSD.[4]

2. Defense Manpower Data Center, undated.

3. For information on the prevalence of mental health problems among OEF/OIF veterans, see, for example, Hoge et al., 2004; Milliken, Auchterlonie, and Hoge, 2007; and Tanielian and Jaycox, 2008.

4. A number of recent studies examine the effect of deployment on other outcomes such as child test scores and family stress (Lyle, 2006; Chandra et al., 2010; Werber et al., 2008), marriage and divorce (Negrusa, Negrusa, and Hosek, undated; Karney and Crown, 2007), and military reenlistment (Hosek and Martorell, 2009). See also Hosek, Kavanagh, and Miller, 2006; Tanielian and Jaycox, 2008; and Hosek, 2011, for summaries of previous studies on the effect of deployment on service member well-being.

Other recent research—for example, Buddin and Kapur (2005), Christensen et al. (2007), EconSys (2008), and Buddin and Han (2011)—shows that while the labor market earnings of veterans are negatively correlated with disability ratings assigned by DoD and the VA, disability compensation, on average, fully (if not more than fully) compensates for earnings losses attributable to disability. However, all of the prior studies note that some groups of disabled veterans appear to be less than fully compensated for lost earnings. For example, EconSys (2008) and Christensen et al. (2007) find that veterans with a disability rating of 100 percent have total earnings below those of otherwise similar veterans with no service-connected disability.

The present study, which encompasses Active Component (AC) and Reserve Component (RC) members whose deployments ended between 2003 and 2006 and follows their and their spouses' subsequent labor market and disability compensation experiences through 2010, differs from past research on injury and disability compensation in a number of significant ways.[5] First, it focuses on injury sustained during deployment rather than on having a service-connected disability. A service-connected disability could be attributable to virtually any incident while serving on active duty, requires a DoD or VA determination of disability, and results in separation from the military. By focusing on injury rather than service-connected disability, this study does not condition on military separation, which by itself can independently affect earnings (Angrist, 1998; Loughran et al., 2011), or on the DoD and VA disability rating determination processes. Second, it focuses on service members injured during OEF/OIF and follows their earnings through 2010. The study population in past research on this topic is dominated by individuals separating from military service prior to OEF/OIF and whose injuries were not attributable to deployment. Third, it accounts for recent policy changes allowing for concurrent receipt of DoD and VA retirement and disability payments, the receipt of lump-sum payments for specific traumatic injuries, and Social Security Disability Insurance (SSDI) payments. Fourth, it employs longitudinal earnings data to show how the effect of injury on labor market earnings and disability compensation changes in the years following injury and to control more completely for the potentially confounding effect of differences in the characteristics of service members who do and do not incur injury. Finally, it shows how the effect of injury differs across AC and RC members and how injury affects not only their own earnings but the earnings of their spouses as well. The spouses of service members could experience declines in labor market earnings if they curtail labor supply in an effort to care

5. We focus only on deployed individuals, since the purpose of this study is to estimate the effect of injury on earnings net of any other deployment-related effects; the disability compensation system compensates individuals for injury and not other hardships associated with deployment.

for their injured husbands or wives, yet the effect of service members' injuries on the earnings of their spouses is virtually unstudied.[6]

The remainder of this monograph has the following structure. Chapter Two describes the data we employ to define our sample and measure key outcomes such as injury, labor market earnings, and disability compensation. Chapter Three presents descriptive statistics related to these outcomes. Chapter Four describes our empirical approach. Chapters Five and Six report the estimated effect of injury on labor market earnings and total household income including disability compensation, respectively. Chapter Seven discusses the aggregate labor market cost of deployment-related injury and the fraction of that cost "replaced" by existing disability-compensation mechanisms.

2. Data

This study draws on administrative data on injury, labor market earnings, and disability compensation obtained from DoD, the VA, and SSA. This chapter explains how we used those data to construct our analysis sample and key measures of injury and earnings.

The Sample

The initial sample for this study consists of 717,225 AC and RC members deployed to Afghanistan and Iraq who completed the Post-Deployment Health Assessment (PDHA-DD Form 2796) or who appear in the Defense Manpower Data Center's (DMDC's) Casualty File between June 1, 2003, and December 31, 2006.[7] All service members deployed outside the continental United States to a land-based location with no fixed U.S. medical treatment facility for 30 or more continuous days must complete the PDHA within five days of the end of deployment. As stated on DD Form 2796, the principal purpose of the PDHA is "to assess your state of health after deployment outside the United States in support of military operations and to assist military healthcare providers in identifying and providing present and future medical care to you." To this end, the PDHA records

6. Christensen et al. (2009) report an estimate of the earnings losses of the caregivers (spouses, parents, and others) for seriously wounded service members by imputing their earnings and assuming these caregivers must stop work altogether. Angrist and Johnson (2000) and Savych (2008) find deployment and other work-related absences have a small negative impact on the earnings of military spouses while the service member is away from home.

7. The sample includes service members reporting a deployment location of Kuwait or Qatar, under the assumption that they were in fact in Iraq and/or Afghanistan during at least part of their deployment. Most deployments to these areas in our data occur in 2003 and probably reflect the pre–Iraq-invasion buildup of military forces.

self-reported information about current physical and mental health and documents concerns regarding exposure to environmental toxins, viruses, and the like. The PDHA process includes a face-to-face interview with a healthcare professional, and the results of that interview are also recorded on the PDHA form, along with any referrals for follow-up medical care. While the PDHA process has existed since 1998, it was not fully implemented until 2003.[8]

To the PDHA sample we added service members who appear in the Casualty File but not in the PDHA data between June 1, 2003, and December 31, 2006. The Casualty File is the source of official statistics on U.S. casualties sustained in support of OEF/OIF. Any service member whose regular duty assignment is disrupted as a result of an injury sustained during hostile action is recorded in the Casualty File, along with information about the nature of the injury and the date it was sustained. Many of these individuals do not complete a PDHA because the seriousness of their injuries obviates the need for conducting such an assessment.[9]

For each service member in our sample, we selected the deployment with the most recent end date. In the specifications presented in the appendix, we also omitted a small number of service members (less than 0.5 percent of our sample) who appear in the Casualty File after 2006. As explained in Chapter Four, we did this so that service members in our control group, who were not injured while deployed (hereafter referred to as uninjured service members), remain uninjured (to the best of our knowledge) in the years following their last deployment between 2003 and 2006.[10]

Demographic Covariates and Spouses

Data on age, gender, component, race/ethnicity, pay grade, education, score on the Armed Forces Qualification Test (AFQT), military occupational specialty, and state of residence were obtained from DMDC's Work Experience File (WEX) and the Defense Eligibility Enrollment Reporting System (DEERS). We also employed DEERS to identify which service members were married in the year prior to deployment and the Social Security Numbers (SSNs) of their spouses. We identified 242,463 spouses of AC members and 132,820 spouses of RC members in our sample.

8. See Joint Chiefs of Staff, 2002.
9. It is likely that some deployed service members fail to complete the PDHA for reasons other than serious injury. We have no reason to believe, however, that this incomplete coverage biases the results reported here.
10. Of course, this selection rule might introduce other bias, since individuals who were injured after 2006 are more likely, all else equal, to have remained in the military and could possess other characteristics correlated with subsequent injury that are also correlated with labor market outcomes.

Beginning and end dates of deployment were obtained from self-reports in the PDHA or, for service members who appear in the Casualty File but not in the PDHA, from DMDC's Global War on Terror Contingency File.[11] Dates of separation from military service were obtained from the WEX.

Injury Categories

We employed the PDHA and Casualty File to measure injuries in our sample. Medical professionals at a field hospital or other medical treatment facility categorize service members who appear in the Casualty File as having non-serious (non–life-altering), serious (life-altering), or very serious (life-threatening) combat injuries, or they are counted as fatalities. For individuals who do not appear in the Casualty File, we use data on injuries referred for follow-up care and the individuals' own assessments of whether their health changed for the worse while deployed, categorizing them as

- No injury: The service member was not referred for follow-up care and did not state that his or her health worsened during deployment.
- Health worsened: The service member stated that his or her health worsened during deployment but he or she was not referred for follow-up care.[12]
- Referred: The service member stated that his or her health worsened during deployment and the injury was referred for follow-up care.

We categorized a service member as having a referred injury if the PDHA recorded a referral indicated for one or more of the following conditions: cardiac; combat/operational stress reaction; dermatological; ear, nose, and throat; eye; family problems; fatigue, malaise, multisystem complaint; audiology; gastrointestinal; genitourinary; gynecological; mental health; neurological; orthopedic; pulmonary; or other condition.

We included individuals who do not appear in the Casualty File to capture those who may have been injured while deployed but not in a manner that would lead to their inclusion in official casualty statistics. We could have categorized deployment-related injury in the PDHA in a variety of ways, but we decided that using the service member's own subjective assessment of his or her change in health in combination with indications of physician referrals was an efficient way to group such injuries.

11. The Global War on Terror Contingency File uses data provided by the services and military pay data to determine dates of deployment. We could have used this source to define our sample, but we chose to use the PDHA instead because of our desire to employ the health data recorded on it.
12. The specific question on the PDHA is "Did your health change during this deployment?" Respondents can choose "Health stayed about the same or got better" or "Health got worse."

Self-reported health assessments of this sort are commonly used in studies of health and well-being and have been shown to be highly correlated with actual diagnoses, activities of daily living, and mortality in a variety of contexts (see, for example, Bound, 1991). In the PDHA, self-reported health change is correlated with other self-reported health conditions, physician referrals, and DoD disability ratings.

Our resulting injury classification is mutually exclusive, with injuries recorded in the Casualty File taking precedence over those recorded in the PDHA. We emphasize, however, that this ordering is imperfect in the sense that we cannot be certain that all injuries recorded in the Casualty File are necessarily more serious than those recorded in the PDHA. In some instances, for example, an individual might have sustained a serious injury as a result of combat actions, but circumstances did not dictate that the injury be recorded in the Casualty File. This individual would then likely be categorized as "health worsened" or "referred." As another example, psychological injuries sustained while deployed could result in a claim that health worsened or a referral but could have an effect on long-term well-being as serious as or more serious than injuries recorded in the Casualty File. In theory, injuries recorded in the PDHA that lead to chronic conditions or permanent disability could have a greater effect on long-term well-being than life-threatening physical injuries from which a service member fully recovers. Despite these caveats, we refer in this monograph to serious and very serious casualties as *more severely/seriously injured* and the health worsened, referred, and non-serious casualties groups as *less severely/seriously injured*.

We use these injury categories rather than disability ratings as our primary measure of injury, because disability ratings—which reflect both the underlying injury and the outcome of the ratings process—are arguably less clearly exogenous (or unrelated to individual agency) than injuries. Individuals may differ in the way they approach the ratings process, and if those differences are related to differences in earnings potential, the estimated correlation between disability ratings and earnings will confound the effect of injury with the effect of other, non-injury factors.

To permit comparisons with prior work for some supplementary analyses, we divide service members listed in the Casualty File according to their DoD disability rating (explained below) rather than the qualitative indicator of severity found in the Casualty File. The disability rating categories used in those analyses are 0 percent, 10 to 40 percent, 50 to 70 percent, and 80 to 100 percent.

Labor Market Earnings

Our measure of labor market earnings includes cash compensation received from DoD and civilian employers. Earnings data were obtained from SSA and DMDC. SSA records in its Master Earnings File (MEF) earnings from all sources subject to

Medicare taxes, including household employers and self-employment.[13] These data are considered to be of very high quality and have been used in many empirical studies, including several related to the labor market outcomes of veterans (e.g., Angrist, 1990, 1998; Christensen 2007; Loughran, Klerman, and Martin, 2006; EconSys, 2008; Loughran et al., 2011).

Not included in SSA earnings records are military allowances—e.g., Basic Allowance for Subsistence (BAS), Basic Allowance for Housing (BAH), Family Separation Allowance (FSA)—and bonuses, which are not subject to Medicare taxes. To account for these significant sources of military earnings, we add these quantities to SSA earnings, using individual-level pay records contained in DMDC's Active and Reserve Duty Pay Files. We obtained annual earnings data between 1995 and 2010 for 97 percent of our sample, leaving 456,218 AC and 236,580 RC members in our analysis file.[14] Our file also contains spousal earnings records over the same period for 224,977 AC and 122,101 RC members. All earnings figures are deflated to 2010 dollars, using the Consumer Price Index for All Urban Consumers (CPI-U).

Disability Compensation

Injured service members are potentially eligible to receive disability compensation from DoD, the VA, and SSA. These disability benefits and the data we use to capture them are described below.

DoD Disability Retired Pay

The military services have the authority to separate service members whose injuries prevent them from performing duties consistent with their office, rank, grade, or rating. Once a service member's condition has stabilized, a Medical Evaluation Board (MEB) at a medical treatment facility makes an initial assessment of whether he or she has a medical condition that is incompatible with continued military service. MEBs then forward such cases to a Physical Evaluation Board (PEB), which makes a formal determination of fitness for duty and rates the service member's disability according to the Veterans Affairs Schedule of Rated Disabilities (VASRD). On the VASRD, disabilities are rated on a 100-point scale in 10-percentage-point increments. Unlike the VA, PEBs evaluate only conditions that compromise ability

13. See Social Security Online, undated, for a list of employment categories that are exempt from Medicare taxes. Unlike Social Security earnings, Medicare earnings are not capped at the Social Security taxable limit.

14. Virtually all service members should appear in the SSA data, since basic pay is subject to Medicare tax. Match rates below 100 percent, therefore, are probably due to discrepancies in the names, SSNs, and dates of birth used to match service members to SSA records.

to serve in the military. Service members receive full military pay during this review process, which can take a year or more to complete, especially for injuries that do not stabilize quickly.

Service members who receive a disability rating of 30 percent or more and are deemed unfit for service are eligible to receive DoD disability retired pay, which is a function of the member's retired pay base, which is itself a function of past military earnings and either the individual's disability rating or years of service, whichever yields the highest benefit.[15] Service members who receive a disability rating of 10 or 20 percent and are not retirement-eligible are eligible to receive a disability severance payment. The value of that payment depends on pay grade, years of service, date of discharge, and whether the disability is combat-related.[16] Service members whose disabilities are not considered stable are placed on the Temporary Disability Retirement List (TDRL) and are eligible to receive disability retired pay even if their disability is rated less than 30 percent. Individuals on the TDRL are reexamined periodically until their condition is deemed stable.

We obtained data on DoD retired pay (disability and non-disability) from DMDC's Retired Pay File, which records monthly retired pay for any individual receiving such pay. Disability severance data were not available for the RC, so we did not include them on our analyses in order to maintain comparability across the AC and RC. Only a small percentage of those in our sample are potentially eligible for disability severance, and the average amount for those who receive it is quite small and paid in a lump sum.

VA Disability Benefits

Service members can and frequently do obtain a separate disability rating from the VA, regardless of whether DoD considers them to be unfit for service. The VA employs the same VASRD scale to rate disabilities but considers the total effect of all service-connected disabilities that limit civilian labor market potential. These service-connected disabilities could be attributable to any aspect of active-duty service and

15. The formula for DoD disability retired pay is retired pay base x adjustment factor, where adjustment factor is the maximum of the service member's disability rating or (years of service x 2.5)/100.

16. According to the Uniformed Services Almanac: "For disability separations occurring prior to January 28, 2008, the disability severance pay is computed by multiplying the monthly basic pay or the member's grade at the time of discharge or the monthly basic pay of any higher grade in which he or she served satisfactorily by twice the number of years of active service. The maximum payment is two years [of] basic pay. Effective for disability separations occurring on or after January 28, 2008, the minimum years of active service for computing disability pay is six in the case of a combat-related disability and three in the case of any other disability for which this pay is being paid. The maximum payment is three yeas, two months [of] basic pay." Service members who receive disability severance must pay this amount back to DoD if they subsequently receive monthly disability benefits from the VA unless their injury was incurred in the line of duty in a combat zone or as a result of performing duty during combat-related operations.

might not be manifest until after the individual separates from the military. Thus, it is not uncommon for service members to receive different disability ratings from DoD and the VA. It also is not uncommon for an individual with identical DoD and VA disability ratings to receive different amounts of DoD disability retired pay and VA disability benefits, since VA disability benefits are not a function of the DoD retired pay structure but rather are based on a schedule intended to reflect lost civilian earnings potential.[17] VA disability benefits also vary with number of dependents, and veterans with specific types of injuries, such as loss of a hand or foot, are entitled to receive additional special monthly compensation (SMC) that varies with the injury and the need for specific types of medical care.[18]

For this study, we obtained from the VA a special extract of VA disability benefits (including SMC and other miscellaneous cash payments) paid to each service member in our sample between 2004 and 2010. These data include VA payments to individuals who did not receive a disability rating from DoD and so would not necessarily be recorded in DMDC's Retired Pay File.

Concurrent Retirement and Disability Pay and Combat-Related Special Compensation

Prior to OEF/OIF, DoD disability retired pay was, with few exceptions, fully offset by VA disability benefits, meaning that service members received the maximum of the two amounts. In 2004 and 2008, however, Congress enacted laws allowing for two new payments, called Concurrent Retirement and Disability Pay (CRDP) and Combat-Related Special Compensation (CRSC), which reduce the extent to which VA disability benefits offset DoD disability retired pay. CRDP, which is being phased in through 2014, is paid to service members who retire with 20 or more years of service and have a VA rated disability of at least 50 percent. CRSC, which is not subject to federal income taxes, is paid to service members who are eligible to receive DoD disability retired pay, have a VA disability rating of 10 percent or more, and can demonstrate that their VA disability rating is attributable at least in part to a combat-related injury. Service members must apply to receive CRSC, whereas DoD automatically pays CRDP to eligible individuals. Both CRDP and CRSC were included in the extract of the Retired Pay File provided to us by DMDC.

17. In an effort to simplify the disability rating process, DoD and the VA developed the Integrated Disability Evaluation System (IDES), first piloted in fall 2007 and now in place worldwide. DoD uses IDES to decide if injured service members are still able to serve. If they are not, IDES gives them a VA disability rating before they leave the service. IDES also helps service members file a VA benefit claim before they separate from the military and allows for informal review boards and more chances to revisit decisions during the rating process. DoD PEB liaison officers and military service coordinators from the VA guide service members through IDES. Legal counsel is also available at no cost to the service member.

18. See Military.com, undated, for a complete list of conditions that qualify for SMC.

Traumatic Injury Protection Under Service Members' Group Life Insurance

Both AC and RC members are eligible to purchase life insurance through the Servicemembers' Group Life Insurance (SGLI) program administered by the VA. Service members who do not want SGLI must opt out, so the vast majority participate in the program. All of those enrolled in SGLI are automatically enrolled in the Traumatic Servicemembers' Group Life Insurance (TSGLI) program, which insures service members against the occurrence of specific traumatic injuries, including amputation, paralysis, burns, sight injury, hearing injury, facial reconstruction, coma, and traumatic brain injury.[19] TSGLI payments range from $25,000 to $100,000 depending on the injury or combination of injuries incurred. All service members participating in SGLI were made eligible for TSGLI beginning in December 2005, and at that time, coverage was made retroactive to cover injuries incurred in OEF/OIF between October 7, 2001, and November 30, 2005.[20] The VA provided us with a list of all service members who had received TSGLI through May 2011, along with the dates and amounts received.

Social Security Disability Insurance

Injured service members may also be eligible to receive SSDI benefits. To obtain SSDI benefits, an individual must demonstrate that he or she has a physical or mental condition that prevents him or her from engaging in any substantial gainful activity (SGA) and that is expected to last at least 12 months or result in death. SSA defines *substantial gainful activity* as activity that results in the receipt of pay or profit of more than an established threshold (currently $1,000/month). Thus, unlike DoD and VA benefits, SSDI benefits are conditional on labor market activity. The potential loss of SSDI benefits can create a financial disincentive against (increased) labor market activity for injured service members who have work opportunities. This could lead to lower observed wage earnings associated with injury (this possibility is discussed further in Chapter Four).

SSDI beneficiaries must also be under the age of 65 and have sufficient work history, which depends on their age. Individuals who were disabled before the age of 22 and do not have sufficient work history can potentially claim SSDI benefits based on their parents' work experience.

19. See "TSGLI Schedule of Losses," undated, for a complete list of qualifying injuries and conditions.

20. Beginning in October 2011, the Veterans' Benefits Act of 2010 (PL 111-275) extends these retroactive benefits to qualifying losses incurred during this period regardless of service-member location or prior SGLI enrollment status.

Initial SSDI eligibility determinations require about four months to complete, on average (Office of Inspector General, 2008).[21] Individuals who are denied benefits in this initial phase can make up to four appeals; nationwide, approximately two-thirds of SSDI applicants are ultimately awarded benefits (Maestas et al., 2011). Applicants must reduce work below the SGA threshold for five months before they can receive SSDI benefits. After receiving benefits, individuals can engage in SGA above the established threshold for the first year or so; after that, benefits are suspended in months in which SGA exceeds the earnings threshold. SSDI benefits are converted to Social Security retirement benefits when the beneficiary reaches the full retirement age.

Our data on SSDI benefits come from SSA's Master Beneficiary Record (MBR) file, which records payments from all Social Security trust fund accounts to all beneficiaries. We constructed a measure of annual SSDI benefits paid to each of the service-member households in our sample by summing two sets of payments. First, we add up all payments made to any beneficiary on the service member's or spouse's account. These payments will capture SSDI benefits paid to the injured service member as well as any supplemental payments made to a spouse or children on the account. Second, to capture disability payments made to service members who became disabled during or after their deployment but before accumulating sufficient work experience to qualify for benefits, we sum all payments made to the service member (or his or her spouse) as a beneficiary on some other person's account. In particular, an individual with a disability that started before age 22 can become entitled to SSDI "child" benefits on his or her parent's account if one of the parents is either receiving Social Security retirement or disability payments or died after having worked long enough to qualify for Social Security benefits. We do not include payments made to other beneficiaries of service members who collect benefits on another's account, such as retired parents.

Although we refer to this measure as "SSDI benefits," it actually includes any payment made from a Social Security trust fund, including the retirement trust fund. In our sample, however, a very high fraction of this total benefit amount is accounted for by SSDI benefits, since very few deployed service members are near retirement age.

We use the monthly benefit paid (MBP) amount on the MBR to compute annual SSDI benefits. MBP records show the payment amount for which the service member was eligible in a given month (we exclude monthly benefits for which the beneficiary is listed as ineligible). MBP does not necessarily reflect the actual amount paid in that month retroactively updated to reflect the correct payment eligibility after changes in status. For example, if a service member was initially denied SSDI benefits but then

21. SSA now expedites SSDI claims made by service members injured in combat (GAO, 2009).

appealed and qualified after some delay, his or her first payment could occur several months after the initial eligibility date. Although actual payments are increased in later months to compensate for this delay, our data record payments made in each month of active eligibility. Since our data are current as of June 2011, which is more than five years after the deployment dates in our sample, and since veteran disability cases now receive priority processing at SSA, we expect the payments to be correct for most of our sample.

Tax Advantage

Military allowances, certain military pays (e.g., those received while serving in an officially designated combat zone), VA disability benefits, CRSC, TSGLI, and a portion of DoD disability retired pay and SSDI benefits are not subject to federal income, payroll, and Social Security—i.e., Federal Insurance Contributions Act (FICA)—taxes.[22] We computed the value of this federal tax advantage, assuming that service members have no interest or dividend income or capital gains, that those who are unmarried in the year prior to deployment file as single with no dependents, and that those married in the year prior to deployment file as married with one dependent child.[23] We apportioned the total value of the tax advantage to each tax-advantaged earnings/disability compensation category according to the category's proportion of total earnings and compensation.

Summary

Our final analysis sample consisted of 456,218 AC and 236,580 RC members. In the models described in Chapters Five and Six, we employed data on annual earnings and disability compensation (including an estimate of the tax advantage) for each individual in the full calendar year prior to deployment and each full calendar year following deployment through 2010. Separations from military service were measured in each calendar year following deployment. All covariates other than injury, deployment location, and military occupational specialty while deployed were measured in the year prior to deployment.

Table 2.1 presents the mean and standard deviation of the key variables in the models described in Chapters Five and Six, by component at the end of deployment.

22. DoD disability retired pay that is not offset by VA benefits is not subject to federal income taxes if the injury that resulted in retirement is combat-related. We employed an indicator variable on DMDC's Retired Pay File to determine whether the service member's disability retired pay was attributable to a combat-related injury. The taxation of SSDI benefits depends on household income; because we were unable to fully account for these tax rules, we assume that all SSDI benefits are untaxed. This is a reasonable assumption for the vast majority of injured service members in our sample, who most likely have limited financial assets.

23. The tax imputations do not account for state taxes or state or federal earned income tax credits.

Table 2.1. Descriptive Statistics, by Component

Variable	AC	RC
Outcomes		
Annual post-deployment earnings[a]		
Own civilian earnings	10,545	29,618
Own military earnings	43,090	21,576
Own total earnings	53,636	51,194
Own total earnings > 0	0.929	0.948
Spousal earnings[b]	14,439	21,874
Spousal earnings>0[b]	0.589	0.677
Household earnings	60,742	62,466
Annual Disability Benefits[a]		
DoD retirement pay	1,132	374
DoD disability pay	50	56
VA disability benefits	1,738	1,766
CRSC	16	12
SSDI	325	675
TSGLI	131	73
Cumulative separation rate	0.297	0.270
Covariates		
Injury		
No injury	0.822	0.736
Health worsened	0.071	0.092
Referred	0.070	0.148
Non-serious casualty	0.028	0.019
Serious casualty	0.003	0.002
Very serious casualty	0.001	0.001
Death	0.005	0.003
Demographics		
Age	26.844	31.766
Female	0.106	0.108
Male	0.894	0.892
White	0.708	0.703
Black	0.186	0.148
Hispanic	0.093	0.083
Other race	0.001	0.063
Married in year prior to deployment	0.493	0.516

Table 2.1—Continued

Variable	AC	RC
No high school diploma	0.076	0.136
High school diploma	0.701	0.502
Some college	0.079	0.180
Bachelor's degree	0.105	0.124
Graduate degree	0.036	0.053
AFQT	58.401	59.020
Military service		
Army	0.629	0.812
Air Force	0.192	0.103
Navy	0.033	0.035
Marine Corps	0.146	0.050
Pay grade: junior enlisted (E-1–E-4)	0.531	0.435
Pay grade: senior enlisted (E-5+)	0.337	0.435
Pay grade: warrant Officer	0.016	0.013
Pay grade: junior Officer (O-1–O-3)	0.091	0.078
Pay grade: senior Officer (O-4+)	0.013	0.022
Pre-deployment health		
Sought mental health counseling	0.032	0.018
Have a medical problem	0.096	0.117
Currently on light duty	0.074	0.057
Self-reported health: Excellent	0.244	0.247
Self-reported health: Very good	0.291	0.335
Self-reported health: Good	0.161	0.183
Self-reported health: Fair	0.014	0.012
Self-reported health: Poor	0.001	0.001
Number of Observations		
Service members	456,218	236,580
Spouses	242,463	132,820

NOTES: Other model covariates include dummies for year deployment begins, month and year deployment ends, dummies for state of residence, dummies for military occupation specialty in both the year prior to deployment and while deployed, AFQT squared, and dummies for missing education, AFQT, pay grade, and pre-deployment health variables.
a. All earnings and benefits are reported in 2010 dollars and include an estimate of the value of the federal tax advantage.
b. Spousal earnings are conditional on being married in the year prior to deployment.

Dependent variables (outcomes) modeled include the service member's total, civilian, and military labor market earnings; whether he or she has positive labor market earnings; his or her spouse's labor market earnings; whether the spouse has positive labor market earnings; household earnings (service member plus spousal labor market earnings); and, finally, labor market earnings plus disability payments. These descriptive statistics are discussed further in Chapter Three.

3. Descriptive Statistics on Injury, Earnings, and Disability Compensation

The descriptive statistics on injury, labor market earnings, and disability compensation presented in this chapter help put the results reported in Chapters Five and Six in context.

Injury

Tables 3.1 and 3.2 show that about 82 percent of AC members and 74 percent of RC members in our sample returned home from deployment without injury (i.e., did not appear in the Casualty File during their deployment and did not report that their health worsened over the course of their deployment). AC members were somewhat

Table 3.1. AC Members Injured, by Injury Categorization

Injury Category	Number	Percentage
Injury categorization 1		
No injury	375,070	82.21
Health worsened	32,189	7.06
Referred	32,079	7.03
Non-serious casualty	12,991	2.85
Serious casualty	1,287	0.28
Very serious casualty	501	0.11
Death	2,101	0.46
Injury categorization 2		
No injury	375,070	82.21
Health worsened	32,189	7.06
Referred	32,079	7.03
Casualty File: 0% disability[a]	12,499	2.74
Casualty File: 1–40% disability	879	0.19
Casualty File: 50–70% disability	856	0.19
Casualty File: 80–100% disability	545	0.12
Death	2,101	0.46

a. Casualty File groups categorize service members who appear in the Casualty File according to their DoD disability rating.

Table 3.2. RC Members Injured, by Injury Categorization

Injury Category	Number	Percentage
Injury categorization 1		
No injury	174,159	73.62
Health worsened	21,716	9.18
Referred	35,041	14.81
Non-serious casualty	4,562	1.93
Serious casualty	356	0.15
Very serious casualty	131	0.06
Death	615	0.26
Injury categorization 2		
No injury	174,159	73.62
Health worsened	21,716	9.18
Referred	35,041	14.81
Casualty File: 0% disability[a]	4,308	1.82
Casualty File: 1–40% disability	255	0.11
Casualty File: 50–70% disability	304	0.13
Casualty File: 80–100% disability	182	0.08
Death	615	0.26

a. Casualty File groups categorize service members who appear in the Casualty File according to their DoD disability rating.

more likely than RC members to report that their health worsened during deployment (14 versus 24 percent). Of those reporting that their health worsened, reservists were considerably more likely than AC members to be referred for follow-up medical care (15 versus 7 percent). Tables 3.1 and 3.2 also indicate that AC members are more likely to appear in the Casualty File than reservists (3.2 versus 2.1 percent). A host of factors could be responsible for the observed difference in the incidence of injury across components. Possibilities include differences in military occupation and specific deployment location that drive the risk of injury.

There appears to be a strong correlation between the qualitative assessment of injuries recorded in the Casualty File and the more formal assessment made in the DoD disability rating processes (Table 3.3). About 11 percent of those with non-serious injuries receive a DoD disability rating within four years following deployment; about 10 percent of them are medically retired within that time period, in contrast to about 35 percent and 65 percent of serious and very serious casualties. Only 2 percent of members with non–Casualty File injuries receive a DoD disability rating within

Table 3.3. Percentage with DoD and VA Disability Ratings Four Years Following Deployment, by Injury Type and Component

	AC			RC		
Injury Category	DoD	Mean DoD	VA	DoD	Mean DoD	VA
No injury	1	48	17	0	50	14
Health worsened	2	47	27	1	47	27
Referred	3	45	36	3	49	39
Non-serious casualty	11	52	44	10	54	55
Serious casualty	34	57	62	39	57	76
Very serious casualty	64	74	76	71	75	85

NOTES: Disability ratings and payments observed four years following deployment. DoD columns show percentage with a positive DoD disability rating. Mean DoD columns show mean DoD disability rating, conditional on having a positive disability rating. VA columns show percentage receiving a VA disability payment.

four years of deployment. The percentage increases with the severity of injury, averaging 47, 52, 57, and 74 percent for non–Casualty File, non-serious, serious, and very serious casualties, respectively. However, a high percentage of uninjured (16 percent) and non–Casualty File (33 percent) individuals receive a disability rating from the VA within four years of deployment. The apparent disconnect between DoD and VA disability ratings could be attributable to any number of factors, including the likelihood that some injuries sustained while deployed do not manifest debilitating symptoms until after the service member has separated from the military.

Pre-Deployment Labor Market Earnings

Table 3.4 highlights a number of interesting patterns with respect to labor market earnings prior to deployment and, hence, prior to injury. First, the pre-deployment labor market earnings of service members who subsequently appear in the Casualty File are considerably lower than those of the uninjured and non-casualties ($35,445 versus $42,114, on average). Second, individuals who receive a referral for subsequent medical care have the highest average earnings in our sample. These two facts suggest considerable heterogeneity in the pre-deployment characteristics of injured service members that is likely to be correlated with future labor market outcomes. Although these differences in pre-deployment earnings are probably accounted for in part by differences in pay grade (which we control for in our models) and years of service, controlling for pre-deployment earnings, which we do implicitly via first-differencing,

Table 3.4. Pre-Deployment Labor Market Earnings, by Injury Type and Component

Injury Category	Own Earnings			Spousal Earnings	Household Earnings
	Civilian	Military	Total		
			AC		
No injury	681	41,715	42,396	11,029	47,808
Health worsened	662	41,410	42,072	11,169	47,571
Referred	701	43,312	44,013	11,003	50,057
Non-serious casualty	760	34,681	35,440	9,309	39,631
Serious casualty	714	34,811	35,526	10,329	39,491
Very serious casualty	781	34,539	35,320	9,987	39,626
			RC		
No injury	24,030	17,280	41,310	20,490	51,681
Health worsened	24,340	16,692	41,032	20,660	51,725
Referred	25,960	16,106	42,066	20,469	53,730
Non-serious casualty	19,969	15,308	35,277	18,427	44,188
Serious casualty	23,607	14,275	37,882	18,567	47,583
Very serious casualty	19,404	15,354	34,758	19,876	43,710

NOTES: Earnings (in 2010 dollars) measured in the year prior to deployment. Spousal earnings are conditional on being married in the year prior to deployment.

provides a more complete control for the potentially confounding effect of fixed unobserved heterogeneity. This aspect of our empirical model is explained more thoroughly in Chapter Four.

Third, as expected, civilian labor market earnings contribute little to the earnings of AC members. Reservists, on the other hand, receive about 59 percent of their total labor market earnings from civilian sources in the year prior to deployment. Fourth, although total service member labor market earnings are similar across AC and RC members, RC spouses appear to earn substantially more than AC spouses ($20,460 versus $10,985, on average). This difference could be attributable to the fact that RC spouses are less likely to have moved recently due to a permanent change in station. The prospect of such moves can undermine a spouse's attachment to the labor force.

Disability Compensation

Tables 3.5 and 3.6 show the percentages of service members in our sample receiving various types of disability compensation, and Tables 3.7 and 3.8 show mean unconditional disability compensation by years since deployment and component. The tables highlight several important features of disability compensation. First, disability compensation increases markedly with years since deployment, which is unsurprising given that injuries must stabilize before they can be evaluated and the disability determination process takes time to complete. Second, disability compensation of all types increases with the severity of injury. Third, a fairly high percentage of uninjured service members are receiving DoD retirement (5 percent, on average) and VA disability (16 percent, on average) four years following deployment, and about 2 percent are receiving SSDI. Our estimates of the earnings loss replaced by disability compensation explicitly account for the fact that some uninjured also receive disability compensation. Fourth, a high percentage of serious and very serious casualties (24 percent and 53 percent, respectively) receive TSGLI payments in the first year following deployment. As shown in Tables 3.7 and 3.8, these one-time payments can be quite large. Finally, by the fourth year following deployment, injured RC members in our sample were somewhat more likely to receive VA disability compensation and SSDI than were injured AC members. As will be shown in Chapter Six, this difference in disability compensation across components, which we cannot explain with our data, drives considerable differences in estimated replacement rates.

Table 3.5. Percentage of AC Members Receiving Disability Compensation, by Injury Type and Years Since Deployment

Injury Category	Disability Compensation Type					
	DoD Retirement	DoD Disability	VA Disability	CRSC	SSDI	TSGLI
No injury						
Year 1	2.1	0.1	4.0	0.0	0.5	0.0
Year 2	3.4	0.3	8.3	0.0	0.8	0.1
Year 3	4.9	0.5	13.3	0.1	1.2	0.1
Year 4	6.3	0.7	17.2	0.2	1.6	0.1
Health worsened						
Year 1	3.4	0.3	8.2	0.0	0.7	0.0
Year 2	5.0	0.6	15.1	0.1	1.2	0.1
Year 3	6.7	0.9	21.8	0.2	1.8	0.1
Year 4	8.2	1.1	27.0	0.3	2.4	0.1
Referred						
Year 1	4.9	0.7	12.7	0.0	1.1	0.0
Year 2	6.8	1.2	22.5	0.2	2.0	0.1
Year 3	8.9	1.5	30.0	0.4	3.0	0.1
Year 4	10.7	1.6	35.6	0.7	4.0	0.1
Non-serious casualty						
Year 1	0.7	2.7	15.3	0.1	3.5	5.3
Year 2	1.1	3.6	29.0	0.6	5.2	2.5
Year 3	1.7	3.3	38.4	2.1	6.7	1.2
Year 4	2.2	3.1	43.9	3.5	7.8	0.6
Serious casualty						
Year 1	0.8	10.3	23.9	0.1	11.1	24.7
Year 2	1.3	10.2	45.7	1.5	13.2	14.0
Year 3	1.9	7.6	57.8	4.7	14.5	3.7
Year 4	2.4	5.8	62.2	8.7	15.9	1.6
Very serious casualty						
Year 1	0.6	12.2	33.7	0.0	39.0	53.3
Year 2	0.6	14.0	59.5	4.2	41.1	17.4
Year 3	1.2	8.4	72.1	14.6	43.5	4.2
Year 4	1.2	6.2	75.8	25.1	42.7	1.4

Table 3.6. Percentage of RC Members Receiving Disability Compensation, by Injury Type and Years Since Deployment

Injury Category	Disability Compensation Type					
	DoD Retirement	DoD Disability	VA Disability	CRSC	SSDI	TSGLI
No injury						
Year 1	0.6	0.0	6.1	0.0	1.2	0.0
Year 2	1.1	0.1	9.2	0.0	1.6	0.0
Year 3	1.7	0.2	11.6	0.1	2.2	0.0
Year 4	2.3	0.3	14.0	0.1	2.9	0.0
Health worsened						
Year 1	0.8	0.4	13.6	0.0	2.0	0.1
Year 2	1.4	0.6	20.3	0.1	2.9	0.0
Year 3	2.0	0.7	24.5	0.2	4.0	0.0
Year 4	2.6	0.9	27.4	0.3	5.1	0.0
Referred						
Year 1	0.9	0.5	20.1	0.0	3.0	0.1
Year 2	1.6	1.1	30.5	0.1	4.5	0.1
Year 3	2.2	1.3	35.8	0.2	6.2	0.1
Year 4	3.0	1.5	39.3	0.5	7.8	0.0
Non-serious casualty						
Year 1	0.4	2.6	27.7	0.0	5.7	4.5
Year 2	0.6	3.7	44.0	0.3	8.1	1.5
Year 3	0.7	3.6	51.5	1.6	10.4	1.1
Year 4	0.9	3.4	55.4	3.3	11.4	0.9
Serious casualty						
Year 1	0.3	10.4	38.5	0.0	18.3	20.2
Year 2	0.0	12.6	63.5	0.6	22.5	14.6
Year 3	1.1	11.0	71.6	5.3	23.6	2.2
Year 4	1.1	9.6	75.6	13.2	25.0	3.4
Very serious casualty						
Year 1	0.0	17.6	49.6	0.0	41.2	52.7
Year 2	0.0	14.5	77.1	3.1	47.3	16.0
Year 3	0.0	8.4	86.3	18.3	46.6	3.1
Year 4	0.0	8.4	84.7	29.8	44.3	4.6

Table 3.7. Mean Disability Compensation for AC Members, by Injury Type and Years Since Deployment (in 2010 dollars)

	Disability Compensation Type					
Injury Category	DoD Retirement	DoD Disability	VA Disability	CRSC	SSDI	TSGLI
No injury						
Year 1	343	5	170	0	62	25
Year 2	707	19	577	2	111	49
Year 3	1,027	36	1,124	5	187	43
Year 4	1,356	51	1,782	11	275	50
Health worsened						
Year 1	552	20	398	1	88	50
Year 2	963	43	1,242	5	170	56
Year 3	1,283	68	2,177	10	301	81
Year 4	1,595	91	3,221	19	442	49
Referred						
Year 1	726	41	670	2	149	42
Year 2	1,256	88	2,121	12	301	65
Year 3	1,601	119	3,493	36	519	61
Year 4	1,956	138	4,870	59	757	45
Non-serious casualty						
Year 1	117	131	1,126	2	546	4,808
Year 2	199	226	3,597	27	892	2,179
Year 3	277	248	5,864	103	1,237	752
Year 4	370	234	7,646	197	1,507	317
Serious casualty						
Year 1	114	559	3,375	6	1,824	23,338
Year 2	201	726	9,507	33	2,431	13,705
Year 3	304	635	13,740	190	2,788	2,941
Year 4	362	463	16,506	389	3,070	839
Very serious casualty						
Year 1	110	684	9,393	0	6,809	65,282
Year 2	86	1,149	22,103	238	8,091	19,647
Year 3	101	1,042	30,193	840	8,444	4,114
Year 4	158	837	33,673	1,419	8,621	995

Table 3.8. Mean Disability Compensation for RC Members, by Injury Type and Years Since Deployment (in 2010 dollars)

Injury Category	Disability Compensation Type					
	DoD Retirement	DoD Disability	VA Disability	CRSC	SSDI	TSGLI
No injury						
Year 1	96	4	258	0	170	7
Year 2	211	11	578	1	253	22
Year 3	335	19	938	3	381	28
Year 4	464	34	1,332	8	542	21
Health worsened						
Year 1	132	25	703	1	309	38
Year 2	257	65	1,664	3	488	31
Year 3	385	73	2,569	10	739	35
Year 4	480	93	3,356	20	1,015	37
Referred						
Year 1	124	39	1,103	1	457	34
Year 2	267	104	2,610	3	800	57
Year 3	385	153	4,021	12	1,197	52
Year 4	498	190	5,226	33	1,618	37
Non-serious casualty						
Year 1	80	177	2,019	0	1,078	4,209
Year 2	120	335	5,242	12	1,709	1,328
Year 3	130	414	8,351	57	2,249	692
Year 4	163	421	10,266	166	2,627	381
Serious casualty						
Year 1	6	627	5,769	0	3,928	19,841
Year 2	0	1,227	13,307	2	4,764	15,718
Year 3	19	970	18,102	151	5,257	1,414
Year 4	76	850	20,925	523	5,729	2,215
Very serious casualty						
Year 1	0	1,283	16,849	0	8,595	66,838
Year 2	0	1,595	29,755	18	10,302	21,296
Year 3	0	1,086	38,831	699	10,381	4,582
Year 4	0	1,037	41,379	1,618	10,064	3,169

4. Empirical Model

To estimate the causal effect of deployment-related injury on earnings and other labor market outcomes, we must first estimate the labor market outcomes that injured service members would have had if they had never been injured. To do this, we use the outcomes of similarly situated service members who were also deployed but who were not injured (i.e., the control group). The causal effect of injury is the difference between the observed labor market outcomes of injured service members and these estimated counterfactual outcomes.

To interpret this difference as the effect of injury on labor market outcomes, we must assume that such differences cannot be explained by other factors that are correlated with labor market outcomes. In general, this assumption is likely to fail. The incidence of injury is likely to be correlated with a wide range of characteristics of service members that determine their exposure to the likelihood of injury or their propensity to report that their health worsened during deployment, such as military occupation and attitudes toward risk, which also independently affect success in the labor market. The principal empirical challenge, therefore, is to control for such characteristics so that the resulting conditional correlation of injury and labor market outcomes is uninfluenced by them (in the language of econometrics, we need to solve the problem of omitted-variables bias).

We employ an empirical model that controls for fixed characteristics of service members potentially correlated with injury and earnings and allows for the possibility that differences in earnings growth over time may be a function of observable differences in these characteristics:

$$\Delta y_{it} = \beta Injury_i + \gamma X_i + \varepsilon_i \quad (1)$$

where Δy_{it} is the change in earnings experienced by individual i between the year immediately prior to deployment and the year following deployment t,[24] $Injury_i$ indicates a vector of indicator variables capturing the nature of individual i's deployment-related injuries (using the injury categories described previously), X_i is a set of covariates, ε_i is an idiosyncratic error term, and $\hat{\beta}$ measures the estimated effect of injury on earnings.

24. Because our earnings data are based on a calendar year but deployments typically begin or end midyear, we use the first complete calendar year immediately prior to the start of deployment and the calendar year prior to the end date of deployment for the purpose of earnings measurement. We include fixed effects for end month of deployment and for pre- and post-deployment calendar years to account for differences across individuals in the time between redeployment and the calendar year in which earnings are measured.

A key feature of Equation 1 is the use of earnings changes rather than earnings levels as the outcome of interest. By subtracting out earnings in the pre-deployment year, we account for preexisting differences in earnings between those who ultimately sustain an injury and those who do not. One potential concern with estimating such equations is the possibility that earnings are correlated with unobserved individual characteristics—for example, risk-taking attitudes—that are also correlated with injury. This unobserved heterogeneity in earnings potential could lead to biased estimates of the impact of injury on earnings. However, if the heterogeneity largely results from differences across individuals that are fixed over time, the use of a differenced earnings measure will result in unbiased estimates.

To illustrate how using a differenced earnings measure helps to resolve bias arising from individual heterogeneity, suppose there is an individual earnings component, u_i, that persists over time, so that earnings levels in year t can be expressed as

$$Y_{it} = \ddot{y}_{it} + u_i \,. \tag{2}$$

Regression estimates that use Y_{it} as an outcome will be subject to omitted-variables bias if they fail to account for u_i and if u_i is correlated with any other determinants of individual earnings ($\ddot{y}_{it}$). However, this problem does not arise when using differenced earnings as an outcome, because the individual earnings component is eliminated as

$$\Delta y_{it} = Y_{it} - Y_{i0} = \ddot{y}_{it} + u_i - \left(\ddot{y}_{i0} + u_i\right) = \ddot{y}_{it} - \ddot{y}_{i0} \,. \tag{3}$$

However, even with differenced earnings outcomes as the dependent variable, Equation 1 may yield biased estimates of the impact of injury on earnings if there are uncontrolled factors related to injury that affect individual earnings trajectories rather than just earnings levels. To examine the empirical relevance of this potential departure from our assumptions, we plot average earnings trajectories for AC and RC members in the years immediately prior to deployment, by injury status following deployment, in Figures 4.1 and 4.2, respectively. As in Table 3.4, the figures demonstrate that there are important differences in average earnings *levels* across those who ultimately sustain different types of injury; in particular, average earnings among official casualties are appreciably below those of the uninjured or those with only self-reported injuries. While it is likely that some of these differences can be explained by observable characteristics such as military rank, years of service, and occupation, observable characteristics are unlikely to fully account for them, suggesting that our first-differencing approach offers a more complete solution to the problem of controlling for fixed heterogeneity than would the inclusion of demographic controls alone.

Figures 4.1 and 4.2 suggest that pre-deployment earnings trajectories are very similar across injury categories for both the AC and the RC. This suggests that pre-deployment earnings heterogeneity can largely be explained by factors that are fixed over time. We test this hypothesis formally by estimating a version of Equation 1 in which the outcome variable is the average yearly change in earnings between the fifth year prior to deployment and the year immediately preceding

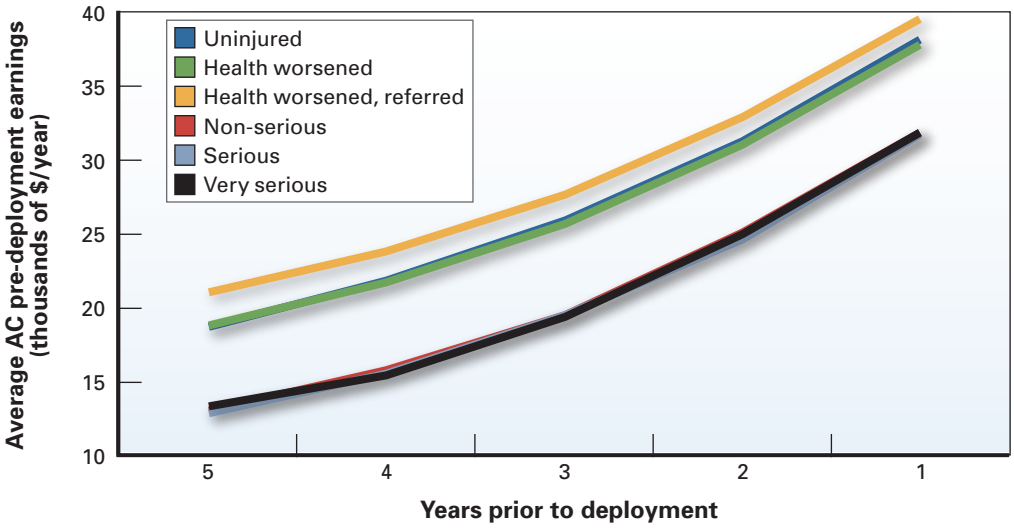


Figure 4.1. Trends in AC Pre-Deployment Earnings, by Injury Type and Years Prior to Deployment

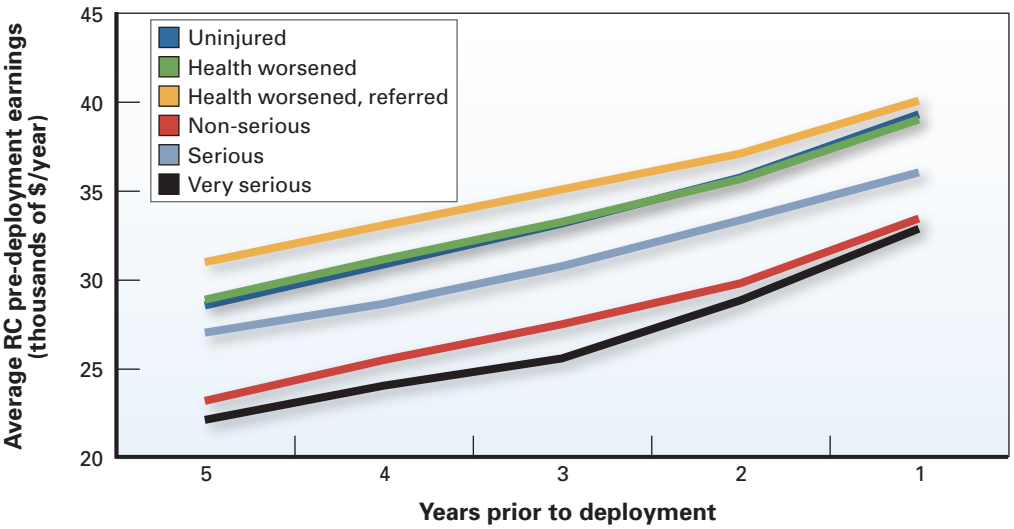


Figure 4.2. Trends in RC Pre-Deployment Earnings, by Injury Type and Years Prior to Deployment

deployment. As can be seen in Table 4.1, most of the estimated coefficients on our injury-category dummies are not statistically different from zero despite our large sample size, and all of the estimated coefficients are small relative to earnings levels or annual earnings changes. This suggests that bias arising from the failure of the statistical assumptions underlying Equation 1 is likely to be minimal.

The potential for unobserved heterogeneity in earnings trajectories to bias estimates from Equation 1 is further mitigated by the inclusion of a wide range of controls (X_i). (See Table 2.1 for a complete list of these control variables.) A large body of research literature dating from Mincer, 1974, demonstrates a relationship between demographic characteristics—work experience and education, in particular—and earnings growth. Thus, we include in X_i a range of demographic characteristics, including age and age-squared, gender, race (white, African-American, or Hispanic), and educational attainment. Given that exposure to injury and earnings potential may differ across individuals with varying job assignments, we also control for pre-deployment rank and military occupation (36 categories). To account for potential business-cycle effects and regional economic conditions, we control for deployment end date and state of residence. Finally, we have access to data on a range of individual-level characteristics that could be correlated with earnings growth but that are typically unavailable to researchers estimating earnings equations. These characteristics include scores on the AFQT—an achievement test designed to measure general aptitude—and several measures of pre-deployment health, including indicators for whether the service member had recently sought mental health treatment or had reported medical problems and self-rated pre-deployment

Table 4.1. Estimated Effect of Injury on Pre-Deployment Annual Earnings Growth, by Injury Type and Component (in 2010 dollars)

		Injury Type				
Component	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
Active	4,848	83**	118**	172**	127	–11
		(17)	(18)	(26)	(85)	(125)
Reserve	2,693	–39	–97**	–22	–255	–143
		(32)	(28)	(65)	(194)	(319)

NOTES: Dependent variable is average yearly change in earnings between the fifth year prior to deployment and the year immediately preceding deployment. Model includes all covariates employed in main analyses. Heteroskedasticity-robust standard errors are in parentheses; *denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

health.[25] The inclusion of controls capturing pre-deployment health accounts for the possibility that some of the differences in earnings growth between the injured and uninjured could reflect health problems that existed prior to injury.

To properly measure the effects of injury on earnings, we assume that after conditioning on our control variables, idiosyncratic fluctuations in earnings, ε_i, are uncorrelated with injury status. We use differenced earnings and numerous controls to account for many possible avenues through which this assumption may fail. Nevertheless, there may be unobserved factors related to injury that also affect earnings growth, in which case our estimates might overstate or understate the true causal impact of injury on earnings.

Unlike prior studies of DoD and VA disability compensation, our control group includes the universe of service members who were deployed over our sample time frame, regardless of whether they ultimately were redeployed or remained in the military. This approach is equivalent to assuming that the future military career characteristics of the injured would have, on average, approximated those of the uninjured if no injury had occurred. Many prior studies (e.g., Greenberg and Rosenheck, 2007) compare injured veterans to uninjured veterans who are no longer in the military. One drawback of limiting such comparisons to service members who have separated from the military is that those who separate may be a nonrepresentative subset of the total force, and their earnings experience may therefore be a poor counterfactual for the earnings experience of injured service members who may or may not have separated had they not been injured.

Equation 1 incorporates both the direct effect of injury on earnings due to changes in productive capabilities and any participation effects that arise as a result of the disability compensation system. In theory, the availability of disability compensation could affect the labor market decisions of injured service members in two ways. First, the system might directly induce workers to withdraw from the labor force in order to qualify for disability payments. In our context, this possibility is relevant only for SSDI, which makes payments solely to individuals who work less than an established threshold (see Chapter Two). Second, disability compensation provides injured service members with unearned income, which, in theory, can lower labor supply irrespective of injury (more wealth induces individuals to consume more leisure and thus supply less labor). This is relevant for DoD and VA disability payments, which

25. These pre-deployment health variables were obtained from the Pre-Deployment Health Assessment (DD Form 2795) administered by DoD to approximately 74 percent of our sample.

are largely not conditional on labor market earnings.[26] Prior research suggests that the availability of disability benefits induces at least some individuals to work less than they otherwise would (e.g., Bound and Burkhauser, 1999). Our approach cannot disentangle such incentive effects from the more direct effect of injury on productive capacity. This distinction is important for understanding how readily our results might generalize to other environments with different rules governing disability payments. In particular, in environments offering disability benefits substantially above or below current levels, it is possible that we would observe patterns of earnings loss that vary from those documented here.

We conclude this section by noting several potential problems with the use of the health measures derived from the PDHA. First, we measure health at the end of deployment, but the effect of some injuries may manifest itself only at a later date, in which case our control group might include some individuals who would claim that their health worsened during deployment if they had been questioned at a later point in time. This might be particularly important for psychological injuries such as PTSD, which research has shown can develop many years after injury (McFarlane, 2000). There is little that we can do to address this possibility, since we do not have access to information about the course of injury in the post-deployment years; we therefore admit that our estimates could understate the impact of injury to the extent that such latent injuries lower earnings in the control group years after deployment has ended.

Second, some service members may be reluctant to report that their health worsened during deployment or that they were experiencing some adverse health symptom that could lead to a referral for follow-up medical care for fear that doing so would compromise their military careers. While such self-reporting bias could bias our estimates of the effect of injury, the effect the bias would have is not clear. On one hand, our control group would be contaminated with individuals who are in fact injured, which would tend to bias estimates toward zero. On the other hand, individuals who do report that their health worsened during deployment might be more seriously injured than the universe of individuals who reported that their health worsened during deployment in the absence of fear of reprisal, which would tend to bias our estimates away from zero. Thus, the net effect of self-reporting bias is not known a priori.

26. Some individuals who receive a disability rating of less than 100 percent from the VA can receive benefits at the 100-percent level if they can demonstrate that they are unable to engage in "substantially gainful employment." In these cases, VA disability compensation is conditioned on labor supply in the same way that SSDI is.

5. The Effect of Injury on Earnings and Other Labor Market Outcomes

This chapter presents the results of estimating Equation 1 (see Chapter Four) for a variety of labor market outcomes measured in the first four years following deployment for all service members in our sample. We begin by estimating the effect of injury on household (service member plus spouse) labor market earnings. We then show that effects on household earnings predominantly concern service member earnings rather spousal earnings. For AC members, the decline in earnings attributable to injury is primarily caused by a decline in military earnings, which, in turn, is due to elevated levels of military separation. Injury has substantially negative effects on both the military and civilian earnings of reservists. Finally, we show that the estimated earnings effects are partly attributable to a decline in employment (which is measured by having positive labor market earnings). The results of a variety of specification checks, including examining earnings effects through seven years following deployment and categorizing Casualty File injuries according to DoD disability ratings, are given in Appendix A.

Household Labor Market Earnings

The estimated effects of injury on various measures of individual and household (service member plus spouse) labor market earnings are reported in separate tables for each outcome and component. From the perspective of military compensation policy, these estimates are valuable because they are relatively invariant to the particular set of disability policies and programs in place at a particular moment in time.[27] They thus provide positive guidance regarding the amount of compensation needed to replace lost earnings over time among those with different levels of injury, in contrast to the normative question of how disability compensation should be structured. The estimated effect (i.e., $\hat{\beta}$ in Equation 1) is the difference in earnings growth since the year prior to deployment between injured and uninjured service members after factors related to both injury propensity and earnings growth potential are controlled for. Assuming that first-differencing and the inclusion of other controls adequately address the potential for omitted-variables bias, the estimates can be interpreted as the difference between actual earnings and the earnings that injured service members would have expected had they not been injured. Because their labor market experiences and opportunities are fundamentally different, we estimate separate models for AC and RC members.

27. They are not completely invariant, because of the incentive effects described above.

Tables 5.1 and 5.2 show that deployment-related injury substantially lowers household earnings for both AC and RC members.[28] Since annual household earnings in the post-deployment period average around $60,000 (see Table 2.1), a $1,000 earnings loss represents roughly 1.7 percent of earnings. In these and the subsequent tables in this chapter, comparing numbers across columns shows how the effects vary with injury severity; comparing entries across rows shows how the effects evolve over time.

Table 5.1. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,414**	–1,993**	–2,518**	–3,977**	–7,680**
	(134)	(142)	(202)	(603)	(1,032)
2	–2,229**	–3,952**	–5,233**	–10,466**	–18,328**
	(163)	(173)	(246)	(756)	(1,351)
3	–2,391**	–4,340**	–5,411**	–11,447**	–22,292**
	(175)	(185)	(265)	(829)	(1,419)
4	–2,693**	–4,651**	–5,787**	–11,943**	–22,555**
	(191)	(200)	(287)	(893)	(1,476)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level, ** denotes statistical significance at the 1-percent level.

Table 5.2. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–397*	–386**	–126	–1,123	–4,911*
	(157)	(131)	(318)	(1,191)	(2,129)
2	–1,448**	–1,563**	–3,741**	–9,448**	–19,709**
	(183)	(153)	(372)	(1,394)	(2,377)
3	–1,770**	–2,136**	–5,937**	–12,279**	–27,138**
	(207)	(173)	(430)	(1,560)	(2,519)
4	–1,900**	–2,607**	–6,290**	–14,770**	–26,808**
	(228)	(191)	(478)	(1,707)	(2,741)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

28. The tables in this chapter and the next present estimated coefficients for the injury variables only. Full regression results corresponding to Tables 5.1 and 5.2 are given in Tables A.1 and A.2 in the appendix.

For both AC and RC members, the magnitude of losses increases with injury severity. For AC members, a self-reported decline in health results in an earnings loss of $1,414 in the first year. The loss is greater for the referred group ($1,993) and even greater for serious ($3,977) and very serious ($7,680) injuries. For RC members, earnings losses are smaller in the first year after deployment: A decline in self-reported health results in an earnings loss of $397, and a referral results in a loss of $386. The estimated earnings losses for less-serious casualties are not statistically significant in the first year, although the point estimate for very serious injuries is substantial (–$4,911) and statistically significant.

The estimates for different years after deployment show the time pattern of the effects of injury and distinguish short-run and longer-run impacts. Estimated earnings losses grow substantially between the first two years following the end of deployment and then grow more slowly between years 2 and 4. The sample does not change with years since deployment (i.e., it is fully balanced), so the time pattern is independent of the composition of the sample.

The growth in estimated earnings losses is more pronounced among reservists than among AC members. In the first year after deployment, the estimated effect of injury on earnings is relatively small and not always statistically insignificant. However, in year 2, the effects are negative and large across all injury categories. The estimated effects in year 1 may be smaller because of higher military compensation for injured reservists who receive medical treatment over an extended period. During that time, reservists continue to receive active-duty and combat pay, which they would no longer have received had they not been injured and ended their deployments.[29] As we will show, the growth in earnings loss between years 1 and 2 among AC members is also probably due to a decline in military earnings attributable to separation.

By year 4, the effects of injury on household earnings are comparable between the components. Those with less-severe injuries are slightly more negatively affected in the AC than in the RC, whereas the converse holds among the more severely injured.

29. There is a relative increase in the number of active-duty days in the year following deployment for reservists with referrals (61 days) and those in the Casualty File with non-serious (65 days), serious (109 days), and very serious (238 days) injuries, relative to those without reported injuries (51 days). This is particularly striking in light of the results in Table 5.12 (p. 42) that show a relative increase in separation rates for injured reservists in the first year after deployment.

Service Member and Spousal Earnings

In this study, we observed earnings effects for injured individuals and their spouses separately. While injury would be expected to have a negative impact on the injured individual's earnings, the expected impact on spousal earnings is ambiguous (e.g., Gronau, 1977). One potential response to the loss of productive capacity resulting from an injury is for spouses to increase their labor in order to maintain household earnings. This would lead to higher spousal earnings even as household earnings decline. Alternatively, spouses may withdraw from the labor force in order to care for wounded family members, compounding service-member earnings loss with decreases in spousal earnings.

We measure marital status in the year prior to deployment and do not condition our estimates on marital status following deployment, since that status could be determined in part by injury. Thus, injury could affect spousal earnings both directly through the mechanisms described above and indirectly through changes in marital status (e.g., injury may induce divorce, which often leads to higher spousal earnings). The effects on spousal earnings that we report account for both of these situations, although the relatively low incidence of divorce suggests that the dominant effect is not through changes in marital status.

Tables 5.3 through 5.6 present estimates of the effect of injury on own and spousal earnings by component. AC members experience large own-earnings losses (Table 5.3) that exhibit patterns similar to those for overall household earnings (Table 5.1). A different pattern emerges for AC spouses (Table 5.4). Spouses of service members with less-serious injury, such as self-reported adverse health changes, actually increase

Table 5.3. Estimated Effect of Injury on AC Service Member Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,542** (123)	–2,148** (131)	–2,646** (189)	–3,943** (562)	–6,249** (910)
2	–2,375** (153)	–4,257** (161)	–5,421** (232)	–10,304** (717)	–17,300** (1,250)
3	–2,616** (163)	–4,740** (172)	–5,518** (250)	–11,121** (795)	–21,033** (1,325)
4	–2,890** (179)	–5,085** (185)	–5,903** (271)	–11,515** (856)	–21,611** (1,384)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.4. Estimated Effect of Injury on AC Spousal Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	251*	236*	245	–88	–3,305**
	(107)	(103)	(162)	(600)	(830)
2	296*	472**	344	–318	–2,353**
	(121)	(118)	(186)	(677)	(881)
3	468**	626**	142	–653	–2,856**
	(134)	(130)	(201)	(719)	(955)
4	427**	674**	151	–870	–2,144*
	(144)	(139)	(222)	(736)	(1,087)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

their earnings by a modest but statistically significant amount, and these earnings gains increase through the fourth year following deployment. For example, spouses of AC members referred for treatment earned $674 more in year 4 than did spouses of the uninjured. The reason for these earnings gains is unclear, but a variety of plausible mechanisms could explain them.[30]

For spouses of AC members with non-serious and serious injuries, the estimated effect of injury on earnings is negative but statistically insignificant. However, spouses of very seriously injured AC members experience earnings losses of several thousand dollars that begin in year 1 and remain fairly stable over time.

Tables 5.5 and 5.6 show analogous results for reservists. We do not observe strong evidence of spousal-earnings gains for any injury category, but we do observe earnings losses of around $4,000 per year among spouses of RC members with serious injuries. The point estimates for the spouses of the very seriously injured are large but statistically insignificant.

30. For example, spouses of those with minor injuries may work more to compensate for earnings losses of their spouses or to qualify for medical benefits (such as psychological counseling) provided by their own employers that may benefit their spouses. Interpersonal difficulties with a service member confronting psychological illness might induce a spouse to substitute work time for time at home. Alternatively, spouses of the uninjured may have higher fertility, leading them to substitute time at home for time at work and decreasing their relative earnings.

To summarize, we find that a very high percentage of estimated household earnings losses attributable to injury are due to declines in service member earnings. However, there is evidence of significant earnings losses among the spouses of the most seriously injured and small earnings gains among the spouses of less seriously injured AC members.

Table 5.5. Estimated Effect of Injury on RC Service Member Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–433**	–400**	–123	892	–3,974
	(141)	(116)	(288)	(1,071)	(2,045)
2	–1,442**	–1,713**	–3,816**	–7,451**	–18,465**
	(165)	(137)	(338)	(1,244)	(2,143)
3	–1,823**	–2,278**	–6,017**	–10,342**	–25,020**
	(188)	(156)	(394)	(1,379)	(2,192)
4	–1,965**	–2,762**	–6,288**	–12,808**	–25,576**
	(207)	(173)	(431)	(1,512)	(2,239)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.6. Estimated Effect of Injury on RC Spousal Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	62	–27	–20	–3,867**	–2,103
	(134)	(106)	(283)	(997)	(2,129)
2	–18	187	150	–3,805**	–2,765
	(154)	(120)	(322)	(1,139)	(2,460)
3	95	158	160	–3,707**	–4,616
	(169)	(133)	(362)	(1,223)	(2,795)
4	119	170	–13	–3,807**	–2,755
	(185)	(143)	(401)	(1,289)	(3,619)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Civilian and Military Earnings

The extent to which the large own-earnings effects shown in Tables 5.3 and 5.5 attributable to declines in military as opposed to civilian earnings is important because it provides insights into the civilian labor market prospects of injured service members. Tables 5.7 and 5.8 show the estimated effect of injury on the civilian and military earnings of AC service members. Tables 5.9 and 5.10 report comparable estimates for RC members. Almost all the earnings losses of AC members, even the most seriously injured, can be explained by reductions in military earnings.

Table 5.7. Estimated Effect of Injury on AC Member Civilian Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	931**	1,338**	642**	225	–1,594**
	(75)	(80)	(98)	(264)	(310)
2	1,481**	2,234**	1,252**	–83	–1,998**
	(110)	(116)	(147)	(407)	(529)
3	1,644**	2,475**	1,132**	118	–2,174**
	(132)	(138)	(180)	(523)	(767)
4	1,789**	2,382**	651**	–323	–2,586**
	(151)	(155)	(202)	(623)	(901)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.8. Estimated Effect of Injury on AC Military Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–2,473**	–3,487**	–3,287**	–4,168**	–4,655**
	(149)	(157)	(223)	(622)	(970)
2	–3,856**	–6,491**	–6,673**	–10,221**	–15,301**
	(192)	(201)	(280)	(792)	(1,311)
3	–4,260**	–7,214**	–6,650**	–11,239**	–18,859**
	(203)	(211)	(294)	(884)	(1,371)
4	–4,679**	–7,467**	–6,554**	–11,192**	–19,024**
	(216)	(223)	(311)	(917)	(1,426)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

The negative effect of injury on military earnings increases markedly between years 1 and 2, especially among serious and very serious casualties. This pattern makes sense given that the military services do not evaluate whether service members can continue to serve until their injuries have stabilized, which can take some time. The estimates imply that non-serious injury actually leads to higher civilian earnings that partially offset the negative effect of such injury on military earnings. These patterns might be expected if those with less-serious injuries are more likely to separate from the military and transition into civilian employment than are the uninjured.

Table 5.9. Estimated Effect of Injury on RC Member Civilian Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–346**	–1,287**	–2,784**	–8,106**	–12,005**
	(134)	(112)	(274)	(1,036)	(1,547)
2	163	–394**	–1,460**	–6,127**	–12,810**
	(157)	(131)	(318)	(1,037)	(1,998)
3	261	–319*	–1,201**	–5,293**	–11,905**
	(178)	(148)	(363)	(1,175)	(2,109)
4	142	–347*	–720	–5,296**	–11,477**
	(196)	(163)	(398)	(1,281)	(2,174)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.10. Estimated Effect of Injury on RC Military Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–87	887**	2,661**	8,998**	8,032**
	(160)	(133)	(343)	(1,350)	(2,039)
2	–1,605**	–1,319**	–2,356**	–1,323	–5,655*
	(181)	(150)	(360)	(1,316)	(2,266)
3	–2,084**	–1,960**	–4,816**	–5,049**	–13,115**
	(203)	(169)	(396)	(1,339)	(2,064)
4	–2,108**	–2,415**	–5,568**	–7,512**	–14,099**
	(220)	(183)	(423)	(1,316)	(2,000)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Civilian earnings losses are substantial among the more seriously injured reservists (Table 5.9), but for all but the very seriously injured, these effects decline over time (especially between years 1 and 2). For those with very serious injuries, civilian earnings losses remain fairly stable over time at around $12,000 per year.

The estimated effect of injury on the military earnings of reservists (Table 5.10) is positive in year 1 for all injury categories except reported worsening of health during deployment without referral for follow-up medical care. Military earnings effects turn negative in year 2 and become increasingly negative in subsequent years. In contrast to year 4 earnings losses of AC personnel, which are largely explained by declines in military earnings, the total earnings losses of RC members are accounted for by declines in both military and civilian earnings.

The overall pattern in Tables 5.9 and 5.10 is consistent with injured reservists remaining on active duty in the year following deployment, possibly receiving treatment for their injuries. Their civilian earnings decline, but their military earnings increase relative to those of uninjured reservists, most of whom return to work in the civilian sector. By year 2, however, the productivity impacts of their injuries begin to be manifest in both their civilian and military work.

Military Separation Rates

Our analysis thus far has revealed patterns of earnings gains and losses that might be explained in part by differential rates of military separation. In particular, earnings loss increases over time among all injury categories, which might be expected if military service in general has a positive effect on earnings (Loughran, Klerman, and Martin, 2006; Loughran et al., 2011), but separation is more likely over time among the injured. In this section, therefore, we estimate the effect of injury on cumulative separation rates in the first four years following deployment.[31]

The second column of Tables 5.11 and 5.12 shows that few uninjured service members (less than 10 percent) separate in the first year following deployment. However, cumulative separation rates for the uninjured increase substantially over the next three years. By year 4, about one-third of uninjured service members have separated.

Individuals with injuries are considerably more likely to separate following deployment. Their separation rates are slightly higher in the first year, and they increase substantially by year 2. The differential impact of injury on separation rates increases

31. Here using differenced outcomes is equivalent to examining separation rates in levels since everyone in the sample is, by definition, serving in the military prior to deployment.

with injury severity; by year 4, service members with serious and very serious injuries are more than 50 percent more likely to have separated than uninjured service members. Again, the effect of less-serious injuries on separation is larger among AC members, but the effect of more-serious injury is greater among RC members.

Table 5.11. Estimated Effect of Injury on AC Members' Cumulative Military Separation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.079	0.018** (0.002)	0.034** (0.002)	0.031** (0.003)	0.017* (0.008)	0.029* (0.014)
2	0.194	0.050** (0.002)	0.086** (0.003)	0.098** (0.004)	0.177** (0.013)	0.238** (0.022)
3	0.287	0.057** (0.003)	0.104** (0.003)	0.115** (0.004)	0.212** (0.013)	0.336** (0.021)
4	0.367	0.060** (0.003)	0.104** (0.003)	0.101** (0.004)	0.189** (0.013)	0.331** (0.018)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.12. Estimated Effect of Injury on RC Members' Cumulative Military Separation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.059	0.006** (0.002)	0.004** (0.002)	0.013** (0.004)	0.029 (0.016)	0.161** (0.035)
2	0.165	0.029** (0.003)	0.030** (0.002)	0.050** (0.006)	0.153** (0.025)	0.338** (0.042)
3	0.253	0.043** (0.003)	0.052** (0.003)	0.101** (0.007)	0.234** (0.027)	0.449** (0.037)
4	0.334	0.051** (0.003)	0.061** (0.003)	0.120** (0.007)	0.247** (0.025)	0.435** (0.032)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Service Member and Spousal Labor Force Participation

In this section, we investigate whether injury affects not only earnings but also labor force participation (which we measure in our data as having positive earnings). In theory, injury could lower earnings by promoting withdrawal from the labor force or by lowering the wages of those who work, or both. Understanding the ways in which injury impacts earnings can inform disability compensation policy by, for example, providing relevant data for determining the proper mix of cash compensation and in-kind programmatic offerings such as job training.

Tables 5.13 and 5.14 present estimates of the impact of injury on labor force participation of AC members and their spouses.[32] In Table 5.13, labor force participation rates for uninjured AC members range from 99 percent in the first year following deployment to 92 percent in year 4. This is not surprising given that many of the uninjured remain in the military at least initially; as a growing fraction separate over time (Table 5.11), the labor force participation rate begins to approach that observed in the civilian labor market.

Although the uninjured experience statistically significant reductions in labor force participation that grow over time, overall participation rates remain high, and differences across injury categories are modest. A sizable fraction of those with non-serious and serious injuries remain in the labor force four years after the end of their deployment. Rates of labor force withdrawal of individuals with very serious injuries are more than twice as large as those with serious injuries. As noted previously, the extent to which these differences reflect the effects of physical impairment versus income effects arising from higher disability payments is unknown.

Roughly 60 percent of spouses of uninjured AC members participate in the labor force, a proportion that remains relatively stable following the end of deployment. In general, we observe few statistically significant differences in labor force participation among AC spouses across injury categories (Table 5.14).

Tables 5.15 and 5.16 show the effect of injury on labor force participation among RC members and their spouses. Employment patterns of RC members across injury categories are similar to those of AC members. In particular, those with less-serious injuries experience small labor force participation impacts, but those in the most severe injury category have substantial labor force participation effects.

32. Since all service members are in the military prior to deployment, use of differenced labor force participation measures is equivalent to estimation in levels for the service members themselves. As with our other outcomes, we take differences between pre-deployment spousal labor force participation and post-deployment participation in order to account for any preexisting differences in propensity to work across injury categories.

Table 5.13. Estimated Effect of Injury on AC Service Member Labor Force Participation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.989	−0.004** (0.001)	−0.008** (0.001)	−0.008** (0.001)	−0.004 (0.004)	−0.047** (0.011)
2	0.966	−0.012** (0.001)	−0.023** (0.001)	−0.034** (0.002)	−0.088** (0.009)	−0.203** (0.019)
3	0.946	−0.019** (0.002)	−0.033** (0.002)	−0.060** (0.003)	−0.149** (0.011)	−0.332** (0.022)
4	0.920	−0.024** (0.002)	−0.041** (0.002)	−0.069** (0.003)	−0.165** (0.012)	−0.379** (0.022)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.14. Estimated Effect of Injury on AC Spousal Labor Force Participation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.598	−0.001 (0.004)	0.007 (0.004)	0.010 (0.007)	0.013 (0.022)	−0.086* (0.034)
2	0.602	0.001 (0.004)	0.013** (0.004)	0.012 (0.007)	0.044* (0.022)	−0.024 (0.034)
3	0.599	−0.001 (0.004)	0.012** (0.004)	0.005 (0.007)	0.021 (0.023)	−0.065 (0.034)
4	0.583	−0.002 (0.004)	0.011** (0.004)	0.008 (0.007)	0.001 (0.022)	−0.067 (0.037)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.16 shows that spouses of reservists are slightly more likely to participate in the labor market than are spouses of AC members. Whereas we did not observe statistically significant spousal labor supply effects for even the most seriously injured AC service members, spouses of serious or very serious RC casualties reduce their labor supply substantially beginning in year 1. The estimated impacts for the very seriously injured, while only marginally statistically significant, are large, representing a roughly 15-percent reduction in labor supply.

Table 5.15. Estimated Effect of Injury on RC Service Member Labor Force Participation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.992	−0.004** (0.001)	−0.003** (0.001)	−0.006** (0.002)	−0.017 (0.009)	−0.114** (0.030)
2	0.979	−0.012** (0.001)	−0.013** (0.001)	−0.030** (0.003)	−0.091** (0.017)	−0.251** (0.040)
3	0.967	−0.019** (0.002)	−0.026** (0.001)	−0.062** (0.004)	−0.159** (0.021)	−0.411** (0.043)
4	0.950	−0.025** (0.002)	−0.036** (0.002)	−0.084** (0.005)	−0.199** (0.023)	−0.420** (0.043)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 5.16. Estimated Effect of Injury on RC Spousal Labor Force Participation Rate, by Injury Type and Years Since Deployment

		Injury Type				
Year After Deployment	Average Uninjured	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	0.706	0.001 (0.004)	−0.003 (0.003)	−0.008 (0.009)	−0.101** (0.029)	−0.088 (0.054)
2	0.705	−0.004 (0.004)	0.000 (0.003)	−0.012 (0.009)	−0.065* (0.033)	−0.104 (0.056)
3	0.694	−0.005 (0.004)	−0.004 (0.003)	−0.003 (0.009)	−0.098** (0.032)	−0.027 (0.058)
4	0.670	−0.004 (0.004)	−0.005 (0.003)	−0.007 (0.010)	−0.090** (0.032)	−0.101 (0.072)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Summary

This chapter presents an empirical model for estimating the impact of injury on labor market outcomes and reported estimates of the impacts of injury on labor market earnings, military separation rates, and labor force participation. A key advantage of our modeling approach is the use of differenced outcome measures, which accounts for unobserved heterogeneity across individuals who ultimately suffer injury and those who do not. We further control for a wide range of demographic characteristics and present evidence based on pre-deployment earnings trends that the assumption of exogeneity of injury in this model is reasonable.

We find that household earnings losses among injured service members increase over time and with injury severity. For AC members with a referral, for example, earnings losses increase from 3 to 7 percent between years 1 and 4, compared with an increase of 13 to 36 percent among very serious casualties. Percentages of earnings losses are relatively high among less seriously injured AC members and among more seriously injured RC members.

Among both AC and RC members, household labor market earnings losses can largely be explained by declines in service member earnings, but there are statistically significant and practically important declines in the earnings of the spouses of seriously injured service members, which are partly attributable to withdrawal from the labor force.

Earnings losses of AC members can be largely explained by declines in military rather than civilian earnings, and these, in turn, can be linked to higher-than-expected separation rates from the military for the injured and general withdrawal from the labor force for the most seriously injured. For less seriously injured AC personnel, higher civilian earnings actually offset some military earnings losses.

Reservists have a more complicated story. We observe general labor force withdrawal for the most seriously injured, but injured reservists remain on active duty longer than uninjured reservists, leading to differential military and civilian earnings patterns in the first post-deployment year relative to later years. Both military and civilian earnings of injured RC members decline in later years.

6. The Effect of Injury on Household Income Including Disability Compensation

In this chapter, we estimate the extent to which retirement and disability compensation offsets the estimated household earnings losses reported in Chapter Five. We use the same empirical strategy described in Chapter Four (i.e., Equation 1), but we use changes in total household income, which we define to be the sum of household labor market earnings and retirement and disability compensation, as the dependent variable. To show the relative importance of different types of retirement and disability compensation, we sequentially add in those payments to household labor market earnings in four stages. We first add DoD and VA retirement and disability payments, then CRSC, then SSDI, and finally, TSGLI. The relevant baseline household labor market earnings losses for these comparisons are those given in Tables 5.1 and 5.2.

Effect of Injury on Household Income

We first show the estimated effect of injury on household labor market earnings, taking into account retirement and disability payments made by DoD and the VA but excluding CRSC. As can be seen in Table 6.1, these payments alone substantially offset estimated household labor market earnings losses among AC members. In many cases, the income losses are now, in fact, income gains.

The table also shows that average DoD and VA payments to injured service members increase over the four years after deployment and increase across injury categories. Service members with injuries receive, on average, between $1,216 and $31,928 of additional DoD and VA compensation in the fourth year after their deployment. These payments reduce estimated income loss in year 4 by about half for those self-reporting declines in health (55 percent for those without referrals and 48 percent for those with referrals) and fully compensate for the estimated earnings losses of non-serious casualties. DoD and VA retirement and disability payments, on average, more than fully compensate AC members with very serious injuries for estimated earnings losses. The estimates imply that those with very serious injuries receive $9,373 more in total household income in year 4 than they would have received had they not been injured.

DoD and VA payments provide even greater replacement for labor market earnings for RC members, as shown in Table 6.2. These payments generally fully compensate for the estimated earnings losses, starting in the first year after deployment. RC members who report that their health worsened during deployment but are not referred for further care are the only group whose net household income

declines. This decline is largest in year 2 after deployment, at $488. In other years, the decline is smaller and not statistically distinguishable from zero. For all other injury types, the receipt of DoD and VA retirement and disability payments results in net increases in total household income. These gains decline from year 1 to year 2 and then increase through year 4, at which point they range from $550 for those with referrals to $13,351 for those with very serious injuries.

Table 6.1. Estimated Effect of Injury on AC Household Income, Including DoD and VA Disability and Retired Pay, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,113**	–1,456**	–1,467**	–(257)	2,239*
	(130)	(137)	(195)	(573)	(994)
2	–1,574**	–2,552**	–2,198**	–(1,068)	4,088**
	(156)	(162)	(230)	(721)	(1,292)
3	–1,436**	–2,355**	–900**	(1,300)	7,280**
	(167)	(173)	(246)	(778)	(1,377)
4	–1,477**	–2,243**	–(435)	2,456**	9,373**
	(181)	(186)	(264)	(844)	(1,438)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 6.2. Estimated Effect of Injury on RC Household Income, Including DoD and VA Disability and Retired Pay, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–3	281*	1,705**	4,880**	12,935**
	(155)	(130)	(311)	(1,147)	(2,387)
2	–488**	126	886*	4,040**	10,841**
	(179)	(150)	(361)	(1,401)	(2,705)
3	–350	414*	1,201**	5,113**	11,377**
	(201)	(167)	(410)	(1,541)	(2,944)
4	–202	550**	2,118**	4,673**	13,561**
	(220)	(182)	(452)	(1,692)	(3,231)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

The incremental effect of adding CRSC to household income is small, as shown in Tables 6.3 and 6.4. The net increase attributable to CRSC is larger in later years and for more-severe injuries, though it generally averages less than $100. For AC members with very serious injuries, CRSC adds $837 in year 3 and $1,408 in year 4 (Table 6.3). Increases in household income attributable to CRSC are similar for RC members (Table 6.4). The relatively small effect of CRSC is not surprising, since only a small percentage of injured service members in our sample receive these payments (see Tables 3.5 and 3.6).

Table 6.3. Estimated Effect of Injury on AC Household Income, Including DoD and VA Disability and Retired Pay and CRSC, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,113**	–1,455**	–1,465**	–(251)	2,240*
	(130)	(137)	(195)	(573)	(994)
2	–1,573**	–2,545**	–2,170**	–(1,034)	4,326**
	(156)	(162)	(230)	(719)	(1,292)
3	–1,434**	–2,333**	–801**	(1,488)	8,117**
	(167)	(173)	(246)	(778)	(1,375)
4	–1,474**	–2,206**	–249	2,840**	10,781**
	(181)	(186)	(264)	(847)	(1,428)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 6.4. Estimated Effect of Injury on RC Household Income, Including DoD and VA Disability and Retired Pay and CRSC, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–2	281*	1,705**	4,880**	12,935**
	(155)	(130)	(311)	(1,147)	(2,387)
2	–486**	128	896*	4,041**	10,858**
	(179)	(150)	(362)	(1,401)	(2,706)
3	–345	420*	1,252**	5,260**	12,073**
	(201)	(167)	(411)	(1,545)	(2,924)
4	–194	566**	2,272**	5,185**	15,173**
	(220)	(182)	(453)	(1,692)	(3,182)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Tables 6.5 and 6.6 show the effect on household income when SSDI and other SSA payments are included. For AC members, the income losses associated with injury are further reduced for those with less-severe injuries, and income gains are larger for those with more-severe injuries. The addition of SSA payments renders earnings losses for AC non-serious casualties statistically insignificant by year 3 and changes the small income loss of $249 in year 4 to a statistically significant $869 income gain. A similar pattern is evident among reservists (Table 6.6). By year 4, RC

Table 6.5. Estimated Effect of Injury on AC Household Income, Including DoD and VA Disability and Retired Pay, CRSC, and SSDI, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,096**	–1,418**	–957**	1,556**	9,032**
	(130)	(137)	(197)	(596)	(1,080)
2	–1,532**	–2,426**	–1,401**	1,317	12,323**
	(155)	(162)	(231)	(750)	(1,382)
3	–1,351**	–2,103**	181	4,093**	16,349**
	(166)	(172)	(247)	(808)	(1,459)
4	–1,353**	–1,861**	869**	5,622**	19,068**
	(180)	(185)	(265)	(870)	(1,503)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 6.6. Estimated Effect of Injury on RC Household Income, Including DoD and VA Disability and Retired Pay, CRSC, and SSDI, by Injury Type and Years Since Deployment (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	96	437**	2,581**	8,555**	21,348**
	(155)	(130)	(321)	(1,315)	(2,738)
2	–313	491**	2,286**	8,416**	20,875**
	(179)	(149)	(369)	(1,551)	(2,981)
3	–79	976**	3,012**	9,963**	22,040**
	(200)	(166)	(414)	(1,636)	(3,186)
4	150	1,286**	4,204**	10,149**	24,662**
	(219)	(181)	(454)	(1,753)	(3,421)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

members in every injury group experience an increase in total household income relative to what they would have received in the absence of injury. Income losses persist only for reservists who report a decline in health (without referral), and those losses are small and statistically insignificant, appearing only in years 2 and 3.

Finally, Tables 6.7 and 6.8 show the effect of including TSGLI payments. As might be expected, these one-time payments have a large impact on average household income losses in the year the payments are made—typically, the first year following injury. In our sample, the 2003 and 2004 deployment cohorts might have received TSGLI payments somewhat later, since they were not distributed until December 2005 (see Tables 3.5 and 3.6). For both components, these payments have a negligible effect on the income of those with self-reported health changes (with or without referrals). Among serious and very serious casualties, however, the effect of TSGLI payments is very large in years 1 and 2 (the payments range from about $13,000 to $23,000 for serious casualties and $19,000 to $67,000 for very serious casualties). Even for non-serious casualties, TSLGI payments in years 1 and 2 are more than $1,000—enough to eliminate the net earnings losses of AC members. As expected, though, by years 3 and 4, most TSGLI payments have been made, so the effects of TSGLI on household income are much smaller.

Table 6.7. Estimated Effect of Injury on AC Household Income, Including DoD and VA Disability and Retired Pay, CRSC, SSDI, and TSGLI, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,067**	–1,402**	3,717**	24,824**	74,144**
	(131)	(137)	(291)	(1,482)	(3,387)
2	–1,525**	–2,397**	627*	14,746**	31,748**
	(156)	(163)	(270)	(1,356)	(2,603)
3	–1,318**	–2,086**	853**	6,972**	20,381**
	(167)	(173)	(258)	(972)	(1,794)
4	–1,354**	–1,863**	1,102**	6,381**	19,976**
	(181)	(186)	(269)	(894)	(1,540)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table 6.8. Estimated Effect of Injury on RC Household Income, Including DoD and VA Disability and Retired Pay, CRSC, SSDI, and TSGLI, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	136 (156)	485** (130)	6,697** (475)	28,357** (2,810)	88,049** (7,419)
2	–312 (179)	507** (150)	3,574** (416)	24,021** (3,031)	42,089** (5,239)
3	–73 (201)	1,001** (167)	3,662** (432)	11,356** (1,750)	26,583** (4,155)
4	167 (220)	1,301** (182)	4,550** (461)	12,337** (1,954)	27,780** (3,734)

NOTES:Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Estimated Replacement Rates

The estimates in this chapter demonstrate the important role of disability compensation from both military and nonmilitary sources in supplementing the income of injured service members. One measure of the extent to which disability payments compensate for lost earnings is the so-called *replacement rate*, which we define as the ratio of actual household income including disability payments to expected household income in the absence of injury. Thus, if a service member (and spouse) had $30,000 in earned income and received $20,000 in disability payments in a given post-deployment year but would have earned $55,000 had he or she not been injured, then the estimated replacement rate for him or her would be 91 percent—i.e., ($20,000 + $30,000)/$55,000. We computed expected household income for each service member in each post-deployment year by adding the predicted increase in household income from the regression model described in Chapter Four to actual household income in the pre-deployment year, ignoring the parameter estimates for injury. Expected household income is the household income our regression model predicts a service member would have earned in a given post-deployment year had he or she not been injured. A decline in household income relative to expected household income results in a replacement rate of less than 100 percent; an increase results in a replacement rate of more than 100 percent.

Table 6.9 shows that average replacement rates are consistently near or above 100 percent and that replacement rates generally increase with the severity of injury.[33] AC members with serious and very serious injuries have replacement rates in year 4 of 122 and 154 percent, respectively. Table 6.9 also shows that average replacement rates for RC members are generally higher than those for AC members. Replacement rates in year 4 for seriously and very seriously injured RC members are 143 and 183 percent, respectively. The relatively high replacement rates among reservists are explained by relatively high average disability payments for the injured (and relatively low average disability payments for the uninjured),

Table 6.9. Estimated Replacement Rates, by Injury Type and Type of Disability Compensation

Item	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
AC					
Household earnings loss in year 4 (2010 dollars)	2,693	4,651	5,787	11,943	22,555
Percentage of average earnings	4	7	9	19	36
Replacement rate (percentage)					
Year 1	101	100	114	165	280
Year 2	100	97	105	146	181
Year 3	99	98	105	124	159
Year 4	99	98	105	122	154
RC					
Household earnings loss in year 4 (2010 dollars)	2,079	3,614	6,080	14,755	26,261
Percentage of average earnings	3	4	10	22	41
Replacement rate (percentage)					
Year 1	101	110	128	186	442
Year 2	97	108	115	188	213
Year 2	107	109	113	142	182
Year 4	107	109	114	143	183

33. See Appendix B for tabulations of the full distribution of replacement rates by component, injury type, and years since deployment.

but why reservists receive higher disability payments on average than AC members within the same injury category in our sample is not known. Finally, the table shows that replacement rates are generally higher in years 1 and 2, reflecting the influence of lump-sum TSGLI payments made in those years.

7. Discussion

Among the many hardships of military deployment is the possibility of injury; 18 percent of deployed service members in our sample returned home feeling that their health worsened over the course of deployment, and another 3 percent were wounded in combat. These more-serious combat injuries, about half of which result in a VA disability rating in our sample, decrease household labor market earnings by an average of 11 percent four years following deployment. Although estimated earnings losses are considerably lower among those with a self-reported decline in health but no combat injuries, the relatively large numbers of such service members add significantly to the social cost of conducting the wars in Iraq and Afghanistan. Table 7.1 shows that service members in our sample who were deployed to Iraq and Afghanistan between 2001 and 2006 and returned home with these less-serious injuries experienced aggregate labor market earnings losses of $1.6 billion through 2010. Official casualties, by comparison, experienced aggregate earnings losses of $556 million, according to our estimates.[34] Disability compensation paid to injured service members (over and above that paid to uninjured service members) in our sample during this same period totaled $2.3 billion, 107 percent of estimated lost household earnings.

Because deployment-related injury and the associated DoD and VA compensation programs are unique, comparisons with other disability compensation systems must be made with appropriate caution.[35] Nevertheless, average replacement rates in workers' compensation programs (the disability insurance systems for civilian work-related injury managed by states) provide some context. In these programs, a common standard for benefit "adequacy" is replacement of two-thirds of gross wages (NASI, 2004). However, actual wage-replacement levels in workers' compensation

34. We compute aggregate household earnings loss by multiplying model parameter estimates by the number of observations of the corresponding injury, post-deployment year, and component cell and summing over components and post-deployment years. In interpreting the values in Table 7.1, it is important to recognize that estimated aggregate earnings losses are most certainly a lower limit on the actual aggregate earnings losses. Although our sample is large and comprehensive, it is likely to omit some fraction of those who were injured while deployed to Iraq and Afghanistan. Our aggregate analysis thus omits their income losses from the totals.

35. For example, our analysis focuses on cash compensation available for injured veterans, but the VA and DoD provide a range of other programs, including vocational training and job placement, for injured veterans. These in-kind programs are not necessarily available through other disability compensation programs such as workers' compensation.

Table 7.1. Aggregate Earnings Losses Attributable to Injury, Net Disability Compensation, and Estimated Replacement Rates, by Injury Type: 2004–2010

Injury Type	Household Earnings Loss	Net Disability Compensation	Disability Compensation/ Earnings Loss (percentage)
Health worsened	557	363	65
Referred	1,048	937	89
Non-serious casualty	403	626	155
Serious casualty	89	205	230
Very serious casualty	63	173	275
All	2,160	2,304	107

NOTES: Estimates of aggregates computed by multiplying model parameter estimates by number of observations in corresponding injury, post-deployment year, and component cell and summing over components and post-deployment years. Net disability compensation is compensation paid above that paid to otherwise comparable uninjured service members. Aggregates employ estimates over all deployment cohorts and post-deployment years.

systems are typically below this standard. Reville et al. (2001) found that two-year after-tax replacement rates for permanent-partial-disability workers' compensation claimants range from 38 to 60 percent across five states. A recent study of workers' compensation claims in California documents pre-tax five-year replacement rates that include the full spectrum of injured claimants in the 30- to 35-percent range (Seabury et al., 2011).[36] Studies of workers' compensation that compute replacement rates by severity of injury typically find higher replacement rates among the more seriously injured, as do we. Seabury et al. (2011), for example, report five-year pre-tax earnings replacement rates for low-, medium-, and high-severity claims in California of 12, 27, and 47 percent, respectively.

The fact that estimated replacement rates for combat-injured service members in our sample are substantially above 100 percent (see Table 6.9) may raise questions about the appropriateness of current levels of disability compensation. However, there are economic arguments for providing replacement rates above 100 percent for individuals with permanent or very serious injury. First, a large body of evidence suggests that

36. These replacement rates do not take into account SSDI payments. However, unlike VA payments, workers' compensation payments and SSDI payments are offset so that the combined total cannot exceed 80 percent of pre-disability earnings.

individuals typically enjoy real wage gains as they grow older, particularly early in their careers. But disability payments, which are indexed for inflation, typically do not otherwise increase over time. Taking a lifecycle perspective, it may be logical to provide benefits above full replacement initially to account for the fact that those with permanent disability will not enjoy the earnings growth in later years that is expected for their uninjured peers. Economic theory also suggests that replacement rates above 100 percent can be justified for occupations in which calculated risk-taking is desirable (e.g., policing, firefighting, military service) (Seabury, 2002). For similar reasons, replacement rates above 100 percent might also serve to attract recruits to relatively risky military occupations. Additionally, if adaptation to serious or permanent injury entails additional out-of-pocket costs that are not faced by the uninjured,[37] it may be appropriate to compensate the injured at above 100 percent to offset these additional costs. Replacement rates above 100 percent might also serve to compensate seriously injured service members for reductions in quality of life that are unrelated to labor market earnings (e.g., pain and suffering, loss of consortium).

Appendix A. Specification Checks

This appendix presents full regression results corresponding to Tables 5.1 and 5.2 and the results of a variety of specification checks designed to examine the sensitivity of the results reported in Chapters Five and Six to alternative approaches to categorizing injury and specifying our empirical model.

Full Regression Results

Full regression results are given in Tables A.1 and A.2.

37. For example, individuals with impaired mobility may require special vehicles or housing renovations to accommodate their mobility needs.

Table A.1. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Full Regression Results (in 2010 dollars)

	Year After Deployment			
Variable	1	2	3	4
Health worsened	–1,414**	–2,229**	–2,391**	–2,693**
Referred	–1,993**	–3,952**	–4,340**	–4,651**
Non-serious casualty	–2,518**	–5,233**	–5,411**	–5,787**
Serious casualty	–3,977**	–10,466**	–11,447**	–11,943**
Very serious casualty	–7,680**	–18,328**	–22,292**	–22,555**
Death	–48,067**	–51,112**	–50,272**	–50,395**
Age	–425**	–544**	–569**	–674**
Male	1,613**	4,166**	5,764**	7,010**
Missing gender	5,615**	6,751**	6,882**	7,963**
White	380**	–58	–480**	–816**
Black	558**	944**	920**	1,074**
Hispanic	–1,577**	–1,688**	–1,324**	–1,549**
Missing race	4,208**	4,001**	2,759**	2,306**
High school diploma	8,842**	10,223**	7,646**	6,928**
Some college	9,535**	11,075**	8,700**	8,516**
Bachelor's degree	10,464**	12,213**	10,441**	10,774**
Graduate degree	11,779**	14,375**	13,444**	14,703**
Missing education	8,461**	9,162**	6,583**	5,451**
AFQT	–56.309**	–52.337**	–59.789**	–46.005**
AFQT squared	0.221**	0.095	0.079	–0.056
Missing AFQT	–1,203**	–4,773**	–8,222**	–10,984**
Air Force	–179	–2,386**	–503**	638**
Navy	–559*	–2,017**	–1,318**	–1,437**
Marine Corps	971**	–2,591**	–2,773**	–1,300**
Pay grade: Senior enlisted (E5+)	1,275**	3,348**	5,234**	6,937**
Pay grade: Warrant Officer	9,075**	12,941**	16,038**	20,627**
Pay grade: Junior Officer (O1–O3)	2,289**	2,320**	3,420**	5,826**
Pay grade: Senior Officer (O4+)	6,070**	9,746**	13,655**	18,051**
Pay grade: Missing	26,630**	33,642**	32,901**	34,228**
Sought mental health counseling[a]	–2,614**	–4,126**	–4,617**	–5,505**
Missing mental health[a]	–334	185	–110	–449
Have a medical problem[a]	–452**	–1,186**	–1,439**	–1,418**
Currently on light duty[a]	–109	–1,149**	–1,294**	–1,801**

Table A.1—Continued

Variable	Year After Deployment			
	1	2	3	4
Self-reported health: Very good	–557**	–724**	–1,073**	–1,419**
Self-reported health: Good	–1,874**	–2,821**	–3,414**	–4,263**
Self-reported health: Fair	–4,646**	–6,180**	–6,688**	–7,327**
Self-reported health: Poor	–7,512**	–9,183**	–9,481**	–12,000**
Self-reported health: Missing	–484	–1,649*	–1,463*	–1,518
Deployment begin: 2002	–16,377*	–18,323*	–17,118*	–3,212
Deployment begin: 2003	–23,951**	–26,089**	–24,016**	–10,396
Deployment begin: 2004	–28,086**	–31,163**	–29,870**	–17,691
Deployment begin: 2005	–32,309**	–35,316**	–34,894**	–22,346*
Deployment begin: 2006	–35,699**	–38,640**	–38,740**	–26,227*
Intercept	34,420**	38,181**	40,394**	29,122**
Number of observations	456,218	456,218”	456,218	456,218

NOTES: * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level. Standard errors are robust to heteroskedasticity. Other model covariates include month and year deployment ends, dummies for state of residence, dummies for military occupation specialty in both the year prior to deployment and while deployed. Omitted categorical variables include no injury, female, other race, no high school diploma, Army, junior enlisted (E-1–E-4), excellent self-reported health, and deployment begin: 2001.

a. Measured prior to deployment.

Table A.2. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Full Regression Results (in 2010 dollars)

	Year After Deployment			
Variable	1	2	3	4
Health worsened	–397*	–1,448**	–1,770**	–1,900**
Referred	–386**	–1,563**	–2,136**	–2,607**
Non-serious casualty	–126	–3,741**	–5,937**	–6,290**
Serious casualty	–1,123	–9,448**	–12,279**	–14,770**
Very serious casualty	–4,911*	–19,709**	–27,138**	–26,808**
Death	–43,677**	–47,979**	–51,155**	–51,929**
Age	–377**	–622**	–842**	–1,054**
Male	1,606**	2,670**	3,442**	3,743**
Missing gender	–3,194	–7,680	–2,236	–576
White	–36	–192	–464**	–410*
Black	702**	995**	973**	1,575**
Hispanic	430*	1,305**	1,513**	1,620**
Missing race	3,379**	3,716**	2,483*	1,897
High school diploma	8,743**	9,663**	10,045**	10,801**
Some college	9,227**	10,781**	11,405**	12,468**
Bachelor's degree	10,171**	11,466**	12,173**	13,440**
Graduate degree	9,613**	11,740**	12,813**	14,039**
Missing education	8,648**	9,627**	9,931**	10,341**
AFQT	–14.921	–13.803	–11.196	–23.883
AFQT squared	–0.057	0.056	0.264*	0.56**
Missing AFQT	–1,108**	–1,769**	–2,265**	–2,687**
Air Force	2,812**	1,623**	1,106**	1,202**
Navy	–244	784*	2,270**	2,672**
Marine Corps	–1,463**	–1,690**	–2,028**	–862*
Pay grade: Senior enlisted (E5+)	458**	1,175**	2,329**	4,066**
Pay grade: Warrant Officer	1,046	3,576**	6,900**	10,784**
Pay grade: Junior Officer (O1–O3)	4,988**	8,446**	13,329**	18,147**
Pay grade: Senior Officer (O4+)	6,068**	8,235**	11,681**	14,799**
Pay grade: Missing	18,328**	23,033**	25,813**	28,546**
Sought mental health counseling[a]	–1,239**	–1,985**	–2,258**	–2,764**
Missing mental health[a]	567	443	139	587
Have a medical problem[a]	–127	–208	–508*	–870**
Currently on light duty[a]	–60	–578*	–1,187**	–1,520**
Self-reported health: Very good	–896**	–1,186**	–1,538**	–1,933**
Self-reported health: Good	–1,779**	–2,529**	–3,120**	–3,777**

Table A.2—Continued

Variable	Year After Deployment			
	1	2	3	4
Self-reported health: Fair	–2,861**	–4,198**	–4,536**	–5,382**
Self-reported health: Poor	–3,704*	–3,236	–3,697	–5,363*
Self-reported health: Missing	–1,167*	–1,444*	–1,539*	–2,443**
Deployment begin: 2002	1,979	1,716	275	2,807
Deployment begin: 2003	–3,169	–5,321*	–6,332	–3,956
Deployment begin: 2004	–6,935**	–11,475**	–12,039**	–10,954**
Deployment begin: 2005	–11,561**	–16,691**	–17,643**	–15,927**
Deployment begin: 2006	–15,803**	–20,637**	–22,101**	–20,403**
Intercept	10,982**	18,091**	23,906**	26,559**
Number of observations	236,580	236,580	236,580	236,580

NOTES: * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level. Standard errors are robust to heteroskedasticity. Other model covariates include month and year deployment ends, dummies for state of residence, dummies for miiitary occupation specialty in both the year prior to deployment and while deployed. Omitted categorical variables include no injury, female, other race, no high school diploma, Army, junior enlisted (E-1–E-4), excellent self-reported health, and deployment begin: 2001.

a. Measured prior to deployment.

Chapter Five Specification Checks

We were able to examine at least four post-deployment years for all individuals in our sample, as described in Chapter Five. We also have additional post-deployment earnings data for individuals who ended deployments prior to 2006. Tables A.3 and A.4 present estimates of the impact of injury on household earnings up to seven years following deployment. In general, estimated effects on earnings do not vary significantly between years 4 and 7, which suggests that earnings losses in the injured population stabilize by year 4. Because the sample changes for earnings beyond year 4 so that we cannot distinguish between time and cohort effects, we re-estimated these specifications focusing only on individuals who ended their deployment in 2003 (see Tables A.5 and A.6). This substantially reduces the number of observations available for estimating the impact of injury, but it allows us to assess patterns in earnings loss for years 1 through 7 over a consistently defined population. Results for this balanced sample also imply that earnings losses are relatively stable after year 4. There is evidence that earnings losses increase somewhat between years 4 and 7 among very serious casualties, but this increase is only suggestive, as the earnings differences across these years are not statistically significant.

Table A.3. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Unbalanced Panel (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,414**	–1,993**	–2,518**	–3,977**	–7,680**
	(134)	(142)	(202)	(603)	(1,032)
2	–2,229**	–3,952**	–5,233**	–10,466**	–18,328**
	(163)	(173)	(246)	(756)	(1,351)
3	–2,391**	–4,340**	–5,411**	–11,447**	–22,292**
	(175)	(185)	(265)	(829)	(1,419)
4	–2,693**	–4,651**	–5,787**	–11,943**	–22,555**
	(191)	(200)	(287)	(893)	(1,476)
5	–2,623**	–4,479**	–4,868**	–13,102**	–23,105**
	(236)	(242)	(390)	(1,099)	(1,854)
6	–2,241**	–4,429**	–5,722**	–12,408**	–21,288**
	(309)	(322)	(600)	(1,335)	(2,428)
7	–1,897**	–4,379**	–7,831**	–8,158	–20,807**
	(541)	(578)	(1,795)	(4,384)	(4,961)

NOTES: Authors' calculations from an unbalanced panel of 456,218 AC service members in years 1–4; 327,353 in year 5; 196,419 in year 6; and 64,685 in year 7. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level, ** denotes statistical significance at the 1-percent level.

Table A.4. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Unbalanced Panel (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–397*	–386**	–126	–1,123	–4,911*
	(157)	(131)	(318)	(1,191)	(2,129)
2	–1,448**	–1,563**	–3,741**	–9,448**	–19,709**
	(183)	(153)	(372)	(1,394)	(2,377)
3	–1,770**	–2,136**	–5,937**	–12,279**	–27,138**
	(207)	(173)	(430)	(1,560)	(2,519)
4	–1,900**	–2,607**	–6,290**	–14,770**	–26,808**
	(228)	(191)	(478)	(1,707)	(2,741)
5	–1,836**	–2,907**	–5,717**	–14,074**	–30,361**
	(277)	(227)	(610)	(2,101)	(3,521)
6	–1,691**	–2,628**	–4,395**	–13,496**	–35,477**
	(410)	(339)	(1,181)	(3,058)	(4,486)
7	–1,739*	–3,568**	–5,862*	–14,110*	–29,308**
	(743)	(696)	(2,918)	(6,095)	(8,881)

NOTES: Authors' calculations from an unbalanced panel of 236,580 RC service members in years 1–4, 185,305 in year 5, 88,702 in year 6, and 26,793 in year 7. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level, ** denotes statistical significance at the 1-percent level.

Table A.5. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Balanced Panel (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–431 (289)	–123 (321)	1,150 (1,024)	–2,460 (2,324)	–1,953 (3,220)
2	–1,850** (372)	–3,140** (416)	–3,818** (1,418)	–11,382** (3,298)	–11,370* (4,437)
3	–2,367** (401)	–3,958** (446)	–8,039** (1,393)	–14,034** (3,491)	–14,044** (4,347)
4	–1,886** (440)	–3,690** (478)	–9,194** (1,491)	–14,017** (3,907)	–13,598** (5,015)
5	–1,527** (459)	–3,777** (507)	–7,728** (1,664)	–13,754** (3,950)	–18,947** (4,813)
6	–1,818** (508)	–4,188** (550)	–7,897** (1,798)	–11,484** (3,901)	–22,184** (4,962)
7	–1,897** (541)	–4,379** (578)	–7,831** (1,795)	–8,158 (4,384)	–20,807** (4,961)

NOTES: Authors' calculations from a balanced sample of 64,685 AC service members ending deployment in 2003. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.6. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Balanced Panel (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	35 (414)	944* (394)	4,929** (1,597)	2,990 (3,660)	–7,050 (9,013)
2	–1,761** (479)	–1,911** (461)	–6,433** (1,562)	–9,407* (4,052)	–18,280 (10,726)
3	–1,365* (533)	–1,946** (519)	–6,814** (1,994)	–9,264* (4,339)	–20,213 (11,614)
4	–1,809** (585)	–2,860** (556)	–7,655** (2,277)	–15,462** (4,330)	–22,346 (12,795)
5	–1,632* (638)	–3,399** (600)	–8,406** (2,646)	–12,130** (3,524)	–25,941* (11,910)
6	–2,030** (700)	–3,800** (651)	–9,298** (2,777)	–11,150* (4,769)	–30,136** (10,473)
7	–1,739* (743)	–3,568** (696)	–5,862* (2,918)	–14,110* (6,095)	–29,308** (8,881)

NOTES: Authors' calculations from a balanced sample of 26,793 RC service members ending deployment in 2003. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

How sensitive are these results to our particular method for categorizing injury? One potential concern is that the self-reported health data from the PDHA may be less reliable than data from the official casualty reporting system. Tables A.7 and A.8 present specifications that use only information contained in DMDC's Casualty File,

Table A.7. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–2,263**	–3,759**	–7,444**
	(201)	(602)	(1,032)
2	–4,772**	–10,076**	–17,904**
	(245)	(755)	(1,350)
3	–4,909**	–11,023**	–21,830**
	(264)	(828)	(1,418)
4	–5,239**	–11,479**	–22,050**
	(287)	(892)	(1,475)

NOTES: Authors' calculations from a balanced sample of 456,218 AC service members. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.8. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–29	–1,032	–4,822*
	(317)	(1,191)	(2,129)
2	–3,365**	–9,094**	–19,367**
	(371)	(1,394)	(2,374)
3	–5,443**	–11,817**	–26,691**
	(429)	(1,560)	(2,514)
4	–5,712**	–14,232**	–26,288**
	(477)	(1,706)	(2,735)

NOTES: Authors' calculations from a balanced sample of 236,580 RC service members. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

categorizing injuries as non-serious, serious, or very serious and coding everyone who does not appear in the Casualty File as uninjured. Using this injury categorization yields very similar results to the baseline results presented in Tables 5.1 and 5.2.

Using the casualty data, we can also examine the sensitivity of our results to the inclusion or exclusion of individuals who were subsequently redeployed and sustained injury after the period covered by our sample. At a conceptual level, there are advantages to both excluding and including such individuals from the analysis. The main rationale for including service members who later sustain injuries, as we do in our main analysis, is that the proper counterfactual for the earnings of the injured is whatever they would have earned had they not been injured during the deployment in question. Potential future scenarios for the uninjured include the possibility of additional deployment and subsequent injury, so the estimates should arguably incorporate such possibilities. An argument for excluding those with future injuries, however, is that if a goal of compensation policy is to allow injured individuals to enjoy economic outcomes similar to those of service members with good health, the most appropriate comparison is between those who are injured and those who are not. In this view, failing to exclude those with subsequent injuries would inappropriately contaminate the comparison group with individuals who are in less-than-perfect health.

In Tables A.9 and A.10 we reestimate specifications incorporating injury information from the Casualty File only, but excluding the individuals who appear in the file after 2006.[38] The actual number of control personnel from our primary sample who were recorded as casualties after 2006 is small, so it is unsurprising that this restriction has little effect on our estimates or conclusions. Thus, as a practical matter, this distinction appears to be unimportant for our analysis. We note, however, that in an analysis that incorporated richer data on health status after 2006 than simple casualty indicators, one might observe larger differences between the results obtained using the full set of controls rather than only the uninjured.[39]

Many prior studies of disability compensation use disability ratings rather than injury categories as measures of injury. Tables A.11–A.14 present estimates using alternative injury categorizations based on DoD disability ratings. The results for household labor market earnings are qualitatively similar to those based on DMDC's categorization in the Casualty File.[40]

38. There are 4,680 such individuals in the AC and 908 in the RC.

39. PDHA data were available only through mid-2007, so we could not use them to look at health in later years.

40. For other earnings outcomes such as spousal earnings and military and civilian earnings, we observe similar patterns to those we obtained using alternative injury categorizations, balanced samples, and samples restricted to the never-injured.

Table A.9. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–2,093**	–3,615**	–7,286**
	(201)	(603)	(1,032)
2	–4,555**	–9,856**	–17,701**
	(245)	(755)	(1,350)
3	–4,772**	–10,856**	–21,695**
	(264)	(828)	(1,418)
4	–5,176**	–11,376**	–21,988**
	(287)	(892)	(1,475)

NOTES: Authors' calculations from a balanced sample of 451,538 AC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; *denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.10. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	14	–997	–4,776*
	(317)	(1,192)	(2,129)
2	–3,310**	–9,056**	–19,312**
	(371)	(1,393)	(2,373)
3	–5,410**	–11,787**	–26,652**
	(429)	(1,559)	(2,513)
4	–5,696**	–14,211**	–26,264**
	(477)	(1,706)	(2,733)

NOTES: Authors' calculations from a balanced sample of 235,672 RC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.11. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Alternative Injury Categorization (in 2010 dollars)

Year After Deployment	Health Worsened	Referred	Disability Rating (percent)			
			0	10–40	50–70	80–100
1	–1,415**	–1,994**	–2,302**	–5,712**	–3,238**	–9,451**
	(134)	(142)	(207)	(623)	(692)	(1,063)
2	–2,232**	–3,958**	–3,931**	–18,194**	–14,934**	–23,705**
	(163)	(173)	(249)	(779)	(908)	(1,229)
3	–2,395**	–4,347**	–3,261**	–22,582**	–22,182**	–30,994**
	(175)	(185)	(264)	(883)	(989)	(1,228)
4	–2,697**	–4,659**	–3,053**	–24,552**	–26,736**	–35,910**
	(191)	(200)	(286)	(891)	(1,006)	(1,283)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.12. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Alternative Injury Categorization (in 2010 dollars)

Year After Deployment	Health Worsened	Referred	Disability Rating (percent)			
			0	10–40	50–70	80–100
1	–396*	–386**	–799*	4,412**	3,045*	–1,123
	(157)	(131)	(321)	(1,406)	(1,354)	(1,997)
2	–1,449**	–1,567**	–3,191**	–9,221**	–12,112**	–17,857**
	(183)	(153)	(376)	(1,644)	(1,464)	(2,360)
3	–1,773**	–2,143**	–4,107**	–17,743**	–23,862**	–30,749**
	(207)	(173)	(427)	(1,767)	(1,622)	(2,586)
4	–1,904**	–2,615**	–3,912**	–21,300**	–26,239**	–40,001**
	(228)	(191)	(474)	(1,837)	(1,792)	(2,592)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.13. Estimated Effect of Injury on AC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Alternative Injury Categorization, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Disability Rating (percent)			
	0	10–40	50–70	80–100
1	–2,051**	–5,470**	–2,980**	–9,189**
	(206)	(623)	(692)	(1,063)
2	–3,477**	–17,758**	–14,467**	–23,230**
	(248)	(779)	(908)	(1,229)
3	–2,767**	–22,108**	–21,673**	–30,477**
	(264)	(882)	(989)	(1,228)
4	–2,513**	–24,034**	–26,181**	–35,345**
	(285)	(890)	(1,005)	(1,283)

NOTES: Authors' calculations from a balanced sample of 451,538 AC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.14. Estimated Effect of Injury on RC Household Labor Market Earnings, by Injury Type and Years Since Deployment: Alternative Injury Categorization, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Disability Rating (percent)			
	0	10–40	50–70	80–100
1	–703*	4,511**	3,147*	–1,025
	(320)	(1,406)	(1,354)	(1,996)
2	–2,819**	–8,836**	–11,715**	–17,475**
	(375)	(1,645)	(1,464)	(2,359)
3	–3,618**	–17,238**	–23,340**	–30,248**
	(426)	(1,767)	(1,622)	(2,582)
4	–3,340**	–20,710**	–25,629**	–39,415**
	(472)	(1,838)	(1,791)	(2,588)

NOTES: Authors' calculations from a balanced sample of 235,672 RC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Chapter Six Specification Checks

Like Chapter Five, Chapter Six focuses on the first four years after deployment. Here, we explore what happens to household income in later years under our first set of alternative specifications. Tables A.15 and A.16 report estimated effects of injury on household income, including DoD and VA retirement and disability payments, CRSC, SSDI, and TSGLI (comparable to Tables 6.7 and 6.8) for years 1 through 7 after deployment, using all available observations in each year. Sample sizes are constant across years 1 through 4, and the results for those years are identical to those reported in Tables 6.7 and 6.8.

The estimated effects of injury on household income in years 5 through 7 are generally similar to those for year 4. For all but the most severe injury groups (very serious casualties for AC and serious and very serious casualties for RC), the estimated effects are more positive after year 4. For AC members with self-reported health changes or referrals—the only injury groups with significant declines in household income in year 4—the estimates decrease in years 5 and 6 and are small (under $500) and statistically insignificant in year 7.

Table A.15. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment: Unbalanced Panel (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–1,067**	–1,402**	3,717**	24,824**	74,144**
	(131)	(137)	(291)	(1,482)	(3,387)
2	–1,525**	–2,397**	627*	14,746**	31,748**
	(156)	(163)	(270)	(1,356)	(2,603)
3	–1,318**	–2,086**	853**	6,972**	20,381**
	(167)	(173)	(258)	(972)	(1,794)
4	–1,354**	–1,863**	1,102**	6,381**	19,976**
	(181)	(186)	(269)	(894)	(1,540)
5	–1,151**	–1,457**	2,259**	7,467**	17,611**
	(223)	(227)	(369)	(1,164)	(1,961)
6	–677*	–988**	3,066**	8,774**	15,625**
	(293)	(302)	(559)	(1,366)	(2,523)
7	–102	–403	3,156	13,403**	13,454*
	(514)	(545)	(1,806)	(3,987)	(5,774)

NOTES: Authors' calculations from an unbalanced panel of 456,218 AC service members in years 1–4, 327,353 service members in year 5, 196,419 service members in year 6, and 64,685 service members in year 7. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.16. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment: Unbalanced Panel (in 2010 dollars)

	Injury Type				
Year After Deployment	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	136 (156)	485** (130)	6,697** (475)	28,357** (2,810)	88,049** (7,419)
2	–312 (179)	507** (150)	3,574** (416)	24,021** (3,031)	42,089** (5,239)
3	–73 (201)	1,001** (167)	3,662** (432)	11,356** (1,750)	26,583** (4,155)
4	166 (220)	1,301** (182)	4,550** (461)	12,337** (1,954)	27,780** (3,734)
5	417 (266)	1,441** (215)	5,412** (589)	14,736** (2,177)	22,726** (4,185)
6	672 (396)	1,785** (322)	9,473** (1,153)	17,009** (3,470)	18,958** (5,979)
7	694 (718)	1,674* (660)	10,520** (2,887)	8,112 (5,286)	45,603** (15,621)

NOTES: Authors' calculations from an unbalanced panel of 236,580 RC service members in years 1–4, 185,305 service members in year 5, 88,702 service members in year 6, and 26,793 service members in year 7. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

These results suggest that all injury groups are fully compensated in the longer term. However, because these estimates are based on all the available observations, not all of the households are present in all seven years. Because the panel is not balanced over time, the year-to-year changes in the estimates could in part reflect the changing composition of the sample as it is limited to earlier and earlier deployments. We test this hypothesis by estimating the effects from year 1 through 7 on a balanced sample of households with deployments ending in 2003.

The results, reported in Appendix Tables A.17 and A.18, indicate that compositional changes are indeed part of the explanation for the increasing effect of injury on household income after year 4. In particular, AC members with self-reported injuries and referrals in the balanced sample have smaller (and less statistically significant) income losses in year 4 than the same group in the unbalanced sample. Nevertheless, the income losses decrease after year 4 for these groups in the balanced panel as well, which suggests that sample composition is not solely to blame.

Table A.17. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment: Balanced Panel (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	–193 (283)	418 (311)	2,531* (1,009)	2,827 (2,408)	9,971** (3,505)
2	–1,060** (359)	–1,474** (389)	953 (1,454)	7,311 (4,533)	16,651** (6,099)
3	–1,283** (387)	–1,640** (414)	4,569* (1,874)	22,212** (6,104)	48,580** (11,874)
4	–634 (419)	–892* (446)	–998 (1,467)	5,133 (4,057)	15,977** (4,416)
5	–81 (437)	–648 (477)	2,349 (1,691)	4,367 (3,723)	9,646* (4,482)
6	–236 (483)	–463 (520)	3,537* (1,790)	10,660** (4,087)	12,186* (6,079)
7	–102 (514)	–403 (545)	3,156 (1,806)	13,403** (3,987)	13,454* (5,774)

NOTES: Authors' calculations from a balanced sample of 64,685 AC service members ending deployment in 2003. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.18. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment: Balanced Panel (in 2010 dollars)

Year After Deployment	Injury Type				
	Health Worsened	Referred	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	374 (416)	1,526** (392)	8,096** (1,764)	5,188 (3,536)	36,075* (14,955)
2	–736 (473)	47 (446)	4,438* (1,915)	10,101 (8,149)	76,445** (24,247)
3	185 (532)	992* (500)	8,997** (2,286)	8,044 (5,730)	131,260** (42,869)
4	26 (571)	812 (527)	8,359** (2,236)	2,736 (5,079)	48,811** (15,070)
5	276 (618)	977 (569)	6,552* (2,557)	5,565 (3,914)	43,147** (14,303)
6	229 (677)	1,301* (618)	9,015** (2,954)	8,811* (3,985)	44,932** (16,963)
7	694 (718)	1,674* (660)	10,520** (2,887)	8,112 (5,286)	45,603** (15,621)

NOTES: Authors' calculations from a balanced sample of 26,793 RC service members ending deployment in 2003. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

As in Chapter Five, a second set of alternative specifications explores the sensitivity of our main results to changes in how we define injury and whether we exclude individuals who appear in the Casualty File after 2006. These results are reported in Tables A.19 through A.26. Results obtained from these alternative specifications are broadly consistent with the baseline results reported in Tables 6.7 and 6.8.

Table A.19. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	3,902**	24,982**	74,315**
	(290)	(1,482)	(3,387)
2	920**	14,995**	32,018**
	(269)	(1,356)	(2,603)
3	1,107**	7,188**	20,616**
	(258)	(972)	(1,794)
4	1,343**	6,587**	20,198**
	(268)	(893)	(1,540)

NOTES: Authors' calculations from a balanced sample of 456,218 AC service members. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.20. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	6,610**	28,279**	87,974**
	(474)	(2,810)	(7,419)
2	3,528**	23,985**	42,056**
	(415)	(3,031)	(5,239)
3	3,518**	11,231**	26,463**
	(431)	(1,749)	(4,156)
4	4,337**	12,147**	27,599**
	(460)	(1,953)	(3,735)

NOTES: Authors' calculations from a balanced sample of 236,580 RC service members. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.21. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	4,089**	25,168**	74,490**
	(291)	(1,483)	(3,388)
2	1,222**	15,298**	32,294**
	(269)	(1,357)	(2,603)
3	1,349**	7,453**	20,847**
	(258)	(972)	(1,795)
4	1,533**	6,814**	20,382**
	(268)	(893)	(1,541)

NOTES: Authors' calculations from a balanced sample of 451,538 AC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.22. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Injury Type		
	Non-Serious Casualty	Serious Casualty	Very Serious Casualty
1	6,656**	28,315**	88,025**
	(474)	(2,810)	(7,420)
2	3,595**	24,031**	42,124**
	(415)	(3,031)	(5,238)
3	3,585**	11,277**	26,535**
	(431)	(1,750)	(4,155)
4	4,395**	12,195**	27,670**
	(460)	(1,953)	(3,734)

NOTES: Authors' calculations from a balanced sample of 235,672 RC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.23. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment, Alternative Injury Categorization (in 2010 dollars)

Year After Deployment	Health Worsened	Referred	Disability Rating (percent)			
			0	10–40	50–70	80–100
1	–1,052**	–1,373**	1,188**	22,621**	36,239**	95,475**
	(131)	(137)	(255)	(1,522)	(1,929)	(3,356)
2	–1,517**	–2,381**	–467	9,107**	19,997**	43,917**
	(156)	(163)	(266)	(1,306)	(1,595)	(2,662)
3	–1,313**	–2,077**	–63	3,979**	10,914**	33,596**
	(167)	(173)	(256)	(1,073)	(1,132)	(1,829)
4	–1,350**	–1,854**	514	2,260*	9,292**	29,785**
	(181)	(186)	(272)	(967)	(980)	(1,550)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.24. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment, Alternative Injury Categorization (in 2010 dollars)

Year After Deployment	Health Worsened	Referred	Disability Rating (percent)			
			0	10–40	50–70	80–100
1	144	506**	3,122**	32,294**	48,990**	86,295**
	(156)	(130)	(395)	(2,774)	(3,514)	(6,085)
2	–308	520**	1,757**	21,790**	25,346**	52,813**
	(179)	(150)	(412)	(2,374)	(2,501)	(4,898)
3	–70	1,007**	1,996**	16,814**	16,463**	35,116**
	(201)	(167)	(425)	(1,943)	(1,830)	(3,688)
4	170	1,308**	2,969**	17,021**	21,025**	29,215**
	(220)	(182)	(460)	(2,128)	(1,937)	(3,457)

NOTES: Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.25. Estimated Effect of Injury on AC Household Income, by Injury Type and Years Since Deployment, Alternative Injury Categorization, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Disability Rating (percent)			
	0	10–40	50–70	80–100
1	1,367**	22,793**	36,423**	95,662**
	(255)	(1,522)	(1,929)	(3,356)
2	–181	9,382**	20,292**	44,217**
	(265)	(1,305)	(1,594)	(2,662)
3	186	4,218**	11,170**	33,856**
	(256)	(1,073)	(1,131)	(1,829)
4	750**	2,488*	9,535**	30,032**
	(272)	(967)	(980)	(1,550)

NOTES: Authors' calculations from a balanced sample of 451,538 AC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Table A.26. Estimated Effect of Injury on RC Household Income, by Injury Type and Years Since Deployment, Alternative Injury Categorization, Excluding Casualties After 2006 (in 2010 dollars)

Year After Deployment	Disability Rating (percent)			
	0	10–40	50–70	80–100
1	3,033**	32,203**	48,895**	86,204**
	(394)	(2,773)	(3,514)	(6,086)
2	1,709**	21,744**	25,295**	52,764**
	(412)	(2,374)	(2,501)	(4,898)
3	1,853**	16,669**	16,310**	34,969**
	(424)	(1,942)	(1,829)	(3,689)
4	2,758**	16,807**	20,800**	28,999**
	(459)	(2,127)	(1,936)	(3,458)

NOTES: Authors' calculations from a balanced sample of 235,672 RC service members who do not appear in the Casualty File after 2006. Uninjured group includes self-reported and referrals. Heteroskedasticity-robust standard errors are in parentheses; * denotes statistical significance at the 5-percent level; ** denotes statistical significance at the 1-percent level.

Appendix B. Distribution of Estimated Replacement Rates

Table 6.9 reports estimated mean replacement rates by component, injury type, and year since deployment. This appendix provides further detail on the full distribution of estimated replacement rates within these groups.

As described in Chapter Six, we define *replacement rate* as the ratio of actual household income including disability payments to expected household income in the absence of injury. Thus, if a service member (and spouse) earned $50,000 including disability payments in a given post-deployment year but would have earned $55,000 had he or she not been injured, the estimated replacement rate for that individual would be 91 percent (i.e., $50,000/$55,000). We computed expected household income for each service member in each post-deployment year by adding the predicted increase in household income from the regression model described in Chapter Four to actual household income in the pre-deployment year, ignoring the parameter estimates for injury. Expected household income is the household income our regression model predicts a service member would have earned in a given post-deployment year had he or she not been injured. A decline in household income relative to expected household income results in a replacement rate of less than 100 percent; an increase results in a replacement rate of more than 100 percent.

Table B.1 shows the full distribution of estimated replacement rates, including TSGLI income, by injury type and year since deployment for AC members. We compute estimated replacement rates for the uninjured as well as the injured, because both experience idiosyncratic income shocks (as proxied by the error term in our regression model) leading to deviations of actual household income from expected household income that are independent of injury. Thus, some uninjured service members will experience replacement rates of less than 100 percent, and others will experience replacement rates of more than 100 percent for reasons unrelated to injury. However, the mean replacement rate for the uninjured is close to 100 percent, and the median replacement rate is exactly 100 percent. The tables then show, as we would expect, that the mean and median replacement rates are significantly greater than 100 percent for seriously and very seriously injured service members: 58 percent and 63 percent of seriously and very seriously injured service members, respectively, have a replacement rate of more than 100 percent in year 4. Seriously and very seriously injured service members are 16 and 46 percent less likely than the uninjured to have replacement rates of less than 100 percent in year 4. Table B.2 reports replacement rates for the AC, excluding TSGLI. Tables B.3 and B.4 report replacement rates, including and excluding TSGLI, for the RC. Figures B.1 and B.2 are histograms of estimated replacement rates in year 4 including TSGLI income for the AC and RC, respectively.

Table B.1. Distribution of Estimated Replacement Rates, Including TSGLI Income, by Injury Type and Years Since Deployment: AC

Injury Type/ Years Since Deployment	Replacement Rate (percent)													Mean Rep. Rate
	0–25	25–50	50–75	75–100	100–125	125–150	150–175	175–200	200–225	225–250	250–275	275–300	300+	
Uninjured														
1	0.04	0.05	0.11	0.29	0.27	0.12	0.06	0.03	0.01	0.01	0.00	0.00	0.00	1.04
2	0.06	0.07	0.12	0.25	0.24	0.13	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.03
3	0.08	0.07	0.12	0.23	0.23	0.13	0.07	0.03	0.02	0.01	0.01	0.00	0.01	1.03
4	0.10	0.07	0.12	0.21	0.22	0.13	0.07	0.04	0.02	0.01	0.01	0.00	0.01	1.02
Self-reported														
1	0.05	0.07	0.12	0.27	0.26	0.12	0.06	0.02	0.01	0.01	0.00	0.00	0.00	1.01
2	0.08	0.08	0.13	0.23	0.23	0.12	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.00
3	0.10	0.08	0.12	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.01	0.00	0.01	0.99
4	0.11	0.09	0.12	0.20	0.21	0.12	0.07	0.03	0.02	0.01	0.01	0.00	0.01	0.99
Referred														
1	0.06	0.07	0.12	0.27	0.25	0.12	0.05	0.03	0.01	0.01	0.00	0.00	0.00	1.00
2	0.09	0.09	0.13	0.24	0.22	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.00	0.97
3	0.09	0.09	0.13	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.01	0.98
4	0.10	0.09	0.13	0.21	0.21	0.12	0.07	0.03	0.02	0.01	0.01	0.00	0.01	0.98
Non-serious casualty														
1	0.05	0.07	0.13	0.25	0.22	0.11	0.06	0.03	0.02	0.01	0.01	0.01	0.03	1.14
2	0.08	0.09	0.13	0.23	0.20	0.12	0.06	0.03	0.02	0.01	0.01	0.01	0.02	1.05
3	0.08	0.10	0.13	0.20	0.20	0.12	0.07	0.04	0.02	0.01	0.01	0.01	0.01	1.05
4	0.09	0.10	0.12	0.19	0.19	0.12	0.07	0.04	0.03	0.01	0.01	0.01	0.01	1.05
Serious casualty														
1	0.02	0.04	0.11	0.21	0.17	0.11	0.06	0.05	0.04	0.02	0.02	0.02	0.13	1.65
2	0.05	0.08	0.13	0.18	0.18	0.11	0.06	0.05	0.03	0.02	0.01	0.01	0.08	1.46
3	0.06	0.08	0.12	0.17	0.19	0.13	0.06	0.05	0.04	0.02	0.02	0.01	0.04	1.24
4	0.05	0.08	0.12	0.17	0.18	0.14	0.09	0.05	0.04	0.02	0.01	0.01	0.03	1.22
Very serious casualty														
1	0.01	0.01	0.05	0.12	0.13	0.08	0.05	0.04	0.03	0.05	0.03	0.04	0.37	2.80
2	0.03	0.06	0.07	0.12	0.16	0.14	0.10	0.07	0.02	0.03	0.03	0.02	0.14	1.81
3	0.03	0.05	0.09	0.14	0.15	0.13	0.14	0.06	0.05	0.02	0.03	0.02	0.09	1.59
4	0.03	0.04	0.08	0.11	0.15	0.16	0.12	0.09	0.05	0.04	0.02	0.02	0.08	1.54

Table B.2. Distribution of Estimated Replacement Rates, Excluding TSGLI Income, by Injury Type and Years Since Deployment: AC

Injury Type/ Years Since Deployment	Replacement Rate (percent)													Mean Rep. Rate
	0–25	25–50	50–75	75–100	100–125	125–150	150–175	175–200	200–225	225–250	250–275	275–300	300+	
Uninjured														
1	0.04	0.05	0.11	0.29	0.27	0.12	0.06	0.03	0.01	0.01	0.00	0.00	0.00	1.04
2	0.06	0.06	0.12	0.25	0.24	0.13	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.03
3	0.08	0.07	0.12	0.23	0.23	0.13	0.07	0.03	0.02	0.01	0.01	0.00	0.01	1.03
4	0.10	0.07	0.12	0.21	0.22	0.13	0.07	0.04	0.02	0.01	0.01	0.00	0.01	1.02
Self-reported														
1	0.05	0.07	0.12	0.27	0.26	0.12	0.06	0.02	0.01	0.01	0.00	0.00	0.00	1.01
2	0.08	0.08	0.12	0.23	0.23	0.12	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.00
3	0.10	0.08	0.12	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.01	0.99
4	0.11	0.09	0.12	0.20	0.21	0.12	0.07	0.03	0.02	0.01	0.01	0.00	0.01	0.99
Referred														
1	0.06	0.07	0.12	0.27	0.25	0.12	0.05	0.03	0.01	0.01	0.00	0.00	0.00	1.00
2	0.09	0.09	0.13	0.24	0.22	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.00	0.97
3	0.09	0.09	0.13	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.01	0.98
4	0.10	0.09	0.13	0.21	0.21	0.12	0.07	0.03	0.02	0.01	0.01	0.00	0.01	0.98
Non-serious casualty														
1	0.05	0.07	0.14	0.26	0.23	0.12	0.06	0.03	0.02	0.01	0.00	0.00	0.01	1.02
2	0.08	0.10	0.13	0.23	0.21	0.12	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.01
3	0.08	0.10	0.13	0.20	0.20	0.12	0.07	0.04	0.02	0.01	0.01	0.01	0.01	1.04
4	0.09	0.10	0.12	0.19	0.19	0.12	0.07	0.04	0.03	0.01	0.01	0.01	0.01	1.05
Serious casualty														
1	0.02	0.05	0.13	0.27	0.22	0.14	0.07	0.04	0.02	0.01	0.01	0.01	0.01	1.10
2	0.05	0.09	0.15	0.21	0.20	0.12	0.07	0.05	0.03	0.01	0.01	0.01	0.01	1.10
3	0.06	0.08	0.13	0.18	0.20	0.13	0.06	0.05	0.04	0.02	0.02	0.01	0.02	1.17
4	0.05	0.08	0.12	0.17	0.18	0.15	0.09	0.05	0.04	0.02	0.01	0.01	0.03	1.20
Very serious casualty														
1	0.01	0.03	0.09	0.21	0.25	0.17	0.10	0.04	0.02	0.02	0.01	0.01	0.03	1.27
2	0.03	0.06	0.09	0.15	0.20	0.16	0.11	0.07	0.03	0.02	0.02	0.01	0.05	1.35
3	0.03	0.05	0.10	0.14	0.15	0.14	0.14	0.07	0.05	0.02	0.03	0.02	0.07	1.48
4	0.03	0.04	0.08	0.11	0.15	0.17	0.12	0.09	0.05	0.04	0.02	0.02	0.07	1.51

Table B.3. Distribution of Estimated Replacement Rates, Including TSGLI Income, by Injury Type and Years Since Deployment: RC

Injury Type/ Years Since Deployment	Replacement Rate (percent)													Mean Rep. Rate
	0–25	25–50	50–75	75–100	100–125	125–150	150–175	175–200	200–225	225–250	250–275	275–300	300+	
Uninjured														
1	0.05	0.07	0.12	0.29	0.25	0.10	0.05	0.03	0.02	0.01	0.01	0.00	0.01	1.06
2	0.05	0.07	0.13	0.27	0.24	0.10	0.05	0.03	0.02	0.01	0.01	0.00	0.01	1.05
3	0.06	0.06	0.13	0.26	0.24	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.04
4	0.08	0.07	0.13	0.24	0.23	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.05
Self-reported														
1	0.06	0.07	0.12	0.28	0.24	0.10	0.05	0.03	0.02	0.01	0.01	0.01	0.02	1.01
2	0.06	0.07	0.12	0.27	0.23	0.10	0.05	0.03	0.02	0.01	0.01	0.01	0.02	0.97
3	0.07	0.07	0.13	0.24	0.22	0.11	0.06	0.03	0.02	0.01	0.01	0.01	0.01	1.07
4	0.08	0.07	0.12	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.01	0.01	0.01	1.07
Referred														
1	0.05	0.07	0.12	0.28	0.25	0.10	0.05	0.03	0.02	0.01	0.01	0.01	0.02	1.10
2	0.05	0.07	0.13	0.27	0.24	0.11	0.05	0.03	0.02	0.01	0.01	0.00	0.02	1.08
3	0.06	0.07	0.12	0.25	0.23	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.02	1.09
4	0.07	0.07	0.13	0.23	0.22	0.12	0.06	0.03	0.02	0.01	0.01	0.01	0.02	1.09
Non-serious casualty														
1	0.05	0.07	0.12	0.22	0.22	0.11	0.06	0.04	0.02	0.02	0.01	0.01	0.05	1.28
2	0.05	0.07	0.12	0.23	0.22	0.12	0.07	0.04	0.02	0.01	0.01	0.00	0.02	1.15
3	0.06	0.08	0.12	0.21	0.22	0.13	0.07	0.04	0.02	0.02	0.01	0.01	0.02	1.13
4	0.06	0.08	0.11	0.19	0.21	0.13	0.08	0.05	0.03	0.02	0.01	0.01	0.02	1.14
Serious casualty														
1	0.03	0.04	0.09	0.19	0.20	0.09	0.06	0.03	0.03	0.03	0.03	0.01	0.16	1.86
2	0.02	0.05	0.10	0.20	0.19	0.12	0.07	0.03	0.03	0.03	0.02	0.01	0.12	1.88
3	0.04	0.05	0.13	0.14	0.23	0.13	0.11	0.05	0.02	0.03	0.02	0.02	0.04	1.42
4	0.04	0.03	0.12	0.19	0.18	0.14	0.08	0.06	0.05	0.03	0.02	0.01	0.04	1.43
Very serious casualty														
1	0.02	0.02	0.05	0.09	0.11	0.05	0.04	0.07	0.04	0.04	0.04	0.01	0.45	4.42
2	0.03	0.02	0.07	0.11	0.08	0.15	0.05	0.10	0.07	0.07	0.03	0.03	0.20	2.13
3	0.02	0.05	0.04	0.15	0.15	0.11	0.15	0.09	0.03	0.05	0.01	0.02	0.12	1.82
4	0.03	0.04	0.07	0.11	0.15	0.11	0.14	0.08	0.06	0.07	0.02	0.00	0.15	1.83

Table B.4. Distribution of Estimated Replacement Rates, Excluding TSGLI Income, by Injury Type and Years Since Deployment: RC

Injury Type/ Years Since Deployment	Replacement Rate (percent)													Mean Rep. Rate
	0–25	25–50	50–75	75–100	100–125	125–150	150–175	175–200	200–225	225–250	250–275	275–300	300+	
Uninjured														
1	0.05	0.07	0.12	0.29	0.25	0.10	0.05	0.03	0.02	0.01	0.01	0.00	0.01	1.06
2	0.05	0.07	0.13	0.27	0.24	0.10	0.05	0.03	0.02	0.01	0.01	0.00	0.01	1.05
3	0.06	0.06	0.13	0.26	0.24	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.04
4	0.08	0.07	0.13	0.24	0.23	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.01	1.04
Self-reported														
1	0.06	0.07	0.12	0.28	0.24	0.10	0.05	0.03	0.02	0.01	0.01	0.01	0.02	1.11
2	0.06	0.07	0.12	0.27	0.23	0.10	0.05	0.03	0.02	0.01	0.01	0.00	0.02	1.07
3	0.07	0.07	0.13	0.24	0.22	0.11	0.06	0.03	0.02	0.01	0.01	0.01	0.01	1.06
4	0.08	0.07	0.12	0.22	0.22	0.12	0.06	0.03	0.02	0.01	0.01	0.01	0.01	1.07
Referred														
1	0.05	0.07	0.12	0.28	0.25	0.10	0.05	0.03	0.02	0.01	0.01	0.01	0.02	1.09
2	0.05	0.07	0.12	0.27	0.24	0.11	0.05	0.03	0.02	0.01	0.01	0.01	0.02	1.12
3	0.06	0.07	0.12	0.25	0.23	0.11	0.06	0.03	0.02	0.01	0.01	0.00	0.02	1.09
4	0.07	0.07	0.13	0.23	0.22	0.12	0.06	0.04	0.02	0.01	0.01	0.01	0.02	1.09
Non-serious casualty														
1	0.05	0.07	0.12	0.22	0.22	0.11	0.06	0.04	0.02	0.02	0.01	0.01	0.05	1.28
2	0.05	0.07	0.12	0.23	0.22	0.12	0.07	0.04	0.02	0.01	0.01	0.00	0.02	1.15
3	0.06	0.08	0.12	0.21	0.22	0.13	0.07	0.04	0.02	0.02	0.01	0.01	0.02	1.13
4	0.06	0.08	0.11	0.19	0.21	0.13	0.08	0.05	0.03	0.02	0.01	0.01	0.02	1.14
Serious casualty														
1	0.03	0.05	0.11	0.22	0.22	0.12	0.08	0.05	0.02	0.02	0.03	0.00	0.06	0.34
2	0.03	0.05	0.10	0.21	0.23	0.15	0.08	0.04	0.03	0.01	0.02	0.01	0.04	1.40
3	0.04	0.05	0.13	0.14	0.23	0.13	0.11	0.05	0.01	0.03	0.02	0.01	0.04	1.39
4	0.04	0.03	0.13	0.19	0.19	0.15	0.08	0.06	0.04	0.03	0.02	0.01	0.04	1.39
Very serious casualty														
1	0.02	0.02	0.07	0.13	0.19	0.09	0.06	0.09	0.05	0.08	0.04	0.04	0.13	1.87
2	0.02	0.02	0.09	0.14	0.10	0.16	0.08	0.13	0.05	0.06	0.01	0.03	0.10	1.71
3	0.02	0.05	0.05	0.15	0.15	0.11	0.15	0.08	0.03	0.06	0.01	0.02	0.11	1.68
4	0.03	0.04	0.08	0.13	0.15	0.10	0.12	0.08	0.07	0.07	0.02	0.00	0.13	1.72

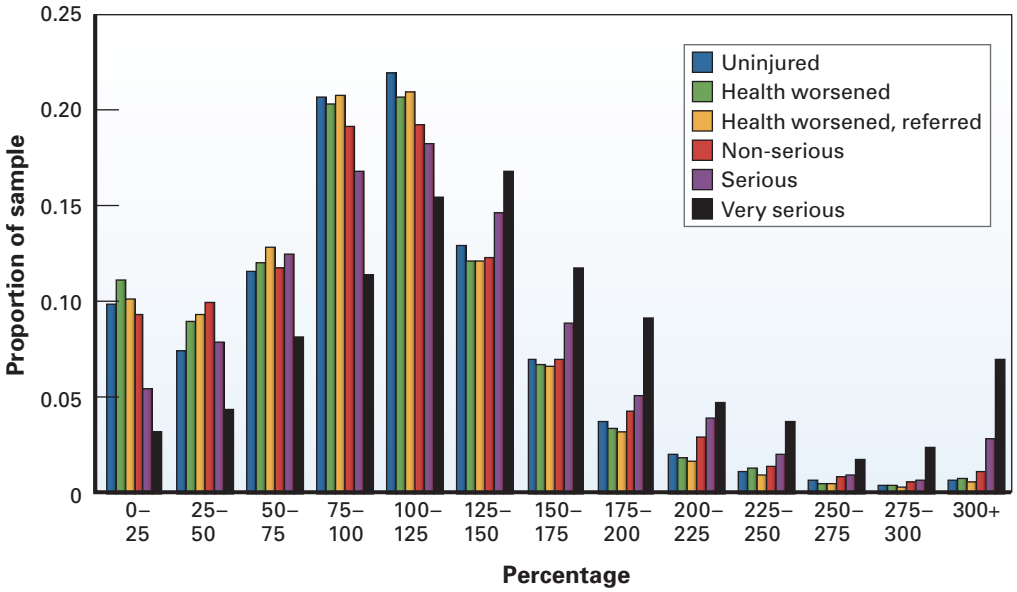


Figure B.1. Histogram of Estimated Replacement Rates Including TSGLI Income for AC Members, by Injury Type

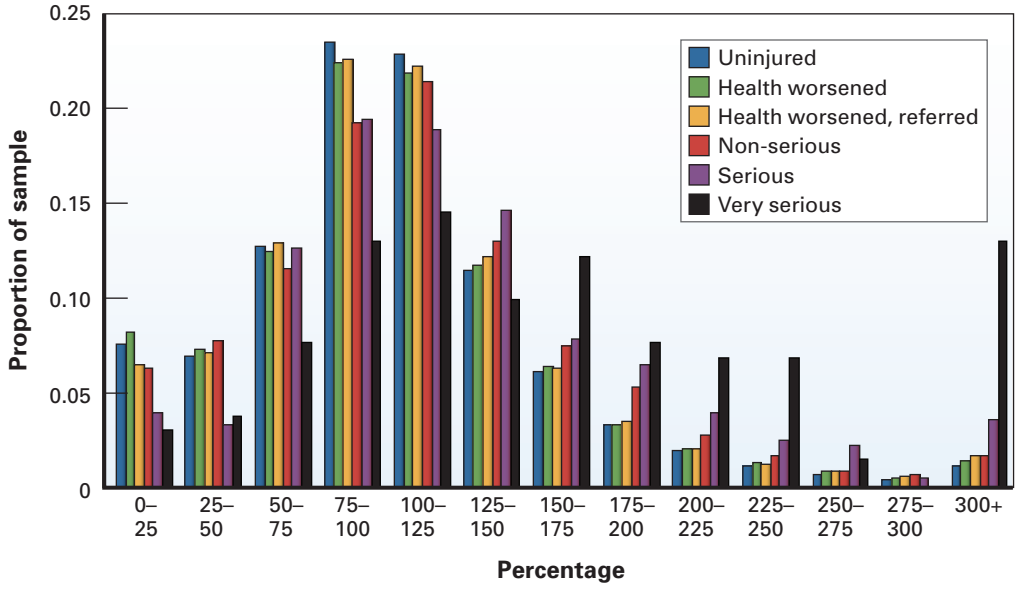


Figure B.2. Histogram of Estimated Replacement Rates Including TSGLI Income for RC Members, by Injury Type

References

Angrist, Joshua D., "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records," *The American Economic Review*, Vol. 80, No. 1, 1990, pp. 313–335.

———, "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants," *Econometrica,* Vol. 66, No. 2, 1998, pp. 249–288.

Angrist, Joshua D., and John H. Johnson, "Effects of Work-Related Absences on Families: Evidence from the Gulf War," *Industrial and Labor Relations Review*, Vol. 54, No. 1, 2000, pp. 41–58.

Bound, John, "Self-Reported Versus Objective Measures of Health in Retirement Models," *Journal of Human Resources*, Vol. 26, 1991, pp. 107–137.

Bound, John, and Richard Burkhauser, "Economic Analysis of Transfer Programs Targeted on People with Disabilities," in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics,* Volume 3, Elsevier, 1999, pp. 3417–3528.

Buddin, Richard, and Bing Han, *Is Military Disability Compensation Adequate to Offset Civilian Earnings Loss from Service-Connected Disabilities?* Santa Monica, Calif.: RAND Corporation, unpublished working paper, 2011.

Buddin, Richard, and Kanika Kapur, *An Analysis of Military Disability Compensation*, Santa Monica, Calif.: RAND Corporation, MG-369-OSD, 2005. As of September 19, 2011: http://www.rand.org/pubs/monographs/MG369.html

Chandra, Anita, Sandraluz Lara-Cinisomo, Lisa H. Jaycox, Terri Tanielian, Rachel M. Burns, Teague Ruder, and Bing Han, "Children on the Homefront: The Experience of Children from Military Families," *Pediatrics*, Vol. 125, No. 1, 2010, pp. 16–25.

Christensen, Eric, Candace Hill, Pat Netzer, DeAnn Farr, Elizabeth Schaefer, and Joyce McMahon, *Economic Impact on Caregivers of the Seriously Wounded, Ill, and Injured*, Alexandria, Va.: Center for Naval Analyses, 2009.

Christensen, Eric, Joyce McMahon, Elizabeth Schaefer, Ted Jaditz, and Dan Harris, *Final Report for the Veterans' Disability Benefits Commission: Compensation, Survey Results, and Selected Topics*, Alexandria, Va.: Center for Naval Analyses, 2007.

Defense Manpower Data Center, "Military Casualty Information," web page, undated. As of May 20, 2011:
http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm

EconSys, *A Study of Compensation Payments for Service-Connected Disabilities*, Falls Church, Va., 2008.

GAO—*See* U.S. Government Accountability Office.

Greenberg, Greg, and Robert Rosenheck, "Compensation of Veterans with Psychiatric or Substance Abuse Disorders and Employment and Earnings," *Military Medicine*, Vol. 172, No. 2, 2007, pp. 162–168.

Gronau, Reuben, "Leisure, Home Production, and Work—The Theory of the Allocation of Time Revisited," *Journal of Political Economy*, Vol. 85, No. 6, 1977, pp. 1099–1123.

Heaton, Paul, and David S. Loughran, "Post-Traumatic Stress Disorder and the Earnings of Military Reservists," Santa Monica, Calif.: RAND Corporation, unpublished working paper, 2011.

Hoge, C. W., C. A. Castro, S. C. Messer, D. McGurk, D., et al., "Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care," *New England Journal of Medicine*, Vol. 351, No. 1, 2004, pp. 13–22.

Hosek, James R., *How Is Deployment to Iraq and Afghanistan Affecting U.S. Service Members and Their Families? An Overview of Early RAND Research on the Topic*, Santa Monica, Calif.: RAND Corporation, OP-316-OSD, 2011. As of September 19, 2011:
http://www.rand.org/pubs/occasional_papers/OP316.html

Hosek, James R., and Paco Martorell, *How Have Deployments During the War on Terrorism Affected Reenlistment?* Santa Monica, Calif.: RAND Corporation, MG-873-OSD, 2009. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG873.html

Hosek, James, Jennifer Erin Kavanagh, and Laura L. Miller, *How Deployments Affect Service Members*, Santa Monica, Calif.: RAND Corporation, MG-432-RC, 2006. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG432.html

Joint Chiefs of Staff, Office of the Chairman, "Updated Procedures for Deployment Health Surveillance and Readiness," Memorandum MCM-0006-02, February 1, 2002.

Karney, Benjamin R., and John S. Crown, *Families Under Stress: An Assessment of Data, Theory, and Research on Marriage and Divorce in the Military*, Santa Monica, Calif.: RAND Corporation, MG-599-OSD, 2007. As of September 19, 2011: http://www.rand.org/pubs/monographs/MG599.html

Loughran, David S., and Jacob Alex Klerman. "The Effect of Activation on the Post-Activation Civilian Earnings of Reservists," *Labour Economics*, 2011. As of June 25, 2011:
http://www.sciencedirect.com/science/article/pii/S0927537111000686

Loughran, David S., Jacob Alex Klerman, and Craig Martin, *Activation and the Earnings of Reservists*, Santa Monica, Calif.: RAND Corporation, MG-474-OSD, 2006. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG474.html

Loughran, David S., Francisco Martorell, Trey Miller, and Jacob Alex Klerman, *The Effect of the Military Enlistment on Earnings and Education*, Santa Monica, Calif.: RAND Corporation, TR-995-A, 2011. As of September 26, 2011:
http://www.rand.org/pubs/technical_reports/TR995.html

Lyle, David S., "Using Military Deployments and Job Assignments to Estimate the Effect of Parental Absences and Household Relocations on Children's Academic Achievement," *Journal of Labor Economics*, Vol. 24, No. 2, 2006, pp. 319–350.

Maestas, Nicole, Kathleen J. Mullen, and Alexander Strand, *Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt*, Santa Monica, CA: RAND Corporation, WR-853-2, 2011. As of September 19, 2011:
http://www.rand.org/pubs/working_papers/WR853-2.html

McFarlane, A. C., "Posttraumatic Stress Disorder: A Model of the Longitudinal Course and the Role of Risk Factors," *Journal of Clinical Psychiatry*, Vol. 61 (suppl. 5), 2000, pp. 15–20.

Military.com, "Special Monthly Compensation (SMC) Tables," web page, undated. As of September 15, 2011:
http://www.military.com/benefits/content/veteran-benefits/special-monthly-compensation-smc-tables.html

Mincer, Jacob, *Schooling, Experience, and Earnings*, New York: Columbia University Press, 1974.

Milliken, C. S., J. L. Auchterlonie, and C. W. Hoge, "Longitudinal Assessment of Mental Health Problems Among Active and Reserve Component Soldiers Returning From the Iraq War," *Journal of the American Medical Association*, Vol. 298, No. 18, 2007, pp. 2141–2148.

NASI—*See* National Academy of Social Insurance.

National Academy of Social Insurance, *Adequacy of Earnings Replacement in Workers' Compensation Programs*, Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 2004.

Negrusa, Sebastian, Brighita Negrusa, and James R. Hosek, "Effect of Work-Related Absences on Marital Stability: The Case of Recent U.S. Deployments," Santa Monica, Calif.: RAND Corporation, unpublished working paper, undated.

Office of Inspector General, *Disability Claims Overall Processing Times*, Washington, D.C.: Social Security Administration, Audit Report A-01-08-18011, 2008.

Reville, Robert T., Leslie I. Boden, Jeffrey E. Biddle, and Christopher Mardesich, *An Evaluation of New Mexico Workers' Compensation Permanent Partial Disability and Return to Work*, Santa Monica, Calif.: RAND Corporation, MR-1414-ICJ, 2001. As of September 19, 2011:
http://www.rand.org/pubs/monograph_reports/MR1414.html

Savych, Bogdan, *Effects of Deployments on Spouses of Military Personnel*, Santa Monica, Calif.: RAND Corporation, RGSD-233, 2008. As of September 19, 2011:
http://www.rand.org/pubs/rgs_dissertations/RGSD233.html

Seabury, Seth A., *Public Safety v. Private Risk: Optimal Injury Compensation for Law Enforcement Officers*, New York: Columbia University, Department of Economics, Ph.D. Dissertation, 2002.

Seabury, Seth, Robert Reville, Stephanie Williamson, Christopher F. Mclaren, Adam Gailey, Elizabeth Wilke, and Frank Neuhauser, *Workers' Compensation Reform and Return to Work: The California Experience*, Santa Monica, Calif.: RAND Corporation, MG-1035-CHSWC, 2011. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG1035.html

Social Security Online, "Code of Federal Regulations, Part 404—Federal Old-Age, Survivors and Disability Insurance (1950–)," web page, undated. As of September 15, 2011:
http://www.ssa.gov/OP_Home/cfr20/404/404-0000.htm

Tanielian, Terri, and Lisa H. Jaycox (eds.), *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery*, Santa Monica, Calif.: RAND Corporation, MG-720-CCF, 2008. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG720.html

"TSGLI Schedule of Losses," web page, undated. As of September 15, 2011:
http://www.insurance.va.gov/sglisite/tsgli/Schedule/Schedule.htm

U.S. Government Accountability Office, "Social Security Disability: Additional Outreach and Collaboration on Sharing Medical Records Would Improve Wounded Warrior's Access to Benefits," Report to the Subcommittee on Social Security, Committee on Ways and Means, House of Representatives, September 2009.

Werber, Laura, Margaret C. Harrell, Danielle M. Varda, Kimberly Curry Hall, Megan K. Becket, and Stefanie Stern, *Deployment Experiences of Guard and Reserve Families: Implications for Support and Retention*, Santa Monica, Calif.: RAND Corporation, MG-645-OSD, 2008. As of September 19, 2011:
http://www.rand.org/pubs/monographs/MG645.html

Chapter 12

Review of Survivor Benefits

Patrick Mackin
Richard Parodi
David Purcell

In 2004 SAG Corporation conducted an independent review to assess the relative value and sufficiency of survivor benefits provided to survivors of members of the uniformed services. The report provided an overview of military benefits and contrasted them with employer-provided survivor benefits for other occupations. The report next addressed alternative policy options to bring military survivor benefits more in line with those benefits received by other occupations, where those benefits were considered more appropriate for the sacrifice involved.

Major changes have been implemented to military survivor benefits since the initial SAG report. These changes include increasing the Servicemembers' Group Life Insurance (SGLI) benefit from $250,000 to $400,000 and the death gratuity from $12,000 to $100,000. In addition, the Post 9-11 GI Bill offers a significant improvement to education benefits over the Montgomery GI Bill. In light of these changes SAG Corporation was asked to update its original report to reflect the current level of survivor benefits.

The updated study also includes several topics not covered in the original report. The military has relied heavily on reserve components in the Iraq and Afghanistan conflicts, and it is important to understand how the benefits available to reservists differ from those available to active duty personnel. Specifically this chapter explores the possibility that a reservist and an active duty member could receive different benefits for a similar death. Finally the updated study evaluates the case of those who die of a service connected disability after they have been discharged.

The review employs a functional categorization of survivor benefits to compare benefits across military and civilian occupations. Death benefits offer to survivors the following:

- immediate income assistance
- transition assistance

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

- income replacement
- unpaid compensation

Using this taxonomy, this chapter provides an overview of current military benefits and contrasts them with employer-provided survivor benefits for other occupations. Most of the tables from the original report are carried over and updated. The chapter next addresses reserve component-specific benefits and contrasts them with active duty benefits. Finally the chapter provides an overview of veterans' benefits and compares the benefits available to those who are vested in the military retirement system with those who are not. For the purpose of this chapter, the term veteran refers to anyone who served in the active military and was discharged under other than dishonorable conditions.[1] The chapter concludes with recommendations for improvements to the military survivor benefits system.

Overview of Current Military Death Benefits

Survivors of members who die on active duty are eligible for a wide variety of benefits. These include immediate assistance to help survivors through the initial period following death, their transition to life without the member, and a combination of lump-sum and annuity cash benefits that help replace the income lost as a result of the member's death.

One aspect of the military benefits system is fundamentally different than the benefits approach employed by all of the other employers that were examined. Excluding cases of gross negligence, dereliction of duty, or other extenuating circumstances, active duty deaths are considered to occur in the line of duty, and survivors are eligible for the same set of benefits regardless of the cause of death.

In most cases, the benefits package available to reservists does not differ significantly from the benefits available to survivors of active duty members. Health care, transition benefits, and annuities are more flexible in order to accommodate the unique circumstances of reservists. The level of benefits available to survivors is often related to whether or not the reservist had been serving for 30 days or more. After that initial 30 day window, reservists are considered active duty and entitled to the same benefits as all active duty members.

A significant difference emerges between active and reserve from the need for a line of duty determination. In general, a death on active duty is presumed to occur in the line of duty; however, a death while serving in the reserves for 30 days or fewer can trigger a line of duty investigation. It is possible that this additional requirement could result in fewer benefits for the survivors of certain reservists.

1. http://www.law.cornell.edu/uscode/uscode38/usc_sec_38_00000101----000-.html.

Less generous assistance and income replacement are available to survivors of veterans who die of a service related injury more than 120 days after separation. The benefits available to veterans are structured differently than those available to members. Survivors of veterans who were vested in the military retirement system can receive income replacement regardless of the cause of death if the member elected the Survivor Benefit option. For those who did not retire from the military, the veteran's death must have been service related in order for the survivor to qualify for most of the benefits.

Immediate Income Assistance

Survivors receive a tax-free death gratuity of $100,000 (increased from $12,000), reimbursement for funeral and burial expenses, and a lump-sum Social Security benefit of $255. Survivors of reserve component members are generally eligible for the same tax-free death gratuity and Social Security lump-sum payment as active duty members. However, as mentioned in the previous section, deaths of reservists serving for 30 days or fewer are subject to a required line of duty investigation.

There is no death gratuity for survivors of veterans who die of service connected disabilities more than 120 days after separation. Social Security provides the $255 lump-sum payment, while the Department of Veterans Affairs (VA) provides some reimbursement for funeral expenses.

Transition Assistance

Beginning with the assignment of a Casualty Assistance Officer who helps the survivors through the period immediately following a member's death, the military provides a number of different types of transition assistance. These include counseling services, a variety of tax benefits, medical and dental coverage, reimbursement for a final move, commissary/exchange benefits, and transitional housing.

The transition assistance available to survivors of reservists who die after being on active duty for more than 30 days is in line with the benefits available to active duty members. In general, if the reservist was eligible for benefits at the time of death, his survivors will be eligible as well. This includes counseling, TRICARE, and the Basic Allowance for Housing (BAH). Survivors have a choice of remaining on their current TRICARE plan, or using TRICARE Prime. The reason for this flexibility is to accommodate survivors who may not live close to a military installation, as the reservist TRICARE plan includes a larger network of civilian providers. More limited transition assistance is available to survivors of those members who die while serving fewer than 30 days. TRICARE Prime is replaced by TRICARE Reserve Select (a premium supported health care program), and in some cases survivors of reservists may not be eligible to receive BAH.

A full-time staff with representatives at each installation provides casualty assistance for the Air Force. Officers in the other services provide this assistance as a collateral duty. Since 2004 the Department of Defense (DOD) has implemented a number of reforms designed to improve the Casualty Assistance Program. These changes include the development of a Survivors Benefit Guide that provides planning and details on the funeral and memorial services, as well as information about the application for, and processing of, all benefits and entitlements.[2]

In addition to the Survivors Benefit Guide, DOD has greatly improved coordination with the VA, and created a Days Ahead Binder which helps organize all of the paperwork needed to file for benefits and entitlements. In 2010 DOD began conducting a survey of survivors six months after the death of the member in order to analyze and improve the process.

The VA provides virtually all of the transition benefits to survivors of veterans. For service connected deaths, transition assistance includes bereavement counseling, medical care for those ineligible for TRICARE, as well as financial counseling to SGLI/VGLI (Veterans' Group Life Insurance) beneficiaries.

Income Replacement

For survivors of members who died in the line of duty, DOD provides income replacement in the form of Survivor Benefit Plan (SBP) annuities (calculated as if the member had retired with a 100 percent disability on the day he or she died, or at the member's actual years of service, whichever is greater),[3] and offers voluntary participation in the Servicemembers' Group Life Insurance Program. Participation in SGLI is nearly universal, and virtually all participants are enrolled at the maximum coverage level ($400,000). In addition to DOD benefits, survivors may receive Dependency and Indemnity Compensation (DIC) and educational benefits from the Department of Veterans Affairs. Survivors are also eligible for survivor benefit annuities through the Social Security Administration (SSA).

Survivors of reservists who die in the line of duty on active duty are eligible for the same income replacement benefits as survivors of active duty members. This includes SGLI, DIC, SBP, and Social Security. There is, however, a separate Survivor

2. DOD Survivors Benefit Guide: http://www.gordon.army.mil/acs/SOS/Survivors%20Guide.pdf.
3. The disability retirement annuity is calculated using the degree of disability, but not to exceed 75 percent times basic pay. The SBP annuity is 55 percent of the retirement annuity. If a member had more than 30 years of service at the time of death, the retirement annuity calculation would be based on years of service * .025 * basic pay.

Benefit Plan available to reservists who are eligible for retirement, the Reserve Component Survivor Benefit Plan (RC-SBP). Reservists who die while on inactive duty for training receive the Reserve Component Annuity, which is calculated using the retired pay the member would have been entitled to on the day the member died based on years of service for computation of retired pay.[4]

Retirees (whether active, reserve, or retired) are eligible to elect the SBP (RC-SBP for retired reservists). However, survivors of veterans who are not vested and die of a service connected disability will be eligible to receive Dependency Indemnity Compensation as well as Social Security Benefits. The VA will also provide education assistance to survivors.

A small subset of survivors (about 10 percent, according to an official at the Office of the Undersecretary of Defense for Personnel and Readiness) is eligible to receive both the SBP and DIC. In these cases, the SBP is offset by the DIC (which is not taxed). Survivors may elect a "Child-Only" SBP option; the member's children receive SBP and the surviving spouse will receive DIC without offset. The spouse will not receive SBP once the children are no longer eligible to receive it, but this may be a more generous option for surviving spouses with young children.[5]

Several bills have been introduced in both the House and the Senate to repeal the offset. The offset has been partially reimbursed by the Special Survivor Indemnity Allowance (SSIA) discussed in detail later in this chapter.

Unpaid Compensation

Survivors receive all pay owed to the member at the time of death. This includes compensation for unused leave and lump-sum payment of any remaining anniversary payments for bonuses or incentive pays. There is no difference here between reservists and active duty members.

4. See: http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001448----000-.html.
5. Children remain eligible to receive SBP as long as they are unmarried and younger than 18, or younger than 22 and a full-time student (disabled children may retain eligibility for life).

Overview of Employer-Provided Death Benefits

The previous study looked at survivor benefits provided to

- federal civilian employees
- law enforcement officers
- firefighters
- commercial aircrews
- private sector employees
- Canadian and British military members

Benefits are more generous for survivors of public sector employees than for private sector employees in most cases. All of the employee groups in the study received additional benefits for deaths in the line of duty.

This updated study's primary concern is military personnel and veterans. It briefly revisits employer-provided survivor benefits in the exposition and updates all relevant tables.

Evaluation of Military Benefits

Military survivor benefits differ fundamentally from the benefits offered by other employers. Except in cases of misconduct, the military's benefit system treats all active duty deaths as line of duty deaths. For example, the survivors of a member who dies in hostile action are eligible for the same benefits as the survivors of a member who dies from an illness. None of the civilian groups we survey provides a uniform level of benefits. Also, benefits for survivors of reservists and veterans may differ, depending on the circumstances of the death.

Most other employers' survivor cash benefits are indexed in some manner to adjust for changes in general price levels or wages. Many military benefits are as well, but we note two exceptions—SGLI coverage and the death gratuity. Both benefits require a change in law to increase coverage; the result has been extended periods in which the benefit level has eroded in real terms, followed by substantial increases in order to catch up. While both the SGLI and death gratuity have been increased since the original report, the value of these benefits will once again erode over time.

Differences in benefits across the surveyed groups are illustrated using hypothetical examples for the survivors of "typical" employees of each organization. Our illustration shows that military cash benefits are comparable to other employers'

total cash benefits in the case of a line of duty death. It also shows that the increase in the death gratuity and SGLI bring the military benefits in line with those received by public safety officers. In our example, the survivors of a law enforcement officer killed in the line of duty receive cash benefits (annuity and lump sum) with a present value equal to roughly 12 times the officer's salary at the time of death. Survivors of a military officer and an enlisted member killed in the same situation would receive cash benefits worth about 13 and 25 times basic pay, respectively.

A second example highlights the key difference between military survivor benefits and other employers' benefits. In a situation that other employers would not consider a line of duty death, the military benefits remain unchanged, but benefits for most other employees are reduced by half.

Another difference between military and civilian benefits is calculations based on salary. The largest benefits available to survivors, the SGLI and DIC, are fixed amounts regardless of how much the member or veteran was making prior to death. According to the Bureau of Labor and Statistics, more than half of civilian employers provide life insurance that is a multiple of pay, and most workers' compensation annuities are also a function of salary.

Conclusions and Recommendations

Overall, we found the system of benefits provided to survivors of members (active duty and reservists and veterans) who die to be adequate. While there is a decrease in the benefits available to veterans when compared to active duty and reserve personnel, they exceed any benefits available from private or public sector employers.

We identified several areas in which improvements could help make the benefits more equitable between active duty, reservists, and veterans; we also reiterate some recommendations from the last report to help make all military benefits comparable to other employer provided benefits. We make the following recommendations:

1. Index Servicemembers' Group Life Insurance coverage and death gratuity to the Consumer Price Index or Cost-of-Living Adjustment (COLA). The automatic increase in SGLI coverage would increase member premiums over time, so members should have the option to allow the escalation or freeze the coverage level at any point.
2. Simplify the language that describes a line of duty determination for reservists. The death of a reservist while in duty status, or traveling to duty status, should trigger an automatic line of duty investigation to determine whether the death was service related. This will allow for a more consistent level of benefits between active duty personnel and reservists.

3. Eliminate the offset of Survivor Benefit Plan payments for Dependents Indemnity Compensation, but only if both programs are reviewed and adjusted to provide an adequate, appropriate level of compensation. The proposed change would replace the current SBP with a lump-sum or annuity payment that reflects the members' accrued retirement benefits. This change would be consistent with the recommendation of the President's Commission on Care for America's Returning Wounded Warriors (Dole-Shalala Commission) that DOD provide compensation for years of service and the VA provide compensation for disability.

Appendix 12-1. Review of Military Survivor Benefits

In 2004, SAG Corporation conducted an independent review that assessed the relative value and sufficiency of benefits provided to survivors of members of the uniformed services. The report provided an overview of military benefits and contrasted them with employer provided survivor benefits for other occupations. The report then addressed alternative policy options to bring military survivor benefits more in line with those benefits received by other occupations, where those benefits were considered more appropriate for the sacrifice involved. The report concluded with recommendations for improvements to the military survivor benefits system:

1. Index Servicemembers' Group Life Insurance coverage and the death gratuity using the annual average increase in basic pay. The increased SGLI coverage option would have no cost to the government, while an initial adjustment to the death gratuity would cost the government $425,580 annually for normal peacetime deaths.
2. Provide $50,000 in SGLI coverage to all members at no cost to the member. This will cost about $55 million annually at current strength levels.
3. Establish full-time casualty assistance positions at every military installation.
4. Maintain the current offset to SBP for DIC payments and the reduction in SBP annuities at age 62.
5. Provide guidance on the proper interpretation of Section 1448(d)(2) of Title 10, United States Code (as amended by P.L. 108-136) to allow SBP Spouse to revert to SBP Child when the surviving spouse remarries.

On February 1, 2005, DOD proposed to increase survivor benefit payments to families of U.S. military personnel killed in designated combat zones by nearly $250,000. This proposed increase effectively doubled the cash that survivors can receive in immediate government payments and life insurance proceeds to $500,000. These benefits were made retroactive to October 2001 for certain survivors of U.S.

troops killed in Iraq and Afghanistan. Under Public Law 109-13, the death gratuity was increased to $100,000 and the SGLI to $400,000 for those who die from wounds, injuries, or illness that are combat or combat-training related. On January 6, 2006, Public Law 109-163 made the increase in death gratuity permanent for nearly all active duty deaths.[6] Public Law 109-80 made the SGLI increases permanent for all active duty deaths.[7] See Appendix 12-2 for excerpts from public laws 109-13, 109-63, and 109-80.

Taxonomy of Benefits

The analysis revealed a wide range of cash and non-cash benefits for survivors of employees who die. In order to make effective comparisons across employers, benefits were organized into categories according to their function. The classification scheme consists of four separate categories for benefits as outlined in Table 1. In application, some benefits may in fact cross categories.

Immediate income assistance usually consists of lump-sum cash payments that are issued to survivors quickly in order to help with extraordinary expenses associated with the employee's death. These may be for a fixed amount or a multiple of the employee's salary (e.g., two months' pay). Immediate income assistance may also include cash or in-kind provision of funeral and burial expenses.

Table 1. Categories of Death Benefits

Benefits Category	Purpose	Examples
Immediate income assistance	Offset any gaps in income and immediate expenses	Death gratuity
Transition assistance	Help survivors adjust to loss of worker	Grief counseling
		Financial counseling
		Medical and dental insurance
Income replacement	Provide alternative source of money to offset loss of worker's earnings	Life insurance
		Survivor benefit pensions
Unpaid compensation	Distribute wages, pension, and other compensation owed to worker at time of death	

6. There are certain extenuating circumstances where a death gratuity payment is not authorized. For example, a payment is not authorized if the member was put to death as a lawful punishment for a criminal act. See 10 U.S.C. 75 (1480) for additional rules. http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001480----000-.html

7. David F. Burelli and Jennifer R. Corwell. 2008. *Military Death Benefits: Status and Proposals*.

Transition assistance benefits help survivors manage over the period in which they must adjust, both financially and emotionally, to the death of the employee. These benefits may include counseling and temporary extension of benefits (e.g., health insurance).

Income replacement benefits compensate for the loss of the employee's earnings. The benefit may take the form of a life insurance policy or a retirement annuity.

Unpaid compensation consists of any accrued pays that are owed to the employee at the time of death. This pay often includes reimbursement for unused leave and the remainder of bonuses and special pays owed.

Active Duty Benefits

Survivors of members of the uniformed services who die on active duty are eligible for a number of benefits ranging from immediate assistance to long-term income replacement annuities. The Department of Defense provides many of the benefits directly; survivors may also receive benefits from the Department of Veterans Affairs and the Social Security Administration.

The DOD Actuary estimates that about 998 active duty members will die each year in the absence of a significant hostile action. Table 2 shows active duty deaths by type of death for calendar years 1985 through 2010.

This section provides a brief description of benefits available to survivors. In this discussion, *survivor* refers to the individuals who are beneficiaries for the survivor benefits. For most benefits, the surviving spouse is first in line, followed by the member's children without regard to age or marital status (includes natural, adopted, or illegitimate children) in equal shares.[8] The member's parents are last in line. Some benefits will depend on the spouse's or children's age and marital status. Note also that survivor is a separate status from *next of kin*.

The discussion is structured according to the classification scheme presented in the previous section. Table 3 summarizes the military survivor benefits discussed in this section according to that categorization.

8. A notable exception is SBP, in which a former spouse may be first in line for part, or all, of the annuity. See DODI 1332.42. http://www.dtic.mil/whs/directives/corres/pdf/133242p.pdf

Table 2. Active Military Deaths, 1985–2010

Calendar Year	Total Military FTE[a]	Total Deaths	Death Rate	Acci-dent	Hostile Action	Homicide/ Self Inflicted	Illness	Pending/ Undet-ermined	Terrorist Attack
1985	2,323,185	2,252	0.0010	1,476	0	386	363	22	5
1986	2,359,855	1,984	0.0008	1,199	2	372	384	27	0
1987	2,352,697	1,983	0.0008	1,172	37	364	383	25	2
1988	2,309,495	1,819	0.0008	1,080	0	375	321	26	17
1989	2,303,384	1,636	0.0007	1,000	23	282	294	37	0
1990	2,258,324	1,507	0.0007	880	0	306	277	43	1
1991	2,198,189	1,787	0.0008	931	147	368	308	33	0
1992	1,953,337	1,293	0.0007	676	0	347	252	17	1
1993	1,849,537	1,213	0.0007	632	0	322	221	9	29
1994	1,746,482	1,075	0.0006	544	0	315	206	10	0
1995	1,661,928	1,040	0.0006	538	0	317	174	4	7
1996	1,613,310	974	0.0006	527	1	240	173	14	19
1997	1,573,995	817	0.0005	433	0	201	170	13	0
1998	1,538,570	827	0.0005	445	0	191	174	14	3
1999	1,525,942	796	0.0005	439	0	188	154	15	0
2000	1,530,430	841	0.0005	430	0	196	181	17	17
2001	1,552,096	951	0.0006	464	15	204	198	23	47
2002	1,627,142	1,063	0.0007	568	18	234	216	27	0
2003	1,732,632	1,465	0.0008	605	336	241	260	23	0
2004	1,711,916	1,874	0.0011	607	738	248	272	9	0
2005	1,664,014	1,943	0.0012	648	739	237	291	28	0
2006	1,611,533	1,880	0.0012	561	767	260	257	35	0
2007	1,608,226	1,953	0.0012	560	847	263	237	46	0
2008	1,683,144	1,439	0.0009	500	351	303	242	42	1
2009	1,640,751	1,515	0.0009	462	346	361	272	74	0
2010	1,685,178	1,436	0.0009	379	452	334	215	112	0

a. Full time equivalents
Source: DOD Personnel and Procurement Statistics (http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm)

Table 3. Recap of Military Death Benefit

Benefit Categories	Military Benefits
Immediate income assistance	Death gratuity
	Funeral and burial benefits
	Social Security lump-sum death payment
Transition benefits	Casualty Assistance
	Counseling services (family centers)
	Tax benefits
	TRICARE (includes dental)
	Commissary and exchange privileges
	Basic Allowance for Housing
	Personal effects and household goods
Income replacement	Dependency and Indemnity Compensation
	VA Educational Assistance Benefits
	Post 9/11 GI Bill
	Social Security payments
	Survivor Benefit Plan
	Servicemembers' Group Life Insurance
	Family Servicemembers' Group Life Insurance
Unpaid compensation	Unpaid compensation and leave

Source: VA benefits (http://www.vba.va.gov/bln/dependents/spouse.htm) and military benefits (http://www.gordon.army.mil/acs/SOS/Survivors%20Guide.pdf)

Immediate Income Assistance

Death Gratuity

At the time of the original report, an immediate tax-free lump-sum payment of $12,000 was paid to survivors to help them cover living expenses and immediate needs. On January 6, 2006, Congress enacted the National Defense Authorization Act for Fiscal Year 2006. It permanently increased (to $100,000) the death gratuity in all cases for members who die on active duty. This increase was made retroactive to October 7, 2001.

The death gratuity benefit has changed in another aspect as well. The member can now specify who is to receive the benefit. While this does provide the member with greater flexibility, it does not conform to the rationale of a death gratuity.[9]

9. http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001477----000-.html.

Burial Benefits

The Department of Defense in most cases will process, transport, and inter remains, providing a casket, vault, and headstone. When survivors choose to make their own arrangements, the Department will reimburse survivors for expenses. The maximum reimbursement for funeral and burial expenses was increased from $6,900 to $8,800, effective April 1, 2007.[10] Travel reimbursement is available for the member's relatives to attend the burial ceremony, memorial service, or to meet remains returning to the United States. The Joint Federal Travel Regulations (JFTR), paragraph U5242, defines eligible relatives, which can include the surviving spouse and children, parents, siblings, and the person who directs the disposition of the deceased member's remains. If no person in these categories is provided travel and transportation allowances, the person who directs the disposition of the member's remains may designate up to two persons "closely related" to the member who may receive travel and transportation allowances.

Social Security Lump-Sum Death Payment

Once a survivor contacts the SSA, he or she will receive a $255 lump-sum death payment within 30 to 90 days and other monthly benefits (discussed below) thereafter. The amount of the lump-sum benefit has not changed since the original report.

Transition Benefits

Beginning with the assignment of a Casualty Assistance Officer who helps the survivors through the period immediately following a member's death, the military provides a number of different types of transition assistance. These include counseling services, a variety of tax benefits, medical and dental coverage, reimbursement for a final move, commissary/exchange benefits, and transitional housing.[11]

A full-time staff with representatives at each installation provides casualty assistance for the Air Force. Officers in the other services provide this assistance as a collateral duty.

Since 2004, DOD has implemented a number of reforms designed to improve the Casualty Assistance program. These include putting together a Survivors Benefit Guide, which provides planning and details on the funeral and memorial service and continues on through the application and processing of all benefits and entitlements.[12]

10. DOD Instruction 1344.08 (March 2009), p. 4.
11. For details on tax benefits available to survivors see the IRS website: http://www.irs.gov/individuals/article/0,,id=121557,00.html
12. DOD Survivors Benefit Guide: http://www.gordon.army.mil/acs/SOS/Survivors%20Guide.pdf

In addition to the Survivors Benefit Guide, DOD has created a Days Ahead Binder, which helps organize all of the paperwork, and greatly improved coordination with the VA. DOD began conducting a survey in 2010 of survivors six months after the death of the member in order to analyze and improve the process. Initial responses have helped the services identify areas of concern. An initial report on the findings from the surveys is expected in June 2011.[13]

Servicemembers' Group Life Insurance

Every active duty service member is automatically provided $400,000 coverage through the SGLI program. The member must pay a monthly premium, but the government subsidizes the program by paying the costs of any death claims above the normal rate expected in peacetime. Also, the government (the four services) reimburses premiums for those in combat. A member may decline coverage or purchase lower levels of coverage. The cost of coverage is the same for all pay grades. The designated beneficiary on the member's SGLI election and certificate form will be paid SGLI in a lump sum or in 36 equal monthly installments. If there is no beneficiary selected, the proceeds are paid "By Law."

Traumatic injury protection is provided as an add-on to Servicemembers' Group Life Insurance (TSGLI) and provides a benefit of between $25,000 and $100,000 depending on the loss directly resulting from the traumatic injury. TSGLI was made effective December 1, 2005, and the coverage applies to active duty members, reservists, National Guard members—including members on funeral honors duty—and one-day muster duty.[14] It is an automatic $1.00 premium charged in addition to the SGLI premium.

Table 4 shows the monthly and annual premiums paid by members participating in the SGLI program while excluding the TSGLI add-on. The maximum cost (for $400,000 coverage) is $312 per year. These premiums were set at the current level effective September 1, 2005. SGLI costs $0.065 per $1,000 of coverage each month.

The SGLI program became effective on September 29, 1965. Table 5 shows that Congress has sporadically increased the maximum coverage (initially set at $10,000 and currently at $400,000).

P.L. 109-13 increased the maximum amount of coverage for SGLI/Veterans Group Life Insurance to $400,000 effective September 1, 2005. According to the Veterans Benefit Administration (VBA), the 100 percent participation rate for 2005

13. Author's discussion with Office of the Secretary of Defense, Office of Family Policy.

14. https://www.insurance.va.gov/sgliSite/TSGLI/TSGLI.htm.

Table 4. SGLI Coverage and Premiums

Coverage Amount	Monthly Premium	Annual Premium
$ 50,000	$ 3.25	$ 39.00
100,000	6.50	78.00
150,000	9.75	117.00
200,000	13.00	156.00
250,000	16.25	195.00
300,000	19.50	234.00
350,000	22.75	273.00
400,000	26.00	312.00

Source: VA.gov (http://www.insurance.va.gov/sglisite/sgli/sglipremiums.htm)

Table 5. Maximum SGLI Coverage Amounts and Effective Dates

Effective Date	Maximum Coverage
09/29/1965	$ 10,000
06/25/1970	15,000
05/24/1974	20,000
12/01/1981	35,000
01/01/1986	50,000
04/06/1991	100,000
12/01/1992	200,000
04/01/2001	250,000
09/01/2005	400,000

Source: VA Insurance website (http://www.insurance.va.gov/sglisite/legislation/legislation.htm)

in Table 6 is an anomaly.[15] All active and reserve members (those who had SGLI coverage and those who previously declined coverage) were automatically covered for $400,000 and had to decline or request a reduced amount.[16]

Table 6. SGLI Coverage and Payments by Year

	2005	2006	2007	2008	2009
Death Claims Paid					
Active	1,979	2,023	2,727	1,709	1,583
Reserve	570	616	669	593	675
Active average payment ($ in thousands)	$248.3	$384.0	$389.6	$380.7	$380.4
Reserve average payment ($ in thousands)	$222.5	$247.9	$350.9	$355.5	$358.6
SGLI Participation					
Total active	1,505,295	1,503,419	1,496,246	1,498,332	1,530,291
Total reserve	752,081	754,855	742,456	751,478	766,242
Average active rate	100.0%	99.2%	99.1%	99.0%	99.0%
Average reserve rate	100.0%	94.1%	94.1%	93.1%	93.1%
Active % with max coverage	100.0%	96.7%	95.2%	94.3%	93.6%
Reserve % with max coverage	100.0%	90.8%	85.1%	85.9%	85.7%
SGLI Premiums					
Total active premiums ($ in millions)	$288.4	$464.2	$482.5	$465.8	$454.2
Total reserve premiums ($ in millions)	$139.7	$239.2	$235.4	$255.3	$221.5
Average per person per year	$174	$289	$303	$293	$284

Source: The Department of Veteran Affairs Regional Office & Insurance Center (VAROIC) in Philadelphia

15. Interview with Vince Markey, Insurance Service Program Management Chief at the VBA.

16. SGLI benefits for reserve component members are discussed in detail below.

Family Servicemembers' Group Life Insurance

The Family Servicemembers' Group Life Insurance (FSGLI) is a program designed for spouses and dependent children of members insured under the SGLI program. FSGLI provides the following:

- maximum of $100,000 of insurance coverage for spouses, requiring a premium payment by the member
- automatic $10,000 coverage for dependent children at no cost to the member

If a member is married to another member, both can be insured under the FSGLI and SGLI programs at the same time, for a maximum coverage amount of $500,000 each.

Unpaid Compensation

The designated beneficiary will collect all unpaid compensation that was due to the service member on the date of death. This compensation includes any remaining bonus annuity payments and payment for unused accrued leave. If the designated beneficiary is unavailable to collect, then unpaid compensation will be paid to the next of kin.

Transition Assistance

Basic Allowance for Housing

Survivors are granted rent-free government housing or the tax-free Basic Housing Allowance or Overseas Housing Allowance. This benefit has been extended from 180 days to 365 days. The 365-day privilege can be a mixture of government and private housing. In order for a survivor to receive BAH, the member must have been eligible to receive those allowances for dependents at the time of death.

Income Replacement

Dependency and Indemnity Compensation

Dependency and Indemnity Compensation is a non-taxable monthly annuity payment administered by the VA. Surviving spouses and dependents must be unmarried in order to receive DIC. This benefit is indexed to inflation (COLA adjusted) and currently pays $1,154 to surviving spouses. If the spouse remarries after 57, she will remain eligible for DIC payments.

Post-9/11 GI Bill: Marine Gunnery Sergeant John David Fry Scholarship

Public Law 111-32, the Marine Gunnery Sergeant John David Fry Scholarship, amends the Post-9/11 GI Bill (chapter 33) to include the children of service members who die in the line of duty after September 10, 2001. The benefit is effective August 1, 2009 (the same day the Post-9/11 GI Bill took effect). Eligible children attending school may receive up to the highest public, in-state undergraduate tuition and fees, plus a monthly living stipend and book allowance under this program.[17]

The Post-9/11 GI Bill represents a substantial increase in educational benefits:

- Tuition and fees paid directly to the school not to exceed the maximum in-state tuition and fees at a public institution of higher learning (see chart listing maximum in-state tuition rates).
- For more expensive tuition, a program exists which may help to reimburse the difference. Called the "Yellow Ribbon Program," this program allows institutions of higher learning (degree-granting institutions) in the United States to voluntarily enter into an agreement with VA to fund tuition expenses that exceed the highest public in-state undergraduate tuition rate.
- A monthly housing allowance based on the Basic Allowance for Housing for an E-5 with dependents at the location of the school.
  - For those attending foreign schools (schools without a main campus in the United States), the BAH rate is fixed at $1,347.00 for 2011.
- An annual books and supplies stipend of $1,000 paid proportionately based on enrollment.
- A one-time $500 rural benefit payment for individuals who reside in a county with six persons or fewer per square mile (as determined by the most recent decennial census), and who relocate to attend school.

Survivors and Dependents Education Assistance (DEA)

The program offers up to 45 months of education benefits to the spouse or child of:

- A veteran who died or is permanently and totally disabled as the result of a service connected disability. The disability must arise out of active service in the armed forces.
- A veteran who died from any cause while such service connected disability was in existence.

17. See VA website (http://www.gibill.va.gov/documents/Fry_Scholarship.pdf).

- A member missing in action or captured in the line of duty by a hostile force.
- A member forcibly detained or interned in the line of duty by a foreign government or power.
- A member who is hospitalized or receiving outpatient treatment for a service connected permanent and total disability and is likely to be discharged for that disability. This change is effective December 23, 2006.[18]

DEA benefits can be combined with the GI Bill or Post 9/11 GI Bill (which both offer 36 months of benefits). Only one benefit can be used at a time, and the total months of education assistance cannot exceed 45 months.

Social Security Benefits

Monthly Social Security payments are based on the length of time the service member has served and the amount of payroll deductions towards the Federal Insurance Contributions Act (FICA). The survivor receives a percentage (usually 75 percent to 100 percent) of the basic Social Security benefit. The percentage depends on the age and the type of benefit for which the deceased is eligible. The most typical situations are as follows:

- widow or widower, age 65 or older: 100 percent
- widow or widower, age 60 to 64: 71–94 percent
- widow, any age, with a child under age 16: 75 percent, or
- children: 75 percent

However, there is a limit to the amount of money that can be paid each month to a family (surviving spouse plus children). The limit varies, but is generally equal to about 150 to 180 percent of the benefit rate. If the total family benefits are above this limit, the family's benefits will be reduced proportionately. There were no major updates to Social Security benefits since the last report.

Survivor Benefit Plan

Survivors of members who die on active duty may be eligible for a portion of the member's retirement compensation under the Survivor Benefit Plan. The National Defense Authorization Act for FY 2002 (NDAA02, P.L. 107-107, December 28, 2001) retroactively applied this benefit to all active duty deaths occurring on or after September 10, 2001. The SBP is paid to the member's spouse (or children if there

18. See VA website: http://gibill.va.gov/post-911/other-programs/dea.html.

is no surviving spouse or the surviving spouse dies). Payments continue until the death or remarriage of the spouse, or until the member's children no longer qualify as dependents. The spouse will continue to be eligible to receive SBP if remarrying after age 55.

A member who dies in the line of duty is assumed to have retired at 100 percent disability on the day that the member died. The formula for the disability retirement annuity is:

*Retired Pay Base * Multiplier %*

The pay base is either highest year's basic pay or high-three average for members who entered after September 7, 1980. The multiplier may be based either on the usual years-of-service calculation (YOS * .025) or on the degree of disability, but the disability calculation may not exceed 75 percent. In most cases, the annuity will always be equal to 75 percent of the retired pay base. However, in the case of individuals who have greater than 30 years of service, the cap is removed.[19] SBP benefits are equal to 55 percent of what the retired member's pay would have been.

Formerly, the Survivor Benefit Plan annuity was reduced from 55 to 35 percent by Social Security once a beneficiary reached age 62 and was eligible to receive Social Security benefits. The National Defense Authorization Act of 2005 established a phase out of that policy.

The phase out increased the SBP percentage as follows:

- 45 percent in April 2006
- 50 percent in April 2007
- 55 percent in April 2008

The Survivor Benefit Plan is offset dollar for dollar by Dependency Indemnity Compensation; however, the National Defense Authorization Act for Fiscal Year 2008 created the Special Survivor Indemnity Allowance to repay a part of that offset. In 2009, this repayment was increased beginning in 2014. P.L. 111-31, June 22, 2009 amended the SSIA to increase by:

- $150 in fiscal year 2014
- $200 in fiscal year 2015
- $310 in fiscal year 2016

19. http://www.gpo.gov/fdsys/pkg/PLAW-111publ383/pdf/PLAW-111publ383.pdf.

The SSIA offset is scheduled to end on October 1, 2017 if not extended by Congress.

The following section summarizes current legislative initiatives regarding survivor benefits, and many of them seek to eliminate the SBP-DIC offset. Proponents of eliminating the offset have argued that the two benefits are for different purposes and, hence, should both be available to eligible survivors. SBP compensates for retirement credit that the member earned but could not collect, while DIC is income replacement for survivors and is based, in part, on the family situation (number and ages of children, for example).

However, there are counterarguments to repealing the offset. Both DIC and SBP are annuities provided by the federal government to survivors of active duty members; there is no precedent within the government (or among other employers) for providing two annuities. Moreover, the analysis below (see Table 14 and Table 15) shows that the current package of benefits is already comparable to or more generous than the set of benefits provided by other employers, and this change would make it even more generous.

Pending Military Survivor Benefit Legislation

Survivor benefits are an area in which Congress has demonstrated a high level of interest. A number of bills are active in the House and Senate that affect various aspects of benefits provided to survivors of members who die while on active duty. Table 7 highlights some pending legislative initiatives.

Table 7. Pending Military Survivor Benefit Legislation

Current Legislation		Purpose	Status	Latest Action
SBP-DIC Offset	H.R. 178	Would end the SBP-DIC Offset	Both bills referred to respective Armed Services Committees	Referral, in committee
	S. 260			Referral, in committee
Military Retiree Survivor Comfort Act	H.R. 493	Would forgive any overpayment of military retired or retainer pay for any period after the death of the recipient	Referred to the Committee on Armed Services	Referral, in committee

Source: http://thomas.loc.gov/home/thomas.php

Benefits Available from Private Trusts, Foundations, and Nonprofit Organizations

Survivors may also receive assistance from non-governmental sources. There are a variety of private (generally nonprofit) organizations that offer counseling services, financial aid, and other help to families of members killed on active duty. These groups also may act as survivor advocates, lobbying the federal government for changes in benefits.

As the level and types of benefits offered varies across organizations, so too do the eligibility requirements. We did not consider these benefits as a part of the military benefits package when assessing the overall adequacy of survivor benefits. DOD cannot rely on these private organizations to provide the benefits, because it exerts no control over the program features and eligibility requirements.

Table 8 offers a list of selected organizations that offer this type of support, along with a brief description of the services and benefits available from each. Other organizations that are not included on this list, but that may also provide some benefits, include veterans' advocacy organizations like the Military Officers

Table 8. Selected Private Organizations Offering Survivor Support

Organizations	Descriptions
Army Emergency Relief Navy-Marine Corps Relief Society Air Force Aid Society	Offer emergency assistance for dependents/survivors of active duty members. Assistance includes money loans, help applying for pensions, insurance, and other survivor benefits.
Tragedy Assistance Program for Survivors Inc. (TAPS)	Offers support, free of charge, to anyone affected by an active duty death. TAPS' services include a national peer support network, grief counseling referral service, crisis intervention, and caseworker assistance.
The Society of Military Widows (SMW)	Serves the interests of women whose husbands died while on active duty.
Gold Star Wives of America	Provides support services, not including financial, to the wives of deceased service members. Also acts as a lobbyist group.
Veterans' Widows International Network, Inc.	Supports veterans and retiree widows.
The Military Widows Gazette	A newspaper for widows that provides legislative news and information regarding survivor benefits.
The Widowed Information and Consultation Service	Provides grief counseling to widows.
American Red Cross	Provides assistance in applying for federal and state benefits for survivors.

Association of America (MOAA), the Retired Enlisted Association (TREA), and the Association of the United States Army (AUSA).

Reserve Component Benefits

Greater use of reservists in a mobilized status increases the likelihood that they will die on active duty. In most cases, the benefits package available to the survivors of reservists does not differ significantly from the benefits available to survivors of active duty personnel. Benefits such as TRICARE and the Reserve Component Survivor Benefit Plan are more flexible in order to accommodate the unique circumstances of reservists. The reason for this flexibility is to accommodate survivors who may not live close to a military installation.

Immediate Income Assistance

Reservists on active duty, active duty for training, or inactive duty training are generally eligible for the same benefits available to active duty members. This includes the death gratuity, burial benefits, and the Social Security Lump-Sum. Some of these benefits do require a line of duty determination, which is adjudicated differently for reservists (discussed below).

Transition Benefits

The transition assistance available to reservists who die while on active duty for more than 30 days is consistent with the benefits available to active duty members. In general, if the reservist was eligible for the benefits at the time of death, his survivors will be eligible as well. This includes counseling, TRICARE, BAH, and SGLI. Survivors have a choice of remaining on their current TRICARE plan or using TRICARE Prime. More limited transition assistance is available to the survivors of members who die while serving fewer than 30 days.

BAH

Continued housing benefits are not available for those who die while serving on drill status.[20] There is an exception: according to 37 U.S.C. 101(18), active duty includes members on active duty for annual training irrespective of the duration specified in their orders. In this case, 37 U.S.C. (403) (l) specifies continued BAH for 365 days to a member on active duty which, as previously defined, includes those on annual training with orders less than 30 days.[21] One note is the lack of clear documentation regarding reserve-specific transition assistance on official web sites.

20. http://myarmybenefits.us.army.mil/Home.html.

21. http://www.law.cornell.edu/uscode/html/uscode37/usc_sup_01_37_10_7.html.

TRICARE Reserve Select

TRICARE Reserve Select provides transitional assistance for six months and is available to survivors of reserve members who were enrolled in the TRICARE Reserve Select program at the time of death.[22] If the survivor was not currently on TRICARE Reserve Select, but the member was covered by it, the survivor will be eligible to purchase TRICARE Reserve Select for six months, as long as he/she does so within 60 days of the member's death.[23] If the death was determined to be line of duty, the survivor will be eligible for the VA-administered Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA). Survivors of reservists who die while serving more than 30 days are eligible for TRICARE Prime, but may elect to use TRICARE Standard if, for example, their current medical service provider does not belong to the TRICARE Prime network. If the reservist was eligible to receive benefits such as TRICARE and BAH, the member's survivor will also be eligible to receive them as transition assistance.

Servicemembers' Group Life Insurance

SGLI coverage is available full time to reservists scheduled to drill at least 12 times a year and available part time to those who do not qualify for full-time coverage (such as the Individual Ready Reserve). Premiums for reservists receiving full-time coverage are the same as active duty. For part-time SGLI participants, the premium is $26.00 per year for $400,000 of coverage. Members in the Individual Ready Reserve are charged $1.00 for $400,000 of coverage for one day call-ups.[24]

Income Replacement

Survivors of reservists who die on active duty are eligible for the same income replacement benefits as survivors of active duty members. This includes DIC, SBP, and Social Security. There is, however, a separate Survivor Benefit Plan—the Reserve Component Survivor Benefit Plan—available to reservists who are eligible for retirement and for those who die while on inactive duty training.

Reserve Component Survivor Benefit Plan

The Reserve Component Survivor Benefit Plan is similar to the Survivor Benefit Plan in that it provides an annuity to survivors based on retired pay. It differs in that it calculates the annuity as a function of reserve retirement pay.

22. TRICARE website (http://www.tricare.mil/mybenefit/).

23. http://www.humana-military.com/library/pdf/trs-handbook.

24. VA website (http://www.insurance.va.gov/sgliSite/handbook/handbookch1.htm#101).

In other words, the base amount differs, not the actual calculation. It is also more flexible, giving reservists the ability to elect one of the following options:

A. Decline to make an election until attaining the eligibility age to begin receiving retired pay.

B. The annuity will begin upon the member's death or upon the date the member would be eligible to receive retirement pay—whichever is later.

C. The annuity will begin immediately upon the member's death, regardless of the member's age when the death occurs.

Reserve Component members are eligible to elect RC-SBP for a spouse, former spouse, or dependent child upon notification of eligibility to receive retired pay, sometimes referred to as the 20 year letter. A member cannot decline coverage without spousal consent. If no election is made within 90 days from the issuance of the 20 year letter, the member is automatically enrolled in option C.

Death Due to Service Connected Disability 120 days after discharge

Active duty survivor benefits are available to survivors of members who die of a service connected disability within 120 days of discharge. In this section we use the term *veteran* to refer to anyone who dies of a service connected disability or disease more than 120 days after discharge. The type of benefits available depends on whether or not the veteran is vested in the retirement system. Benefits available to those vested in the retirement system include:

- SBP
- RC-SBP
- TRICARE Retired Reserve

However, members who are not vested in retirement, and who die of a service connected disability, or are rated totally disabled by the VA at the time of death, are eligible for comparable benefits from the VA:

- DIC
- CHAMPVA

It is important to note, however, that it is unlikely that a member with service connected disabilities severe enough to lead to death would be discharged without disability retirement. Disability retirement is available to members who were found

unfit to perform the duty of their office, grade, rank, or rating because of a physical disability incurred while receiving basic pay. In order to qualify for disability retirement, the member must have 20 years of good service or a disability rating of 30 percent under the standard schedule of disability ratings used by the VA.[25] Pay is calculated by multiplying retired base pay by one of two multipliers:

- the percentage of disability assigned or
- the years of credible service times 2.5 percent

In either case the multiplier cannot exceed a multiplier of 75 percent. There is one exception to the 75 percent cap. In the case of those who have greater than 30 years of service and who retire for disability, the years of service cap is removed (See P.L. 111-383 Sec. 631).[26]

Members unfit to perform their duties, but with less than 20 years of good service and a disability rating below 30 percent, may be separated for physical disability under 10 U.S. Code, section 1203 or Section 1206. Severance pay is calculated as years of service multiplied by twice the amount of monthly basic pay. However, the minimum years of service for this computation are six years if the disability occurred in the line of duty in a combat zone, and three years otherwise.[27] In addition a member separated for a physical disability could be entitled to receive COLA-adjusted monthly disability compensation from the Department of Veterans Affairs.

Veteran Benefits

Immediate Income Assistance

There is no death gratuity for survivors of any veteran (reserve or active) who dies of a service connected disability. Social Security provides a lump-sum payment, while burial benefits are provided by the VA. For service connected deaths, the VA will reimburse up to $2,000. The VA will also pay $300 for burial expenses for a veteran whose death is not service connected, if that veteran was entitled to receive disability pension or compensation at the time of death.

25. Further details can be found at (http://www.law.cornell.edu/uscode/10/usc_sec_10_00001201----000-.html).
26. http://www.gpo.gov/fdsys/pkg/PLAW-111publ383/pdf/PLAW-111publ383.pdf.
27. Further details can be found at (http://www.law.cornell.edu/uscode/10/usc_sec_10_00001212----000-.html).

Transition Benefits

The VA provides virtually all of the transition benefits to veterans. For service connected deaths, transition assistance includes bereavement counseling, medical care for those ineligible for TRICARE, as well as financial counseling to SGLI/VGLI beneficiaries. These benefits are also available to those who die of a non-service connected death, but were rated totally disabled by the VA at the time of death.

Income Replacement

Retirees (whether active or reserve) are eligible to elect the Survivor Benefit Plan. However, survivors of veterans who are not vested and die of a service connected disability will be eligible to receive Dependency Indemnity Compensation as well as Social Security benefits. The VA will also provide education assistance to survivors.

Table 9 shows the benefits available to survivors of veterans from DOD and the VA based on type of service and discharge. See Appendix 12-3 for a complete list of benefits and their qualification criteria.

Table 9. Benefits Available to Survivors of Veterans by Status

Death occurs more than 120 days after discharge							
Active		**Active Retired**		**Reserve**		**Reserve Retired**	
DOD	**VA**	**DOD**	**VA**	**DOD**	**VA**	**DOD**	**VA**
	DIC		DIC		DIC		DIC
	Burial expenses	SBP	Burial expenses		Burial expenses	RC-SBP	Burial expenses
	Education assistance		Educational assistance		Educational assistance		Educational assistance
	CHAMPVA	TRICARE	CHAMPVA[a]		CHAMPVA	TRICARE	CHAMPVA[a]
	VGLI		VGLI		VGLI		VGLI

a. Those that for some reason are ineligible to receive TRICARE will be covered under CHAMPVA.
Source: VA benefits website (http://www.vba.va.gov/bln/dependents/spouse.htm)

Line of Duty Determination

There is a difference in the wording used to describe eligibility for reservists and active duty personnel. Reservists who die on active duty are generally presumed to have died in the line of duty. However, off duty reservists and reservists who die while on duty for fewer than 30 days are generally required to receive a line of duty determination in order to qualify for benefits such as the death gratuity. This differs from the active duty process, where the member is considered to be on duty 24/7. It is also important to note that the burden to obtain a line of duty determination often rests on the member's survivors.

For example, special rules apply to reservists in determining eligibility for the death gratuity. As stated in 10 U.S. Code 1480 (Chapter 75):

> **(c)** For the purposes of section 1475 (a)(3) of this title, the Secretary concerned shall determine whether the decedent was authorized or required to perform the duty or training and whether or not he died from injury so incurred. For the purposes of section 1476 of this title, the Secretary of Veterans Affairs shall make those determinations. In making those determinations, the Secretary concerned or the Secretary of Veterans Affairs, as the case may be, shall consider—
>
> 1. the hour on which the Reserve began to travel directly to or from the duty or training;
> 2. the hour at which he was scheduled to arrive for, or at which he ceased performing, that duty or training;
> 3. the method of travel used;
> 4. the itinerary;
> 5. the manner in which the travel was performed; and
> 6. the immediate cause of death.

In cases covered by this subsection, the burden of proof is on the claimant.

Our analysis highlights a possible case where a reservist and an active duty member could die under exactly the same circumstances, yet their survivors would receive different benefits. For example, if a reservist with orders for fewer than 30 days of active duty dies of a heart attack while remaining at a hotel at or in the vicinity of the site of duty or training, the above criteria would be used to make an eligibility determination. If the medical condition leading to the heart attack is found to be non-duty related, the reservist's manner of death is likely to render possible survivors ineligible to receive the death gratuity. However, an active duty member could die of a heart attack in a similar situation and likely remain eligible for the full range of benefits.

For deaths that take place within 120 days after discharge U.S. Code 1476 title 10 Chapter 75 states that a determination is not necessary for a survivor to be eligible for the death gratuity:

> **(a)**
>
> **(1)** Except as provided in section 1480 of this title, the Secretary concerned shall pay a death gratuity to or for the survivors prescribed in section 1477 of this title of each person who dies within 120 days after discharge or release from–
>
> **(A)** active duty; or
>
> **(B)** Inactive duty training (other than work or study in connection with a correspondence course of an armed force or attendance, in an inactive status, at an educational institution under the sponsorship of an armed force or the Public Health Service).
>
> **(2)** A death gratuity may be paid under paragraph (1) only if the Secretary of Veterans Affairs determines that the death resulted from an injury or disease incurred or aggravated during–
>
> **(A)** the active duty or Inactive duty training described in paragraph (1); or
>
> **(B)** travel directly to or from such duty.
>
> **(b)** For the purpose of this section, the standards and procedures for determining the incurrence or aggravation of a disease or injury are those applicable under the laws relating to disability compensation administered by the Department of Veterans Affairs, except that there is no requirement under this section that any incurrence or aggravation have been in line of duty.
>
> **(c)** This section does not apply to the survivors of persons who were temporary members of the Coast Guard Reserve at the time of their death.

Thus, a line of duty determination is not needed for the death gratuity; however, U.S. Code 1448 Chapter 73 Title 10, which details the eligibility criteria for the Survivor Benefit Plan, clearly states that a line of duty determination is necessary:

> **(d) Coverage for Survivors of Members Who Die on Active Duty.–**
>
> (1) **Surviving spouse annuity.**– Except as provided in paragraph (2)(B), the Secretary concerned shall pay an annuity under this subchapter to the surviving spouse of–
>
> (A) a member who dies while on active duty after–
>
> (i) becoming eligible to receive retired pay;

> (ii) qualifying for retired pay except that the member has not applied for or been granted that pay; or
>
> (iii) completing 20 years of active service but before the member is eligible to retire as a commissioned officer because the member has not completed 10 years of active commissioned service; or
>
> (B) a member not described in subparagraph (A) who dies in line of duty while on active duty.

According to the Disability Evaluation System (DES), which is used to determine if an injury or disease was line of duty, the circumstances in which an active duty member's injury is presumed to be line of duty are as follows:

1. Disease (with exceptions);
2. Injuries clearly incurred as a result of enemy action or attack by terrorists;
3. Injuries while passenger in common commercial or military carriers.

In the case of the reservist, however, a line of duty determination is required for an injury or illness incurred while performing duty of 30 days or less, while traveling directly to or from the place at which such duty is performed, or while remaining overnight between successive periods of inactive duty training (IDT), at or in the vicinity of the site of the IDT if the site is outside reasonable commuting distance from the member's residence.[28]

The Survivor Benefit Plan is contingent on a line of duty determination, and while the death gratuity does not require a line of duty determination (U.S. Code 1476 title 10 Chapter 75 (b)), eligibility must still be established. It is possible that the separate language used for reservists in both of these benefits could lead to inconsistent adjudication. For a complete list of benefits and their eligibility criteria see Appendix 12-3.

Other Employers' Survivor Benefits

Other employers offer comparable types of survivor benefits for workers who die in the line of duty, although the criteria for eligibility and levels of compensation vary widely. This section provides a brief review of the benefits offered to federal civilian employees and workers in the private sector.

28. http://www.dtic.mil/whs/directives/corres/pdf/133238p.pdf (see E3.P4.4.1.2).

Federal Employees' Group Life Insurance

Employees may supplement the basic coverage (Table 10). Option A adds $10,000 in coverage, while Option B adds a multiple of 1, 2, 3, 4, or 5 to annual basic pay. Under Option B, an employee could potentially have as much as $750,000 in Federal Employees' Group Life Insurance (FEGLI) coverage. Option C adds family coverage. Proceeds of FEGLI policies are not taxable as income to the beneficiary. According to the Office of Personnel Management, about 83 percent of all Work Schedule employees have Basic FEGLI coverage. About 33 percent of employees take Option A coverage and nearly 42 percent take Option B.

Table 10. Extent of FEGLI Coverage, September 2006

Type of FEGLI Coverage	Number of Work Schedule Employees	Percentage of Total Work Schedule Employees
Basic	1,770,634	83.80%
Ineligible	112,330	5.30
Waived	230,789	10.90
Standard (Option A)	553,868	26.20
Family (Option C)	534,232	25.30
Additional (Option B)	733,882	34.70
1 Multiple	98,793	4.70
2 Multiples	117,913	5.60
3 Multiples	105,749	5.00
4 Multiples	44,907	2.10
5 Multiples	366,520	17.30
FEGLI Unspecified	227	0.00
Total	2,113,980	100.00

Note: The totals may not add up because individuals who have Standard, Family, and Additional may also have basic. 2006 was the most recent publicly available data at the time this chapter was written.

Source: The Office of Personnel Management

Private Sector Survivor Benefits

Table 11 demonstrates that the most common survivor benefit for private sector employees is life insurance. Over half of all employees receive some sort of life insurance benefit; for establishments with 100 or more workers, the coverage rate is 75 percent.

Table 11. Percent of Workers Participating in Survivor Benefits, by Worker and Establishment, 2009

	Survivor Benefits (Percent Participating)		
	Life Insurance	AD&D[a]	Survivor Income Benefits
Characteristics			
Total	56%	41%	2%
Worker characteristics:			
Management, professional, related	76	58	3
Sales and office	56	39	2
Blue-collar/service employees	44	36	2
Full time	71	50	2
Part time	13	8	1
Establishment characteristics:			
1–99 workers	40	24	2
100 workers or more	75	62	3

a. Accidental Death and Dismemberment (AD&D)
Source: Bureau of Labor and Statistics (http://www.bls.gov/ncs/ebs/benefits/2010/benefits_life.htm)

Table 12 provides some more detailed coverage data for full-time employees of medium and large private establishments. The Bureau of Labor Statistics (BLS) survey data reported here are for 2009; they show that about 55 million employees of these establishments had at least a basic life insurance benefit. Over half (57 percent) received a coverage amount based on a multiple of salary and wages. The rest were covered for a flat dollar amount. Most also had supplemental coverage available, but few (13 percent) required an employee contribution.

Table 12. Life Insurance Provisions for Full-Time Employees, Medium/Large Private Establishments, 2010

Item	All Employees	Prof., Tech., and Related Employees	Clerical and Sales Employees	Blue-Collar and Service Employees
Number (in thousands) with basic life insurance	55,316	23,948	28,062	25,274
Percent with:				
Multiple of earnings benefit	60%	74%	72%	36%
Dollar amount benefit	38%	25%	27%	63%
Supplemental coverage available	59%	71%	67%	47%
Required employee contribution	13%	13%	16%	11%
Number (in thousands) with multiple of earnings formula	33,190	17,722	20,205	9,099
Average multiple	1.3	1.4	1.3	1.3
Percent with multiples of:				
< 1.0	1%	1%	2%	1.5%
	61%	57%	65%	60%
1.1 – 1.9	12%	12%	10%	14%
	22%	25%	20%	22.5%
> 2.0	4%	5%	4%	2.5%
Number (in thousands) with flat dollar amount of insurance	12,612	5,987	7,577	15,923
Average flat dollar amount	$21,800	$42,766	$22,792	$16,560

Source: Bureau of Labor and Statistics (http://www.bls.gov/ncs/ebs/benefits/2010/benefits_life.htm)

Comparison Tables

Immediate Income Assistance

Benefits such as DIC and SBP are indexed to inflation or COLA adjusted. The death gratuity has seen sporadic increases from Congress, yet loses value during interim periods. The civilian sector typically ties lump-sum payments and life insurance to wages, providing an automatic increase. Historically, Congress has determined that the death gratuity is an emergency fund and is effectively unrelated to the member's pay. If DOD would rather maintain a single gratuity amount, the annuity could simply be adjusted annually to reflect the increase in either consumer prices or civilian wages.

Figure 1 illustrates the impact of tying the death gratuity to increases in the Consumer Price Index. Assuming that the latest adjustment to $100,000 was the "correct" level when established at the beginning of FY 2005, we constructed a gratuity level that has grown with CPI since 1984. Note that actual increases occur infrequently. Consequently, the real value of the gratuity declines substantially between adjustments.

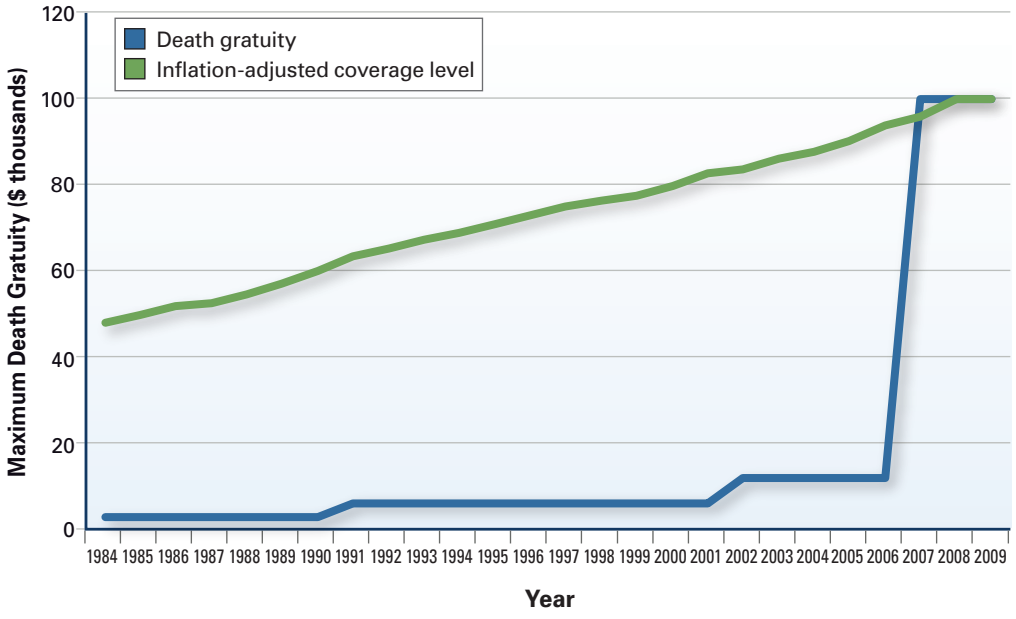


Figure 1. Actual vs. Indexed Death Gratuity by Fiscal Year

Transition Benefits

Military transition benefits also compare favorably with those offered by other employers. All services immediately assign another member as the Casualty Assistance Officer who will help the survivors navigate through the initial period of adjustment after the death of a member. Additionally, survivors receive a housing allowance or in-kind housing for a transition period. They are also eligible for reimbursement of moving costs and for continued medical and dental coverage under the TRICARE program.

The array of transition benefits for military survivors are, generally, more extensive than those offered to other survivors. The improvements to transition benefits since the last report has not significantly altered the adequacy of the program compared to other employer benefits.

Income Replacement

If military members were eligible for FEGLI rather than SGLI, senior members would be eligible for higher levels of insurance, while many enlisted personnel would face substantially lower caps. Table 13 contains a hypothetical illustration for two active duty members—an O-5 at YOS 18 and an E-6 at YOS 14. The O-5 could conceivably buy coverage to a maximum of $533,000 under FEGLI. However, the E-6 could only purchase $322,000 of insurance. Also, the cost per $1,000 of coverage would be significantly higher under FEGLI.

As we saw earlier in the discussion about the death gratuity, SGLI coverage levels have changed only sporadically over time. The real level of income coverage will decay substantially between adjustments, as illustrated in Figure 2. Again assuming

Table 13. Comparison of SGLI and FEGLI

	Officer Example		Enlisted Example	
Pay grade	O-5	GS-11	E-6	GS-5
YOS	18		14	
Annual pay	$89,870	$65,371	$37,913	$35,657
	SGLI	FEGLI	SGLI	FEGLI
Maximum coverage	$400,000	$533,000	$400,000	$322,000
Maximum coverage as percent of salary	445%	815%	1055%	903%
Monthly premium	$26.00	$84.95	$26.00	$38.66

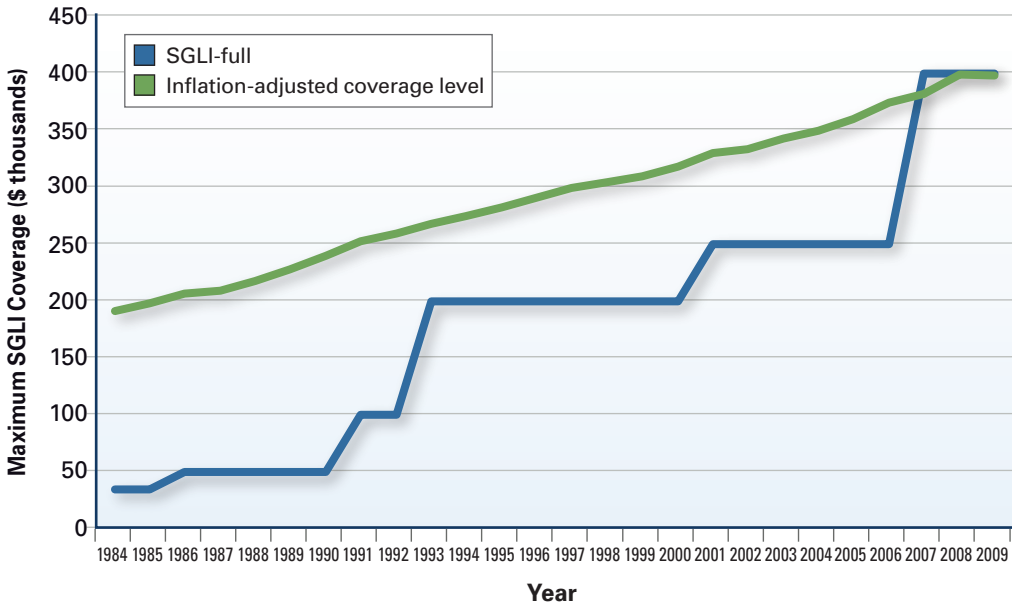


Figure 2. Actual versus Indexed SGLI by Fiscal Year

that the latest SGLI coverage adjustment in 2005 set it to the "correct" level, we estimated what the coverage level should have been across fiscal years to provide the same level of income replacement.

Table 14 and Table 15 show the cash compensation for each hypothetical employee's survivors. Benefits are grouped by category; the benefit type column denotes whether it is a lump-sum or an annuity. We assumed in each case that spouses do not remarry, in order to show what the maximum level of benefits over a lifetime would be. We discount all future-year benefits by 15 percent; we did not attempt to attach a monetary value to non-cash benefits or tax benefits. See Appendix 12-4 for sources for Tables 14–17. See Appendix 12-5 for a comparison across death benefit categories.

In Table 14 we compare an active duty O-5 (AD O-5), a reserve O-5 (R O-5), a government employee at the GS-11 pay grade, a government contractor who is assumed to be receiving pay equivalent to a GS-12, and a police officer at the GS-12 level. The reservist is assumed to have a civilian job that—in addition to drill pay—provides a salary at the GS-11 schedule. In Table 15 we compare an active duty E-6 (AD E-6), and a reserve E-6 (R E-6). We reduce the GS-11 employee to a GS-5, and the government contractor and police officer to GS-6.

Table 14. Comparison of Cash Benefits for Line of Duty Deaths (Officers)

	Type	AD O-5	R O-5	GS-11	Contractor	Police
Employee Characteristics						
Annual Salary		$89,870	$80,944	$65,371	$78,355	$72,213
Drill Pay			$15,573			
Age		39	39	39	39	39
DOB		1972	1972	1972	1972	1972
YOS		17	17	17	17	17
Spouse age		37	37	37	37	37
Spouse life expectancy		43	43	43	43	43
Children age		14	14	14	14	14
Immediate Income Assistance						
Death Gratuity	L	$100,000	$100,000	$9,000		$75,000
Funeral benefits	L	$8,800	$8,800	$1,000	$1,000	$11,000
Social Security Lump-Sum	L	$255	$255	$255	$255	$255
Transition Benefits						
BAH	L	$28,008	$28,008			
Income Replacement						
DIC						
With children	A	$20,712	$20,712			
First 2 years	A	$23,712	$23,712			
Without children	A	$13,848	$13,848			
Social Security						
Annual	A	$44,436	$42,540	$38,915	$41,981	$40,681
Annual 62+	A	$25,392	$24,300	$22,224	$23,977	$23,161
Retirement Lump-Sum	L			$62,408		$144,425
SBP						
Child SBP (without offset)	A	$37,072	$37,072			
Life Insurance	L	$400,000	$400,000	$399,671	$186,685	$244,425
AD&D Insurance				$68,000	$109,697	
Workers' Comp. with child					$10,256	$7,461
Workers' Comp.					$52,237	$48,142
FECA						
With children				$10,113		
Without children				$32,686		
Annual 62+				$26,804		
PSOB						$318,312
Totals						
Lump Sum Payments		$537,063	$537,063	$476,926	$296,637	$637,992
Annuities						
First 2 years		$105,220	$103,324			
Children		$102,220	$100,324	$49,028	$52,237	$48,142
Without children		$13,848	$13,848	$32,686	$52,237	$48,142
62+		$39,240	$38,148	$49,028	$23,977	$23,161
Present Value of Benefits		$1,104,677	$1,094,539	$789,465	$669,903	$991,123
PV as % of Annual Salary		1229%	1352%	1208%	855%	1373%

Note: See Appendix 12-4 for source information.

Table 15. Comparison of Cash Benefits For Line of Duty Deaths (Enlisted)

	Type	AD E-6	R E-6	GS-5	Contractor	Police
Employee Characteristics						
Annual Salary		$37,913	$39,382	$35,657	$39,748	$53,125
Reserve Pay			$1,469			
Age		29	29	29	29	29
DOB		1982	1982	1982	1982	1982
YOS		11	11	11	11	11
Spouse age		27	27	27	27	27
Spouse life expectancy		54	54	54	54	54
Children age		8	8	8	8	8
Immediate Income Assistance						
Death Gratuity	L	$100,000	$100,000	$9,000		$75,000
Funeral benefits	L	$8,800	$8,800	$1,000	$1,000	$11,000
Social Security Lump-Sum	L	$255	$255	$255	$255	$255
Transition Benefits						
BAH	L	$18,312	$18,312			
Income Replacement						
DIC						
With children	A	$20,712	$20,712			
First 2 Years	A	$23,712	$23,712			
Without children	A	$13,848	$13,848			
Social Security						
Annual	A	$30,320	$29,717	$28,535	$30,092	$35,573
Annual 62+	A	$16,296	$16,068	$15,636	$16,212	$19,920
Retirement Lump-Sum	L			$47,551		$106,250
SBP						
Child SBP (without offset)	A	$15,779	$15,779			
Life Insurance	L	$400,000	$400,000	$325,589	$186,685	$206,250
AD&D Insurance				$38,000	$55,647	
Workers' Comp. with child					$0	$0
Workers' Comp.					$26,499	$35,417
FECA						
With children				$0		
Without children				$17,829		
Annual 62+				$11,107		
PSOB						$318,312
Totals						
Lump Sum Payments		$527,367	$527,367	$372,844	$242,587	$599,817
Annuities						
First 2 years		$69,811	$69,208			
Children		$52,787	$53,429	$28,535	$30,092	$35,573
without Children		$13,848	$13,848	$17,829	$26,499	$35,417
62+		$30,144	$29,916	$26,743	$16,212	$19,920
Present Value of Benefits		$891,631	$893,353	$560,903	$571,900	$1,018,044
PV as % of Annual Salary		2352%	2268%	1573%	1439%	1916%

Note: See Appendix 12-4 for source information.

How do military survivor benefits compare in cases that would not be considered line of duty deaths by other employers? Survivors would not receive workers compensation survivor benefits, Accidental Death and Dismemberment (AD&D) insurance and, in some cases, would receive a lower pension annuity. Additionally, the police officer's survivors would not receive the Public Safety Officers' Benefits Program (PSOB) benefit or the lump-sum payments from Arlington County or the Commonwealth of Virginia. Table 16 and Table 17 illustrate that, while active duty military benefits are unchanged, each of the other employers provides reduced benefits. Reservists would lose the death gratuity, DIC, and SBP and receive reduced transition assistance.

In Table 16, the present value of cash benefits in our examples drops by between $183,000 (contractor) to $466,000 (reserve O-5). For most employees, the total level of benefits was cut by approximately 30 percent; the police officer's survivors, however, would see about a 44 percent reduction in benefits.

In Table 17, the benefits were reduced by between $36,000 (contractor) and $359,000 (police officer). The contractor only lost about 6 percent while the reserve E-6 and the police officer both saw a 35 percent reduction in benefits.

Table 16. Comparison of Cash Benefits for non-Line of Duty Deaths (Officers)

	AD O-5	R O-5	GS-11	Contractor	Police
Present value of benefits	$1,104,677	$627,891	$593,705	$486,424	$551,089
PV as % of annual salary	1229%	810%	908%	621%	763%
Reduction in PV from line of duty benefits	0%	-43%	-25%	-27%	-44%

Note: See Appendix 12-4 for source information.

Table 17. Comparison of Cash Benefits for non-Line of Duty Deaths (Enlisted)

	AD E-6	R E-6	GS-5	Contractor	Police
Present value of benefits	$891,631	$582,787	$500,840	$534,953	$658,481
PV as % of annual salary	2352%	1480%	1405%	1346%	1239%
Reduction in PV from line of duty benefits	0%	-35%	-11%	-6%	-35%

Note: See Appendix 12-4 for source information.

Comparison of Reserve, Veterans and Retirees

Table 18 reports the present value of cash benefits for hypothetical survivors of veterans who die more than 120 days after discharge.

The following hypothetical veterans are evaluated:

- a service connected O-5 (O-5)
- a service connected E-6 (E-6)
- a retired O-5 (RO-5)
- a retired E-6 (RE-6)

Reservists and active duty veterans who die are entitled to the same VA administered benefits: DIC, life insurance, medical, and education benefits. For those vested in the retirement system, the largest difference is the Survivor Benefit Plan and Reserve Component Survivor Benefit Plan. Both of these plans are a function of retired pay, and active duty members enjoy a more generous retirement system then reservists. However, those that die of a service connected disability are also eligible for dependency indemnity compensation, which makes up some or all of the difference. As a result, Table 18 does not distinguish between a veteran who served on active duty or in the reserves. See Appendix 12-6 for a summary of the comparison across survivor benefit categories.

The hypothetical situation underlying Table 18 has several assumptions:

- a discharged/retired O-5 earns pay comparable to a GS-11 government employee;
- a discharged/retired E-6 earns pay comparable to a GS-5 government employee;
- retired pay is calculated using the High 3 system; and
- deaths are considered to be service connected.

Table 18. Comparison of Cash Benefits by Type of Military Discharge

	Type	O-5	E-6	R O-5	R E-6
Employee Characteristics					
Annual salary		$65,371	$35,657	$111,860	$56,564
Drill Pay				$46,489	$20,907
Age		39	29	42	38
DOB		1972	1982	1969	1973
YOS		17	11	20	20
Spouse age		37	27	40	36
Spouse life expectancy		44	56	41.8	40.8
Children age		14	8	17	17
Immediate Income Assistance					
Death Gratuity	L	$0	$0	$0	$0
Funeral benefits	L	$2,000	$2,000	$2,000	$2,000
Social Security Lump-Sum	L	$255	$255	$255	$255
Transition Benefits					
BAH	L	$0	$0	$0	$0
Income Replacement					
DIC					
First 2 years	A	$23,712	$23,712	$23,712	$23,712
With children	A	$20,712	$20,712	$20,712	$20,712
Without children	A	$13,848	$13,848	$13,848	$13,848
Social Security					
Annual	A	$38,904	$27,434	$48,455	$35,783
Annual 62+	A	$21,636	$15,312	$27,684	$20,076
Retirement Lump-Sum	L				
SBP					
Spouse first 2 years				$2,697	$840
Spouse	A	$0	$0	$5,697	$840
Spouse without children		$0	$0	$12,561	$840
Life insurance	L	$400,000	$400,000	$400,000	$400,000
Totals					
Lump-Sum payments		$402,255	$402,255	$402,255	$402,255
Annuities					
First 2 Years with children		$62,616	$51,146	$74,864	$60,335
With children		$59,616	$48,146	$74,864	$57,335
Without children		$13,848	$13,848	$26,409	$14,688
62+		$35,484	$29,160	$54,093	$34,764
Present Value of Benefits		$832,930	$727,113	$991,169	$742,663
PV as % of annual salary		1274%	2039%	886%	1313%

How do veteran's non-line of duty survivor benefits compare? Non-retirees will lose the DIC, but could still collect life insurance. Retirees will lose DIC and the SSIA, but SBP would be calculated without the DIC offset. All veterans would lose burial benefits. Benefits dropped from $6,948 (RO-5) to $169,624 (O-5). Table 19 illustrates that, on average, the retired members' benefits dropped 17 percentage points less than those not vested in retirement.

Table 19. Comparison of Cash Benefits by Status (not Line of Duty Death)

	O-5	E-6	R O-5	R E-6
Present value of benefits	$663,306	$573,312	$981,405	$685,779
PV as % of annual salary	1015%	1608%	877%	1212%
Reduction in PV from line of duty benefits	-20%	-21%	-1%	-8%

Summary

Our analysis examined the benefits available to survivors of military (reserve and active duty) personnel who die on active duty. We also looked at veterans who die more than 120 days after discharge of service connected disabilities. We found that the programs offered through the services and other government agencies (e.g., the Department of Veterans Affairs) do a good job in providing financial and related assistance to survivors in the immediate aftermath of the member death and during the transition period as the survivors adjust to civilian life. Income replacement benefits are substantial, and have been improved since the earlier report.

The overall level of military survivor benefit exceeds the level offered by other employers and, since the earlier report, now exceeds the benefits available to law enforcement personnel, firefighters, and other public safety officers.

We were not able to find any evidence in the literature directly linking the level of survivor benefits to recruiting, retention, or performance of personnel. The rationale that we applied in our analysis was that the level of survivor benefits should:

- be comparable to the set of benefits offered by other employers in order to maintain competitiveness
- be easy to understand and avoid needless duplication of benefits
- offer a consistent, predictable level of benefits
- properly reflect the value that society places on military service
- reimburse survivors adequately for the loss of the member

For those who die of a service connected disability more than 120 days after discharge, we conclude that benefits should also be comparable between retirees and non-retirees. Based on these criteria, we offer the following recommendations to improve the military survivor benefits:

- Index SGLI coverage and the death gratuity to the Consumer Price Index or Cost-of-Living Adjustment. The automatic increase in SGLI coverage would increase member premiums over time, so members should have the option to allow the escalation or freeze the coverage level at any point.
- Simplify the language that describes a line of duty determination for reservists. This will allow for a more consistent level of benefits.
- Eliminate the offset to SBP for DIC payments, but only after reviewing and adjusting the level of SBP benefits to ensure that the total amount of annuity payments is appropriate.

Index SGLI and Death Gratuity

Because SGLI coverage limits and the death gratuity are set in law, substantial erosion in the effective level of the benefit can occur between adjustments. We recommend that both programs be changed to include an automatic, annual adjustment based on the Consumer Price Index or Cost-of-Living Adjustment. For SGLI, members can be offered the option to automatically index coverage or keep it fixed at a particular level. This change will maintain the effective benefit level for both SGLI and the death gratuity without requiring intervention by Congress. The cost of the SGLI indexing would be reflected in the premiums, although the services would realize an increased cost in the years in which the "extra hazards" provision applies.

Simplify the Line of Duty Determination for Reservists

The language used to describe a line of duty determination differs between reservists and active duty. In general, current legislation effectively defines death while on active duty as line of duty, although an investigation may be initiated if the member's command believes that circumstances warrant one. In contrast, a reservist's command must make an active decision to undertake an investigation of the reservist's death to determine whether it was line of duty if he or she was not on active duty for at least 30 days.

One way to reduce confusion is to mandate a line of duty investigation for the death while in duty status, or while traveling to or from duty status, of any reservist who was not on active duty for at least 30 days. In this case, the presumption is that the death occurred while on duty, and an automatic investigation will determine whether the death was a result of that duty.

Eliminate SBP-DIC Offset

While there are arguments both for and against the repeal of the SBP-DIC offset, we recommend its elimination, largely because the current system is complicated and difficult for beneficiaries to understand. However, simple repeal of the offset without reconsideration of the level of benefits would dramatically increase program costs without any clear evidence that the overall level of benefits is inadequate.

If the purpose of SBP for survivors is to compensate for the accrued value of retired pay which the member will not be able to collect, it should be based on the value of the retirement package at the time of death. That is, assuming that the member had remained on active duty until vesting in the retirement system, calculate the current value of accrued service. This benefit could be paid to the survivor either as an annuity or a lump-sum payment. In almost every case, the value of SBP currently exceeds the amount that would be accrued.

Determining the value of the retirement benefit is a fairly complicated computation, but there is a precedent in the current calculation of disability retired pay. Recall that, for a disabled member, the annuity may be based either on years of service or degree of disability, whichever provides the larger payment. For this recommended change, the survivor of a member killed while on duty would receive an annuity based on the years of service computation, and the disability compensation would be provided through DIC.

Table 20 illustrates the impact of the proposed changes for several hypothetical cases. The recomputed annuity is lower in every case, but the combined annuities and allowances often increase under the proposed revisions. Survivors of junior officers and junior enlisted are most likely to see a reduction in the overall value of the annuity; this is not surprising, since the discrepancy between SBP based on 100 percent disability and based on years served is greatest for these cases.

Comparing the alternative to the status quo across a typical payout period (using the assumptions from the analysis above), the present value of annuity payments is 71 percent to 117 percent of the status quo payments.

Table 20. Alternative SBP Examples

Benefit Program	O-2 with 4 YOS	O-4 with 12 YOS	O-5 with 20 YOS	E-4 with 4 YOS	E-6 with 11 YOS	E-8 with 20 YOS
DIC						
First 2 years	$23,712	$23,712	$23,712	$23,712	$23,712	$23,712
With children	$20,712	$20,712	$20,712	$20,712	$20,712	$20,712
Without children	$13,848	$13,848	$13,848	$13,848	$13,848	$13,848
Status Quo						
SBP Annuity	$20,145	$31,350	$39,243	$10,538	$15,639	$22,817
First 2 years	$0	$9,663	$15,531	$0	$0	$0
With children	$0	$12,663	$18,531	$0	$0	$2,105
Without children	$6,297	$19,527	$25,395	$0	$1,791	$8,969
SSIA	$3,720	$3,720	$3,720	$3,720	$3,720	$3,720
DIC + SBP + SSIA						
First 2 years	$27,432	$37,095	$42,963	$27,432	$27,432	$27,432
With children	$24,432	$37,095	$42,963	$24,432	$24,432	$26,537
Without children	$23,865	$37,095	$42,963	$17,568	$19,359	$26,537
Alternative						
Annuity	$2,686	$12,540	$26,162	$1,405	$5,734	$15,211
Alt. Annuity + DIC						
First 2 years	$26,398	$36,252	$49,874	$25,117	$29,446	$38,923
With children	$23,398	$33,252	$46,874	$22,117	$26,446	$35,923
Without children	$16,534	$26,388	$40,010	$15,253	$19,582	$29,059
PV status quo ($ millions)	$3.53	$2.05	$0.89	$2.70	$1.26	$0.55
PV alternative ($ millions)	$2.51	$1.53	$0.87	$2.36	$1.29	$0.65
% change in PV	-28.86%	-25.69%	-2.17%	-12.82%	2.38%	16.80%

Other details of the accrued retirement compensation could be worked through further study. For example, the compensation could be paid in a lump-sum or annuity. Because this proposal would result in a lower level of benefits than the current system, further analysis is warranted to ensure that the level of disability and indemnity compensation provided by the VA is adequate to meet survivors' needs.

This recommendation is consistent with the recommendation of the President's Commission on Care for America's Returning Wounded Warriors (Dole-Shalala Commission) to restructure the disability and compensation systems. The commission recommended that DOD would provide compensation for years served and VA would be responsible for disability compensation and benefits.[29]

Conclusions

We found the system of benefits provided to survivors of members (active duty and reservists) who die on active duty to be adequate, substantial, and comprehensive. While the military system does not provide increased survivor benefits in cases which other employers traditionally consider line of duty deaths, the benefits package is comparable to what other groups of employees receive when a death is in the line of duty. The increases in the death gratuity and SGLI made the survivor benefits package more consistent with the benefits offered to police officers, firefighters, and other emergency personnel.

We identified some areas in which improvements could help make the benefits more comparable to the standard set of benefits offered by other employers. These include pegging SGLI coverage and the death gratuity to the Consumer Price Index; adjusting the line of duty definition to provide a standard adjudication process; and eliminating the SBP-DIC offset. For veterans who die of a service connected disability more than 120 days after discharge, we found the benefits to be adequate, generally exceeding the benefits available to civilian and law enforcement personnel covered under workers compensation (which varies by state).[30]

29. *Serve, Support, Simplify: Report of the President's Commission on Care for America's Returning Wounded Warriors*. July 2007, p. 6.

30. http://topics.law.cornell.edu/wex/workers_compensation.

Appendix 12-2. Excerpts from U.S. Code

Excerpts from P.L. 109-13:

Death Gratuity

SEC. 1013. (a) INCREASE IN DEATH GRATUITY.–
(1) AMOUNT.–Section 1478 of title 10, United States Code, is amended–
(A) in subsection (a), by inserting ", except as provided in subsections (c), (e), and (f)" after "$12,000";
(B) by redesignating subsection (c) as subsection (d); and
(C) by inserting after subsection (b) the following new subsection (c):
"(c) The death gratuity payable under sections 1475 through 1477 of this title is $100,000 in the case of a death resulting from wounds, injuries, or illnesses that are–
"(1) incurred as described in section 1413a(e)(2) of this title; or
"(2) incurred in an operation or area designated as a combat operation or a combat zone, respectively, by the Secretary of Defense under section 1967(e)(1)(A) of title 38.".
(2) CONFORMING AMENDMENT.–Subsection (a) of such section, as amended by paragraph (1), is further amended by striking "(as adjusted under subsection (c))" and inserting "(as adjusted under subsection (d))".

Servicemembers' Group Life Insurance

SEC. 1012. (a) INCREASED MAXIMUM AMOUNT OF SERVICEMBERS' GROUP LIFE INSURANCE.–Section 1967 of title 38, United States Code, is amended–
(1) in subsection (a)(3)(A), by striking clause (i) and inserting the following new clause:
"(i) In the case of a member–
"(I) $400,000 or such lesser amount as the member may elect as provided in subparagraph (B);
"(II) in the case of a member covered by subsection
(e), the amount provided for or elected by the member under subclause (I) plus the additional amount of insurance provided for the member by subsection (e); or
"(III) in the case of a member covered by subsection
(e) who has made an election under paragraph (2)(A) not to be insured under this subchapter, the amount of insurance provided for the member by subsection

(e).”; and
(2) in subsection (d), by striking “$250,000” and inserting “$400,000”.
(b) INCREMENTS OF DECREASED AMOUNTS ELECTABLE BY MEMBERS.–
Subsection (a)(3)(B) of such section is amended by striking “member or spouse” in the last sentence and inserting “member, be evenly divisible by $50,000 and, in the case of a member’s spouse”.
(c) ADDITIONAL AMOUNT FOR MEMBERS SERVING IN CERTAIN AREAS OR OPERATIONS.–

(1) INCREASED AMOUNT.–Section 1967 of such title is further amended–
(A) by redesignating subsection (e) as subsection (f); and
(B) by inserting after subsection (d) the following new subsection (e):
“(e)(1) A member covered by this subsection is any member as follows:
“(A) Any member who dies as a result of one or more wounds, injuries, or illnesses incurred while serving in an operation or area that the Secretary designates, in writing, as a combat operation or a zone of combat, respectively, for purposes of this subsection.
“(B) Any member who formerly served in an operation or area so designated and whose death is determined (under regulations prescribed by the Secretary of Defense) to be the direct result of injury or illness incurred or aggravated while so serving.
“(2) The additional amount of insurance under this subchapter that is provided for a member by this subsection is $150,000, except that in a case in which the amount provided for or elected by the member under subsection (a)(3)(A)(i)(I) exceeds $250,000, the additional amount of insurance under this subchapter that is provided for the member by this subsection shall be reduced to such amount as is necessary to comply with the limitation in paragraph (3).
“(3) The total amount of insurance payable for a member under this subchapter may not exceed $400,000.
“(4) While a member is serving in an operation or area designated as described in paragraph (1), the cost of insurance of the member under this subchapter that is attributable to $150,000 of insurance coverage shall, at the election of the Secretary concerned–
“(A) be contributed as provided in section 1969(b)(2) of this title, rather through deduction or withholding from the member’s pay; or
“(B) if deducted or withheld from the member’s pay, be reimbursed to the member through such mechanism as the Secretary concerned determines appropriate.”

Excerpt from P.L. 109-163:

Death Gratuity

SEC. 664. ADDITIONAL AMOUNTS OF DEATH GRATUITY FOR SURVIVORS OF CERTAIN MEMBERS OF THE ARMED FORCES DYING ON ACTIVE DUTY.

(a) INCREASED AMOUNT OF DEATH GRATUITY.–

(1) INCREASED AMOUNT.–Subsection (a) of section 1478 of title 10, United States Code, is amended by striking "$12,000" and inserting "$100,000".

(2) AMENDMENTS.–Such section is further amended–

(A) in the first sentence of subsection (a), by striking "(as" and all that follows in that sentence and inserting

a period; and

(B) by striking subsection (c).

(3) EFFECTIVE DATE.–The amendment made by paragraph

(1) shall take effect as of October 7, 2001, and shall apply to deaths occurring on or after the date of the enactment

of this Act and, subject to subsection (c), to deaths occurring during the period beginning on October 7, 2001, and ending on the day before the date of the enactment of this Act.

(b) RETROACTIVE PAYMENT OF ADDITIONAL DEATH GRATUITY FOR CERTAIN

MEMBERS NOT PREVIOUSLY COVERED.–Such section is further amended by adding at the end the following new subsection:

"(d)(1) In the case of a person described in paragraph (2), a death gratuity shall be payable, subject to section 664(c) of the National Defense Authorization Act for Fiscal Year 2006, for the death of such person that is in addition to the death gratuity payable in the case of such death under subsection (a).

"(2) This subsection applies in the case of a person who died during the period beginning on October 7, 2001, and ending on May 11, 2005, while a member of the armed forces on active duty and whose death did not establish eligibility for an additional death gratuity under the prior subsection (e) of this section (as added by section 1013(b) of Public Law 109–13; 119 Stat. 247), because the person was not described in paragraph (2) of that prior subsection.

Excerpt from P.L. 109-80:

Servicemembers' Group Life Insurance

SEC. 2. REPEALER.
Effective as of August 31, 2005, section 1012 of division A of the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Tsunami Relief, 2005 (Public Law 109–13; 119 Stat. 244), including the amendments made by that section, are repealed, and sections 1967, 1969, 1970, and 1977 of title 38, United States Code, shall be applied as if that section had not been enacted.

SEC. 3. INCREASE FROM $250,000 TO $400,000 IN AUTOMATIC MAXIMUM COVERAGE UNDER SERVICEMEMBERS' GROUP LIFE INSURANCE AND VETERANS' GROUP LIFE INSURANCE.
(a) MAXIMUM UNDER SGLI.–Section 1967 of title 38, United States Code, is amended–
(1) in subsection (a)(3)(A)(i), by striking "$250,000" and inserting "$400,000"; and
(2) in subsection (d), by striking "of $250,000" and inserting "in effect under paragraph (3)(A)(i) of that subsection".
(b) MAXIMUM UNDER VGLI.–Section 1977(a) of such title is amended–
(1) in paragraph (1), by striking "in excess of $250,000 at any one time" and inserting "at any one time in excess of the maximum amount for Servicemembers' Group Life Insurance in effect under section 1967(a)(3)(A)(i) of this title"; and
(2) in paragraph (2)–
(A) by striking "for less than $250,000 under Servicemembers' Group Life Insurance" and inserting
"under Servicemembers' Group Life Insurance for less than the maximum amount for such insurance in effect under section 1967(a)(3)(A)(i) of this title"; and
(B) by striking "does not exceed $250,000" and inserting "does not exceed such maximum amount in effect under such section".
(c) EFFECTIVE DATE.–The amendments made by this section shall take effect as of September 1, 2005, and shall apply with respect to deaths occurring on or after that date.

Appendix 12-3. (New) Survivor Benefits and Eligibility Criteria

Benefit Name	Eligibility Criteria
Bereavement Counseling	❖ Any member who dies in service to the country, or dies while federally activated. ❖ If the member was receiving treatment for a service connected disability and the death was: • unexpected, or • occurred while the veteran was participating in a Hospice program (or a similar program) conducted by the Secretary. *Source: http://Veterans.house.gov/documents/title38.pdf* *Accessed on September 28, 2010*
Burial	❖ Any veteran who was discharged from service under conditions other then dishonorable ❖ Members of reserve components, and members of the Army National Guard or the Air National Guard, who die while hospitalized or undergoing treatment at the expense of the United States for injury or disease contracted or incurred under honorable conditions while performing active duty for training or inactive duty training, or undergoing such hospitalization or treatment ❖ Reservists and National Guard members who, at time of death, were entitled to retired pay under Chapter 1223, title 10, United States Code, or would have been entitled, but for being under the age of 60. Specific categories of individuals eligible for retired pay are delineated in section 12731 of Chapter 1223, title 10, United States Code. *Source: http://www.cem.va.gov/bbene/eligible.asp* *Accessed on September 28, 2010*
CHAMPVA	❖ The spouse or child of a veteran who has been rated permanently and totally disabled for a service connected disability by a VA regional office, or ❖ The surviving spouse or child of a veteran who died from a VA-rated service connected disability, or ❖ The surviving spouse or child of a veteran who was at the time of death rated permanently and totally disabled from a service connected disability, or ❖ The surviving spouse or child of a military member who died in the line of duty, not due to misconduct (in most of these cases, these family members are eligible for TRICARE, not CHAMPVA). *Source: http://www4.va.gov/hac/forbeneficiaries/champva/champva.asp* *Accessed on September 28, 2010*

Benefit Name	Eligibility Criteria
Death Pension	❖ The deceased veteran was discharged from service under other than dishonorable conditions, AND ❖ The deceased veteran served at least 90 days of active military service 1 day of which was during a war time period. If he or she entered active duty after September 7, 1980, generally he or she must have served at least 24 months or the full period for which called or ordered to active duty. (There are exceptions to this rule.) AND ❖ You are the surviving spouse or unmarried child of the deceased veteran, AND ❖ Your countable income is below a yearly limit set by law (The yearly limit on income is set by Congress). *Source: http://www.vba.va.gov/bln/21/Rates/pen02.htm Accessed on September 28, 2010*
Dependency and Indemnity Compensation	❖ Military service member who died while on active duty, active duty for training, or inactive duty training, OR ❖ Veteran whose death resulted from a service-related injury or disease, OR ❖ Veteran whose death resulted from a non service-related injury or disease, and who was receiving, or was entitled to receive, VA Compensation for service-connected disability that was rated as totally disabling ❖ For at least 10 years immediately before death, OR ❖ Since the veteran's release from active duty and for at least five years immediately preceding death, OR ❖ For at least one year before death if the veteran was a former prisoner of war who died after September 30, 1999. *Source: http://www.vba.va.gov/bln/dependents/spouse.htm Accessed on September 28, 2010*
Financial Counseling	Available to SGLI, FSGLI, TGLI, and VGLI beneficiaries or claimants. *Source: http://www.insurance.va.gov/sgliSite/BFCS/BFCS.htm Accessed on September 28,2010*
Home Loan Guarantee	The unmarried surviving spouse of a veteran who died on active duty or as a result of a service connected disability.
Post 9-11 GI Bill	Children of an active duty member of the Armed Forces who has died in the line of duty on or after September 11, 2001, are eligible for this benefit. A child may be married or over 23 and still be eligible. *Source: http://www.gibill.va.gov/documents/Fry_Scholarship.pdf Accessed on September 28, 2010*

Benefit Name	Eligibility Criteria
Survivors' and Dependents' Educational Assistance	❖ A veteran who died or is permanently and totally disabled as the result of a service-connected disability. The disability must arise out of active service in the Armed Forces. ❖ A veteran who died from any cause while such service-connected disability was in existence. ❖ A servicemember missing in action or captured in line of duty by a hostile force. ❖ A servicemember forcibly detained or interned in line of duty by a foreign government or power. ❖ A servicemember who is hospitalized or receiving outpatient treatment for a service connected permanent and total disability and is likely to be discharged for that disability. This change is effective December 23, 2006. *Source: http://www.gibill.va.gov/pamphlets/CH35/CH35_Pamphlet_General.htm* *Accessed on September 28, 2010*
Burial and Expenses	❖ A Reserve or Guard who dies while on active duty, active duty training, inactive duty training, or, while hospitalized and undergoing treatment at the expense of the United States for an injury or disease incurred or contracted in the above circumstances. ❖ A member dies as a retired member of an armed force under the Secretary's jurisdiction during a continuous hospitalization of the member as a patient in a United States hospital that began while the member was on active duty. *Source: http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001481----000-.html* *Accessed on October 1, 2010*
Commissary and Exchange Privileges	❖ A Reserve or Guard member who dies while on active duty, active duty for training or inactive duty training (regardless of the period of such duty); or ❖ While traveling to or from the place at which the member was to perform or had performed active duty, active duty training, or inactive duty training (regardless of the period of such activity). *Source: http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001061----000-.html* *Accessed on October 1, 2010*
DOD Benefits	**Eligibility Criteria**
Death Gratuity	❖ A Reserve of an armed force who dies while on inactive duty training or from a service connected disease or injury within 120 days of discharge. ❖ Any member of a reserve officers' training corps who dies while performing annual training duty under orders for a period of more than 13 days.

Benefit Name	Eligibility Criteria
Survivor Benefit Plan (Retirement)	❖ A member who, upon retiring from active service or active duty, has a spouse, former spouse, or dependent child. ❖ A Reserve Component member who has a spouse, former spouse, or dependent child upon notification of eligibility to receive retired pay, or in the case of a member who elected not to participate in RC-SBP, when the member becomes entitled to receive retired pay. *Source: http://uscode.house.gov/download/pls/10C75.txt* *Accessed on September 29, 2010*
Survivor Benefit Plan	❖ A member who dies not in the line of duty while serving on active duty and who: • Was eligible to receive retired pay; • Was qualified for that pay but had not applied for or been granted that pay; or had completed 20 or more years of active service but before being eligible to retire as a commissioned officer due to not having 10 years of commissioned service. ❖ A Reserve Component member who dies from an illness or injury incurred or aggravated in the line of duty or during inactive duty training performed on or after September 10, 2001. ❖ A Reserve Component member who dies after completing the service required to receive Reserve Component retired pay but before making a Program election. *Source: http://www.dtic.mil/whs/directives/corres/pdf/133242p.pdf* *Accessed on September 29, 2010*
TRICARE	❖ A member who dies while on active duty, active duty training, or inactive duty training. ❖ A member who died from an injury, illness, or disease incurred or aggravated in the line of duty while the member remained overnight immediately before the commencement of Inactive duty training. *Source: http://www.law.cornell.edu/uscode/html/uscode10/usc_sec_10_00001076----000-.html* *Accessed on October 30, 2010*

Appendix 12-4. Sources for Tables 14–17

	O-5 and E-6		
Age	Age was calculated by adding the years of service to an estimated entry date of 22 and 18 for the O-5 and E-6 respectively. We used the same method to calculate age for tables 14 through 17.	**DIC First 2 Years**	According to US Code Chapter 13, title 1311(f) an additional $250.00 is paid to a spouse with one or more children below the age of 18 for 2 years
Annual Salary	High-36 pay using the 2011 OSD pay tables: http://militarypay.defense.gov/index.html	**Funeral Benefits**	Amount listed in the 2010 Uniformed Services Almanac
Basic Allowance for Housing (BAH)	We used the average BAH for an O-5 and an E-6 with a family of four; data was obtained from the 2011 OUSD Personnel and Readiness Greenbook: http://militarypay.defense.gov/index.html	**Present Value**	Present value is calculated by discounting all of the anticipated income streams by 15%.
Children Age	We used the average age of two children; we assumed the first child was born two years after service entry date and the second child two years after the first.	**Survivor Benefit Plan (SBP)**	SBP calculation was obtained from the OUSD Military Compensation website; the method used to estimate the DIC/SBP offset was provided by an official at the OUSD: http://militarypay.defense.gov/index.html
Date of Birth	Subtracted the member's age from the current year (2011)	**SGLI**	Amount obtained from the Department of Veterans Affairs website: http://www.insurance.va.gov/sgliSite/SGLI/SGLI.htm
Death Gratuity	Amount listed by the OUSD Personnel and Readiness Military Compensation website: http://militarypay.defense.gov/benefits/deathgratuity.html	**Social Security**	Amount obtained from the Social Security Administrations Benefits Calculator on Wednesday January 12, 2011: http://www.socialsecurity.gov/OACT/quickcalc/index.html
DIC	DIC base amount and child allowance were obtained from the OUSD Military Compensation website http://militarypay.defense.gov/index.html	**Social Security Lump-Sum**	Listed on the Social Security website: http://www.socialsecurity.gov/survivorplan/ifyou7.htm
		Spouse Life Expectancy	This data was provided by the OSD Office of the Actuary.

	General Schedule (GS)-11, GS-5, Contractor, and Police Officer		
Age	For comparison purposes we used the O-5s' age for the GS-11 and the GS-12 Police Officer, and we used the enlisted members' age for the GS-5 GS-6 and the GS-6 Police Officer.	**Federal AD&D Insurance**	According to the Federal Employees Almanac, employees are paid $2,000 plus their last salary rounded up to the nearest thousand.
Annual Salary	Annual Salary was taken from the 2011 GS pay schedule for the GS-11 and GS-5. The police officers' pay was calculated by taking the national average of a GS-12 and GS-6 public safety officer. http://www.opm.gov/index.asp	**Funeral Benefits**	There are two benefits offered to Federal Employees: ❖ $200 is payable under section 8133(f) of Title 5, US Code and ❖ $800 is payable under 5 US Code 8134(a)
Children Age	We referenced the O-5's children for the GS-11 and Police officer's children, and the E-6's children for the GS-5.	**PSOB**	Current and historic PSOB levels are listed at: http://www.ojp.usdoj.gov/BJA/grant/psob/psob_main.html
Contractor AD&D Insurance	According to the Bureau of Labor and Statistics 56% of employers provide AD&D insurance as a fixed multiple of earnings; the average multiple is 1.4: http://www.bls.gov/opub/perspectives/	**Social Security**	The amount was obtained from the Social Security Administrations Benefits Calculator on Wednesday January 13, 2011: http://www.socialsecurity.gov/OACT/quickcalc/index.html
Death Gratuity	According to the 2010 Federal Employees Almanac, the death gratuity is $10,000 less funeral expenses.	**Spouse Life Expectancy**	We assumed the same 2 year offset for civilians as for the members' spouse.
FECA	Calculation for FECA can be found in 5 US Code section 8133 (a); while caring for children 75% of the individuals annual salary is provided to the surviving spouse; 50% percent is provided after children reach 18 years of age. Payments are offset by Social Security payments.	**Workers' Comp**	Workers Compensation varies dramatically between States. We based our calculations on the benefits available to Police Officers in Northern Virginia. Currently the benefit is 2/3 of the last annual salary less Social Security; workers' comp is paid for 500 weeks. http://lawenforcementfund.org/benefits.htm

	Active, Retired, and Retired Reserve		
Age	For those discharged from the service and for active duty retirees, we calculated age in the same manner as Table 14. The OSD Office of the Actuary provided the average age for both O-5 and E-6 reservists with 20 good years.	**Reserve Component Survivor Benefit Plan (RC-SBP)**	Method of Calculation for RC-SBP can be found in the Reserve Forces Almanac; average points for both the O-5 and the E-6 were provided by the OSD Office of the Actuary.
Annual Salary	Annual salary is estimated at the current GS-11 and GS-5 pay for the O-5 and E-6 respectively.	**Reserve Points**	The OSD Office of the Actuary provided the average points for an O-5 and an E-6 with 20 good years.
Children Age	We carried over the same assumptions from Table 14.	**Retired Pay**	We assume both the O-5 and E-6 retired in 2010; retirement pay is calculated using the High 36 plan. Pay tables can be found at: http://www.dfas.mil/
Funeral Benefits	Information about funeral benefits can be found at the Veterans Affairs website: http://www.cem.va.gov/bbene/benvba.asp	**Spouse Life Expectancy**	Data for spouse life expectancy was provided by the OSD Office of the Actuary.
Life Insurance	The Veterans Affairs website provides information regarding the amount of coverage offered by the Veterans Group Life Insurance (VGLI): http://www.cem.va.gov/bbene/benvba.asp	**Years of Service**	We assumed 20 years of service for retirees; for those not vested in the retirement system, we carried over the years of service from Table 14.

Appendix 12-5. (Updated) Benefits Across Employers

	O-5 at YOS 16[a]		E-6 at YOS 7 [b]		GS-11 at YOS 18 [c]		GS-5 at YOS 14[d]		Contractor Employee[e]		Arlington County Police Officer at YOS 15[f]	
Immed. inc. Assistance	Death Gratuity	$100,000	Death Gratuity	$100,000	Death Gratuity	$9,000	Death Gratuity	$9,000			State Lump-Sum	$75,000
	Funeral benefits	$8,800	Funeral benefits	$8,800	Funeral benefits	$1,000	Funeral benefits	$1,000			Funeral benefits[g]	$11,000
	Social Security Lump-Sum	$255	Social Security Lump-Sum	$255	Social Security Lump-Sum	$255	Social Security Lump-Sum	$255	Social Security Lump-Sum	$255	Social Security Lump-Sum	$255
Transition Benefits	Casualty assistance		Casualty assistance								COPS	
	Tax ben.		Tax ben.		Tax ben.		Tax ben.				Tax ben.	
	TRICARE		TRICARE		Health care		Health care				Health care	
	Comm./Ex. privileges		Comm./Ex. privileges									
	ID card		ID card									
	BAH[h]	$28,008	BAH[i]	$18,312								
Income Replacement	DIC	$20,712/ year	DIC	$20,712/ year								
	VA education benefits	N/A	VA education benefits	N/A	Retirement Lump-Sum	$62,408	Retirement Lump-Sum	$47,551			Retirement Lump-Sum	$144,425
	Social Security payments	$44,436/ year	Social Security payments	$16,296/ year	AD&D insurance	$68,000	AD&D insurance	$38,000	AD&D insurance	$109,697	Education Benefits	N/A
	Survivor Benefit Plan	$37,212/ year	Survivor Benefit Plan	$15,799/ year	Soc. Sec. payments	$38,915/ year	Soc. Sec. payments	$28,535/ year	Soc. Sec. payments	$41,981/ year	Soc. Sec. payments	$40,681/ year
	SGLI	$400,000	SGLI	$400,000	FEGLI[k]	$399,967[1]	FEGLI[k]	$325,589	Life Ins.	$186,685	Life Ins.	$244,425
Sacr./Emp. Liability					FECA	$21,768/ year	FECA	$15,705/ year	Workers Comp.	$37,384/ year	Workers Comp.	$33,367/ year
											PSOB	$318,312

a. Annual Salary = $89,870, DOB: 1972
b. Annual Salary = $37,913, DOB: 1982.
c. Annual Salary = $78,355, DOB: 1972.
d. Annual Salary = $65,371, DOB: 1972.
e. Annual Salary = $35,657, DOB: 1982.
f. Annual Salary = $72,213, DOB: 1972.
g. http://www.cardinalacademy.org/Reports/death.htm
h. Average BAH rate is $2,334 monthly.
i. Rate BAH rate is $1,526 monthly
k. http://www.opm.gov/calculator/worksheet.asp
l. Amount equal to 1.4 times annual earning

Appendix 12-6. (New) Benefits Across Veterans Status

	SC O-5 at YOS 16[a]		SC E-6 at YOS 7[b]		Retired O-5 at YOS 20[c]		Retired E-6 at YOS 20[d]		Retired Reserve O-5 at YOS 30[e]		Retired Reserve E-6 at YOS 20[f]	
Immed. inc. Assistance	Funeral benefits	$2,000	Funeral benefits	$2,000	Funeral benefits	$2,000	Funeral benefits	$2,000	Funeral benefits	2,000	Funeral benefits[g]	$2,000
	Soc. Sec. Lump Sum	$255	Soc. Sec. Lump-Sum	$255	Soc. Sec. Lump-Sum	$255	Soc. Sec. Lump-Sum	$255	Soc. Sec. Lump-Sum	$255	Soc. Sec. Lump-Sum	$255
	Casualty assistance	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assist.	Casualty assistance	Casualty assistance
Transition Benefits	Tax Ben.		Tax ben.		Tax ben.		Tax ben.				Tax ben.	
	CHAMPVA		CHAMPVA		Retired Reserve Select		Retired Reserve Select		Retired Reserve Select		Retired Reserve Select	
	Financial planning		Financial planning		Comm./Ex. privileges		Comm./Ex. privileges		Comm./Ex. privileges		Comm./Ex. privileges	
					ID Card		ID Card		ID Card		IR Card	
					Financial planning		Financial planning		Financial planning		Financial planning	
	DIC	$20,712/ year	DIC	$20,712/ year	VA Educ. benefits		VA Educ. benefits		VA Educ. benefits		VA Educ. benefits	
Income Replacement	VA Educ. benefits	N/A	VA Educ. benefits	N/A	DIC	$20,712/ year	DIC	$20,712/ year	DIC	$20,712/ year	DIC	$20,712/ year
	Soc. Sec. payments	$38,904/ year	Soc. Sec. payments	$27,434/ year	Soc. Sec. payments	$48,455/ year	Soc. Sec. payments	$35,783/ year	Soc. Sec. payments	$3,151/ year	Soc. Sec. payments	$0/ year
					Survivor Benefit Plan	$12,561	Survivor Benefit Plan	$840	Survivor Benefit Plan	$15,379	Survivor Benefit Plan	$840
	VGLI	$400,000	VGLI	$400,000	VGLI	$400,000	VGLI	$400,000	VGLI	$400,000	VGLI	$400,000
					FECA	$21,768/ year	FECA	$15,705/ year	Workers Comp.	$37,384/ year	Workers Comp.	$33,367/ year

a. Annual Salary = $65,371, DOB: 1972.
b. Annual Salary = $35,657, DOB: 1982.
c. Annual Salary = $111,860, DOB: 1969.
d. Annual Salary = $56,564, DOB: 1973.
e. Annual Salary = $65,371, DOB: 1968.
f. Annual Salary = $35,657, DOB: 1961.

References

Burrelli, David F. and Jennifer R. Corwell. 2008. *Military Death Benefits: Status and Proposals.* Congressional Research Service Report for Congress RL32769, 26 March 2008.

CHAPTER 13

Analysis of Financial Support to the Surviving Spouses and Children of Casualties in the Iraq and Afghanistan Wars

Amalia R. Miller
Paul Heaton
David S. Loughran

Summary

Over a decade of operations in Iraq and Afghanistan has focused the nation on meeting the needs of military families, especially families of servicemembers who were injured or killed in combat. The President directed the Secretary of Defense, as part of the Eleventh Quadrennial Review of Military Compensation (QRMC), to focus part of its review on "Compensation benefits available to wounded warriors, caregivers, and survivors of those fallen servicemembers" (Obama 2009). The research documented in this report, and sponsored by the 11th QRMC, responds to that directive by providing the first comprehensive, quantitative assessment of the impact of combat deaths on household labor market outcomes. It also assesses the extent to which payments that surviving spouses and children receive from the DoD, VA, and Social Security Administration compensate for earnings losses attributable to combat deaths.

Study Design

This study measures the impact of combat deaths on the financial well-being of surviving spouses and children. Our focus is on married servicemembers with deployments to Iraq or Afghanistan ending between June 2003 and December 2006. We obtained longitudinal, administrative data from military personnel records, casualty records, and annual Social Security earnings databases, which we linked together using Social Security numbers of servicemembers and their spouses. We combined this information with data on payments made to surviving spouses

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

and children from the Department of Defense, Department of Veterans Affairs, and Social Security Administration. Together, these data enable us to estimate the impact of combat death on household income and earnings and to assess the degree to which cash benefits from the federal government compensate surviving household members for their financial losses.

In our sample of 347,078 married servicemembers who deployed in 2003 to 2006, the casualty records show that 1,184 (or 0.3 percent) were killed in combat. We compared the labor market earnings of households experiencing a combat death in the years following deployment with the labor market earnings of deployed but uninjured servicemember households. Because the risk of combat death is likely correlated with characteristics of servicemembers that could themselves affect household labor market outcomes (e.g., pay grade, military occupation, risk-taking behavior), we made these comparisons controlling for a rich array of individual-level characteristics, including labor market outcomes for both servicemembers and spouses prior to deployment. This approach accounts for potentially unobserved factors that are unique to specific households and fixed over time, and increases the likelihood that our results capture the causal effect of combat death on household earnings. Nevertheless, these controls are imperfect, and the patterns we document could in theory also partially reflect other uncontrolled characteristics of households, which would undermine such a causal interpretation.

Labor Market Earnings Effects

We find that household labor market earnings decline substantially in the years following a combat death. The estimated drop in annual household earnings over the first four years following a fatality ranges from $63,000 to $68,000 for members of the active component and from $59,000 to $65,000 for members of the reserve component. There appears to be little change in the magnitude of the effect over the first four years. The main driver of the labor market earnings drop is naturally the loss of the service member's own earnings. We also found, however, that declines in spousal earnings are significant over the first four years. These losses range from $4,600 to $5,500 for active component spouses and from $7,700 to $8,800 for reserve component spouses.

Estimated Replacement Rates

Surviving spouses and children can potentially receive recurring monthly benefits from a number of federal sources, including the Department of Defense (DoD), the Department of Veterans Affairs (VA), and the Social Security Administration (SSA). In addition, family members are eligible to receive one-time payments from

the Servicemembers' Group Life Insurance program, the DoD Death Gratuity, and combat zone tax forgiveness. Many of these survivor payments are received tax free, which we account for in our analysis.

On average, recurring benefits from these sources offset over two-thirds of the estimated losses in household labor market earnings attributable to combat deaths over the first four years following the fatality. Excluding lump-sum payments, the estimated effect of a combat death on total household income—defined as the sum of servicemember and spousal labor market earnings plus survivor compensation from the recurring sources listed above—in the fourth year following deployment is negative for both reserve and active component members, but substantially smaller than the estimated effect on earnings. The post-compensation income loss in year 4 for active component members averages about $20,000, or about 30 percent of the total earnings loss in that year. For reserve component members, the post-compensation income loss of $14,000 is about 22 percent of the total drop in household earnings.

The household income replacement rate in year 4, defined as the ratio between actual income (including all recurring forms of survivor benefits from the DoD, VA, and SSA) and expected income had the servicemember returned uninjured from his or her deployment is 78 percent for the median surviving spouse household in the active component and 88 percent for the median surviving spouse household in the reserve component. Taking into account the value of the lump-sum payments (mainly from the Death Gratuity and Servicemembers' Group Life Insurance) spread over a 20-year horizon increases the average replacement rates to 116 percent and 122 percent for the surviving families members of the active and reserve components, respectively. Within each component, the household income replacement rates are lowest for servicemembers who had no dependent children at the time of their deaths and are highest for households with more than two dependent children.

The household income replacement rate includes the value of the surviving spouse's earnings (and earnings loss) as well as the predicted income growth that the servicemember would have experienced had the servicemember not been injured. An alternative measure of the generosity of survivor benefits is the individual income replacement rate, which is the ratio of survivor benefits to the servicemember's own pre-deployment income. The median individual replacement rates in our sample are 68 percent and 72 percent for members of the active and reserve components, respectively, when we consider only recurring benefits, and 170 percent and 184 percent when we include lump-sum payments amortized over 20 years. The comparison relative to the member's own pre-deployment income is more similar to the basis for compensation used in other recurring survivor benefit programs,

where benefits are adjusted for inflation but not for predicted income growth, and where spouse income is ignored. For example, family members of DoD civilian employees who die while performing their official duties are compensated based on the provisions of the Federal Employee Compensation Act using a compensation formula based on prior earnings. The key finding of substantial income replacement (over two-thirds) from recurring payments and complete income replacement from recurring plus lump-sum payments is consistent across the different replacement rate measures.

Discussion

Among the many hardships of military deployment is the possibility of injury and death. In our sample of 347,078 married servicemembers who deployed in 2003 to 2006, 1,184 (or 0.3 percent) were killed in combat. The research documented in this report uncovers the financial impact of these losses on the surviving household members. The substantial decline in labor market earnings experienced by these households, due primarily to the loss of the member's own earnings, is to a large extent offset by recurring payments from the DoD, VA, and SSA. When the lump-sum survivor payments are included in the analysis for a period of 20 years, the average surviving spouse household receives survivor compensation that replaces more than 100 percent of lost earnings.

This research has not sought to answer the difficult normative question of whether the replacement rates reported here are appropriate. The appropriate level of benefits depends in large part on the overarching goals and constraints associated with a particular compensation system. Heaton et al. (2012), for example, argue that the structure and amount of compensation provided to families of combat casualties should adjust to reflect policymaker preferences regarding the desirability of fulfilling goals such as compensating for economic loss, ensuring a stable inflow of new personnel into the military, and appropriately recognizing the sacrifice of those who have given the ultimate sacrifice in serving the country. While normative questions surrounding benefit adequacy are important, resolving them lies beyond the scope of the present inquiry.

1. Introduction

Over a decade of operations in Iraq and Afghanistan has focused the nation on meeting the needs of military families, especially families of servicemembers who were injured or killed in combat. According to official casualty records, 6,370 members of the U.S. military were killed during, or as a result of injuries sustained during, their deployments to Iraq or Afghanistan between October 7, 2001 and March 5, 2012.[1]

Little is known about the economic impact of combat deaths on surviving household members. The present study provides some of the first empirical evidence on this issue. The analysis includes married active and reserve component servicemembers whose deployments ended between 2003 and 2006, and follows their and their spouses' subsequent labor market and other compensation through 2010. By comparing earnings trajectories of uninjured households to those of households that experience a combat death, we are able to quantify the financial impact of combat-related deaths on the surviving spouses and children of deceased servicemembers. We first estimate the impact of a servicemember's death on household earnings. Next, we measure the extent to which survivor benefits and compensation from various federal government sources provide financial replacement for lost earnings. This study does not attempt to quantify the non-financial losses experienced by spouses and children or the non-financial types of support that may be available to them.

The closest previous study is a 2007 report (Christensen et al. 2007) that assessed the financial status of military widows by comparing their income to the income of widows in the general population using data from the Current Population Survey (CPS). Similar to this report, that study considered both spousal earnings and compensation from the DoD and VA, including the tax advantage from such payments. However, that study differs from this one in several ways. First, that study compared different groups of widows (military and civilian), whereas we estimate the impact of combat deaths relative to outcomes for military spouses of servicemembers who return from their deployments without injuries. That study was also a cross-sectional analysis that compares levels of income, rather than changes in income around the time of death. Many widows in that study were observed years or decades after the servicemember's death. Unlike the present analysis, that study was not focused on combat-related deaths; the population was older and the deaths were mainly non-combat-related.

The remainder of this report has the following structure. Chapter Two describes the data we employ to define our sample and measure key variables such as combat

1. http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm accessed on March 12, 2012.

deaths, labor market earnings, and survivor compensation and presents descriptive statistics related to these variables. Chapter Three describes our empirical approach. Chapter Four reports the estimated effects of combat death on labor market earnings and total household income including survivor compensation, respectively. Chapter Five discusses the fraction of earnings losses that are replaced by existing disability compensation mechanisms and Chapter Six concludes.

2. Data

This study draws on administrative data on combat-related injury and death, labor market earnings, and disability and survivorship compensation obtained from DoD, VA, and SSA. This Chapter explains how we used those data to construct our analysis sample and construct key measures of injury and earnings.

Sample Definition

Our initial sample for this study consists of over 700,000 active and reserve component members deployed to Afghanistan and Iraq who completed the Post-Deployment Health Assessment (PDHA-DD Form 2796) or appear in DMDC's Casualty File between June 1, 2003 and December 31, 2006.[2]

All servicemembers deployed outside of the continental United States to a land-based location with no fixed U.S. medical treatment facility for 30 or more continuous days must complete the PDHA within five days of the end of deployment. As stated on DD Form 2796, the principal purpose of the PDHA is "to assess your state of health after deployment outside the United States in support of military operations and to assist military healthcare providers in identifying and providing present and future medical care to you." To this end, the PDHA records information about current physical and mental health as reported by the servicemember and documents concerns regarding environmental exposures. PDHA administration has been required since 2003.[3]

To the PDHA sample, we then added servicemembers who appear in the Casualty File, but not in the PDHA data, between June 1, 2003 and December 31, 2006. The Casualty File is the source of official statistics on U.S. casualties sustained in support of OEF/OIF. Any servicemember whose regular duty assignment is disrupted as a result of an injury sustained during hostile action is recorded in the Casualty File

2. We include in our sample servicemembers reporting a deployment location of Kuwait or Qatar under the assumption that these individuals were in fact deployed to Iraq and Afghanistan during at least part of their deployment. Most deployments to these areas in our data occur in 2003 and likely reflect the pre-Iraq invasion buildup of military forces.

3. See DoD MCM-0006-02 "Updated Procedures for Deployment Health Surveillance and Readiness."

along with information about the nature of their injury including the date the injury was sustained. Many of these individuals will not complete a PDHA because the seriousness of their injuries obviates the need for conducting such an assessment.[4]

For each servicemember in our sample, we selected the latest deployment that ended before January 1, 2007. Beginning and end dates of deployment were obtained from self-reports in the PDHA or, for servicemembers who appear in the Casualty File, but not in the PDHA, from DMDC's Global War on Terror Contingency File.[5]

Demographic Covariates and Spouses

Data on age, gender, component, race/ethnicity, pay grade, education, score on the Armed Forces Qualification Test (AFQT),[6] military occupational specialty, and state of residence come from DMDC's Work Experience File (WEX) and the Defense Enrollment Eligibility Reporting System (DEERS). We also employed DEERS to identify which servicemembers were married in the year prior to deployment and the Social Security Number (SSN) of their spouse. We identified 224,977 spouses of active component (AC) members and 122,101 spouses of reserve component (RC) members in our sample. Our analysis sample is restricted to servicemember households for which we identified a spouse in the year before deployment.[7]

Fatalities and Injuries

We employed the PDHA and Casualty File to measure fatalities and injuries in our sample. Medical professionals at a field hospital or other medical treatment facility categorize servicemembers who appear in the Casualty File as having a non-serious ("non-life altering"), serious ("life-altering"), or very serious ("life-threatening") combat injury. Individuals who died as a result of their injuries (either immediately or after some time) are counted as fatalities. In our sample of married service members, we observe 893 combat-related deaths in the AC and 291 in the RC. Table 2.1 reports the number of combat deaths by component and year in our sample.

4. It is likely that some deployed servicemembers fail to complete the PDHA for reasons other than serious injury. We have no reason to believe, however, that this incomplete coverage biases the results reported here.
5. The Global War on Terror Contingency File employs data provided by the services and military pay data to determine dates of deployment. We could have used this data source to define our sample, but chose to use the PDHA instead because of our desire to employ the health data recorded on that form (see below).
6. AFQT scores are available only for enlisted personnel.
7. For the purposes of this analysis households are defined consistently over time based upon the identities of the spouses in the pre-deployment year, regardless of their actual marital status in future years. Thus we do not consider the role of post-deployment marital dissolution, a topic that has been examined by other researchers (e.g. Karney and Crown 2007).

Table 2.1—Number of Combat Fatalities Among Married Servicemembers, By Year and Component

	AC	RC
2003	31	24
2004	322	89
2005	246	125
2006	294	53
Total	893	291

For individuals who do not appear in the Casualty File, we employ data on injuries referred for follow-up care, and the individual's own assessment of whether his or her health changed for the worse while deployed:

- No injury: Was not referred for follow-up care and did not state health worsened during deployment
- Health worsened: Stated health worsened during deployment, but was not referred for follow-up care[8]
- Referred: Stated health worsened during deployment and injury was referred for follow-up care

The analysis sample includes servicemember households in all of the injury groups, including fatalities and uninjured. We estimated separate effects of each type of injury and found similar estimates to those reported in Heaton, Loughran, and Miller (2012). Those results are not reported in this report, however, because the focus of this analysis is on combat deaths. Nevertheless, the fact that this analysis includes controls for injuries is important for the interpretation of the results. In all cases, the effects of combat death are calculated relative to the benchmark case that no injury was recorded at the end of the deployment.

Labor Market Earnings

Our measure of labor market earnings includes cash compensation received from the Department of Defense and civilian employers. Earnings data employed in this research come from SSA and DMDC. SSA records in its Master Earnings File (MEF) earnings from all sources subject to Medicare taxes, including household

8. The specific question on the PDHA is "Did your health change during this deployment?" Respondents could choose "Health stayed about the same or got better" or "Health got worse."

employers and the self-employed.[9] These earnings data are considered to be of very high quality and have been used in many empirical studies, including a number of studies related to the labor market outcomes of veterans (e.g., Angrist 1990, Angrist 1998, Christensen 2007, Loughran, Klerman, and Martin 2006, EconSys 2008, Heaton and Loughran 2011, Loughran et al. 2011).

Not included in SSA earnings records are military allowances (e.g., Basic Allowance for Subsistence (BAS), Basic Allowance for Housing (BAH), Family Separation Allowance (FSA)) and bonuses, which are not subject to Medicare taxes. To account for these significant sources of military earnings, we add these quantities to SSA earnings using individual-level pay records contained in DMDC's Active and Reserve Duty Pay Files. We obtained annual earnings data between 1995 and 2010 for 97 percent of our sample.[10] All earnings figures are deflated to $2010 using the Consumer Price Index (CPI-U).

Average household earnings amounts are reported in Table 2.2, separately by component, for households in which the servicemember returned uninjured from his or her deployment (the baseline group) and for those in which the servicemember died from a combat injury during deployment. In the year *before* deployment, household income is higher for servicemembers who were not injured during their deployments, and this is true for both servicemembers and their spouses. Married servicemembers in the AC and RC have similar amounts of total pre-deployment earnings, but RC spouses earn about twice the amount earned by AC spouses.

The moderate gap in household earnings between households with and without casualties before deployment increases dramatically afterward. In the AC, households without injuries average 10 times the annual earnings as those with deaths; in the RC, it is closer to 7.2 times. After deployment, spousal earnings account for about 17 percent of household earnings for uninjured members of the AC, and about 26 percent for uninjured RC members. For households with fatalities, after the first post-deployment year (when some households may be receiving delayed compensation on behalf of the servicemember), household earnings are all from the spouse. This is because our household income measure is based on servicemembers and spouses and it excludes gifts or other contributions from other family members, such as adult children, parents, or siblings.

9. See http://www.ssa.gov/OP_Home/cfr20/404/404-0000.htm for a list of employment categories that are exempt from Medicare taxes. Unlike Social Security earnings, Medicare earnings are not capped at the Social Security taxable limit.

10. Virtually all servicemembers should appear in the SSA data since basic pay is subject to Medicare tax. Match rates below 100 percent, therefore, are likely due to discrepancies in the names, Social Security numbers, or dates of birth used to match servicemembers to SSA records.

Table 2.2—Summary Statistics by Component for Uninjured and Fatalities

	AC		RC	
	Uninjured	Deaths	Uninjured	Deaths
Pre-deployment Earnings				
Servicemember	53,713	50,405	53,925	48,137
Spouse	11,040	9,338	20,509	18,414
Household Earnings	64,753	59,743	74,434	66,552
Post-deployment Household Earnings				
Year 1	75,905	6,527	79,899	11,409
Year 2	79,121	6,537	83,421	11,322
Year 3	80,381	7,427	86,031	11,530
Year 4	81,931	7,899	86,911	11,805
Post-deployment Spouse Earnings				
Year 1	12,484	6,076	21,096	11,397
Year 2	13,705	6,537	21,930	11,322
Year 3	14,674	7,427	22,422	11,530
Year 4	15,161	7,899	22,400	11,805
Demographics				
Age	30	28	36	34
Male	0.94	1.00	0.95	0.99
White	0.71	0.76	0.75	0.73
Black	0.18	0.11	0.12	0.09
Hispanic	0.10	0.13	0.08	0.05
Married in pre-deployment year	1.00	1.00	1.00	1.00
No high school diploma	0.07	0.10	0.12	0.11
High school diploma	0.63	0.68	0.43	0.54
Some college	0.11	0.08	0.21	0.15
Bachelor's degree	0.13	0.12	0.17	0.15
Graduate degree	0.06	0.03	0.07	0.04
AFQT	58	57	58	61
Military Service				
Army	0.62	0.75	0.77	0.89
Air Force	0.24	0.02	0.15	0.00
Marine Corps	0.10	0.20	0.03	0.07
Navy	0.04	0.02	0.05	0.04

Table 2.2—Summary Statistics by Component for Uninjured and Fatalities (Continued)

	AC		RC	
	Uninjured	Deaths	Uninjured	Deaths
Pay grade: junior enlisted	0.34	0.40	0.26	0.32
Pay grade: senior enlisted	0.48	0.44	0.55	0.56
Pay grade: warrant officer	0.12	0.09	0.12	0.06
Pay grade: junior officer	0.02	0.01	0.04	0.02
Pay grade: senior officer	0.02	0.03	0.02	0.02
Pay grade missing	0.01	0.03	0.01	0.02
Pre-Deployment Health				
Self-reported health: Excellent	0.28	0.30	0.22	0.24
Self-reported health: Very good	0.30	0.29	0.34	0.33
Self-reported health: Good	0.15	0.16	0.18	0.17
Self-reported health: Fair	0.01	0.02	0.01	0.01
Self-reported health: Poor	0.00	0.00	0.00	0.00
Sought mental health counseling	0.03	0.03	0.02	0.02
Have a medical problem	0.09	0.10	0.10	0.10
Currently on light duty	0.07	0.06	0.06	0.05

Note: All dollar amounts are reported in constant 2010 dollars.

In addition, our household measure does not account for income from new spouses. We defined household units based on marriage in the year before deployment in large part to avoid concerns about endogeneity in changes in marital status, but also because of data quality concerns regarding the exact timing of changes in marital status (especially for events that would lead to a termination in benefits) in the DEERS system. To the extent that surviving spouses are remarrying, and their new spouses have positive earnings, our omission will cause us to overstate the financial harm from combat deaths on surviving family members.[11]

11. Although we have some information on remarriage in the data from the Survivor Benefit Plan, this information is unfortunately indirect and incomplete. Of the 627 cases of suspended benefits we observe in January 2012 (which is 5 to 8.5 years after the death dates), only 56 have the reason listed as remarriage (coded as "NAM" in the data).

Survivor Benefits

Surviving spouses and children are potentially eligible to receive various forms of compensation from 3 primary sources: the Departments of Defense and Veterans Affairs, and the Social Security Administration. Recurring monthly payments are made through these programs:

- Survivor Benefit Plan (SBP)
- Special Survivor Indemnity Allowance (SSIA)
- Dependency and Indemnity Compensation (DIC)
- Social Security Administration Survivor Benefits

Those payments can take the form of annuities that are paid out as long as the surviving spouse or children maintain eligibility (SBP, SSIA, DIC). They also include some transition payments for the initial year or two following the servicemember's death (DIC and SSA benefits). In addition, surviving spouses or children can receive lump-sum payments from:

- Servicemembers' Group Life Insurance (SGLI)
- Death Gratuity
- Combat Death Tax Forgiveness

This section provides a brief description of the key features of these programs and outlines our data sources and methods of computing benefits for each surviving spouse household.

Table 2.3 summarizes these payments for our samples of households with combat deaths in the AC and RC. The first two columns of the table show the percent of these households receiving each of these benefits. The next two columns report average payment amounts, in constant 2010 dollars and adjusting for tax advantages when applicable, for the sub-sample of households that received each type of benefit.

Table 2.3—Benefits to Surviving Spouses and Children

	Percent Receiving		Mean if Receiving	
	AC	RC	AC	RC
Survivor Benefit Plan				
Year 1	71.91	73.45	12,485	13,676
Year 2	71.46	71.72	12,510	13,829
Year 3	70.79	70.69	12,589	13,977
Year 4	69.78	70.34	12,895	14,024
Dependency and Indemnity Compensation				
Year 1	100.00	100.00	28,390	27,872
Year 2	100.00	100.00	23,457	23,652
Year 3	100.00	100.00	23,451	23,197
Year 4	100.00	100.00	23,796	23,630
Special Survivor Indemnity Allowance				
Year 1	0.00	0.00		
Year 2	4.16	3.45	152	152
Year 3	9.44	10.34	350	298
Year 4	14.27	15.52	490	499
Social Security Benefits				
Year 1	68.09	69.31	33,439	39,123
Year 2	67.98	68.97	27,896	32,906
Year 3	67.64	68.97	27,716	31,771
Year 4	67.08	68.62	27,887	31,208
Lump-Sum Payments with Tax Advantage				
SGLI	100.00	100.00	655,976	660,340
Death Gratuity	100.00	100.00	163,994	165,085
TSGLI	1.08	1.72	129,125	160,091
Combat Zone Tax Forgiveness	45.96	64.14	2,196	3,288
Lump-Sum Payments without Tax Advantage				
SGLI	100.00	100.00	436,453	437,864
Death Gratuity	100.00	100.00	109,113	109,466
TSGLI	1.08	1.72	92,307	105,768

Note: All dollar amounts are reported in constant 2010 dollars.

Survivor Benefit Plan

This SBP program is administered by the DoD. It provides monthly payments to eligible spouses, former spouses, and children of deceased service members. Coverage in the plan is provided at no cost to servicemembers while they are in active service. Upon retirement, servicemembers can elect to cover their spouses only, their spouses and children (in which case children receive payments if the spouse dies or loses eligibility through remarriage), or their children only. Spouses and former spouses are eligible for SBP payments until their death or remarriage (before age 55).[12] Children can receive payments as long as they are unmarried and under the age of 18 or 22 if they are enrolled in school. Children who become disabled before losing eligibility and are unable to support themselves can receive benefits for life. The base amount of the payment for a member who dies while serving on active duty is equal to 55 percent of what the servicemember's retirement pay would have been had he or she been retired as totally disabled, but cannot exceed 75 percent of the member's high 36 months (for members when entered military service after September 7,1980). This amount does not vary with the number of beneficiaries; if there are multiple children who are designated as beneficiaries, each receives an equal share of the total amount. Payments made to spouses are reduced by payments from the VA's DIC program, but child-only SBP benefits are not affected by DIC. SBP payments are taxed as regular income.

We obtained data from the military on the current payment amounts (as of January 2012) made to each beneficiary associated with a servicemember from our sample who died, as well as the amount of the DIC offset (if any). This allowed us to determine the base amount for that servicemember for 2011. Using the historical cost of living (COLA) adjustments applied to the SBP program, we were able to compute base amounts for past years as well. We assigned payments to all servicemember households currently receiving SBP payments starting from the day after the death date (pro-rated for the first month and then full months afterward).

Some households were not receiving payments in January 2012 because of loss of eligibility (remarriage for spouses, age or marriage for children), but may have received them in the past. For those households, we attempted to collect information on the amount of past SBP payments.

When available, we used information on the amount of SBP to which the person would be entitled if they were currently eligible (this is routinely maintained after loss

12. Surviving spouses whose remarriage ends in divorce or widowhood can have their SBP benefits reinstated.

of eligibility because eligibility can sometimes be restored, for example, by ending a marriage or enrolling in school). For surviving spouses who were no longer receiving benefits due to remarriage, we assigned payments from the death date until the remarriage date (which we inferred from the date the current pay status started). For households in which the last child was no longer eligible to collect SBP as a dependent (because of age or marriage), we similarly used information on the past amount and the date of the most recent status change. Unfortunately, we were not able to access historical payments or base amounts for accounts that have been closed for over 18 months. For 327 surviving spouse households (or 28 percent, 250 in AC and 77 in RC) we have no record of any SBP payments, although it is possible that some of these families received some compensation. This limitation means that we may understate the value of this benefit to surviving spouses and children.

Dependency and Indemnity Compensation

DIC payments are provided monthly to eligible survivors of veterans whose deaths are determined to be service-connected. The program is administered by the VA, and the amount depends on the number of children and the time since the member's death. Spouse DIC payments are made for the life of the spouse, provided that the spouse does not remarry before age 57 (payments can be reinstated if the remarriage ends). Children are eligible for payments until they turn 18. DIC pays an additional transitional monthly benefit for up to two years as long as there are surviving children under the age of 18. The amount of the transition benefit depends on the death date (which affects duration of payment), the time since the death (maximum duration is 24 months), and the age of the youngest child (transition payments stop on the first month after the month in which the youngest child reaches age 18). DIC paid to spouses offsets SBP payments if the spouse is the beneficiary (the DIC offset), and DIC payments are not taxed.

We computed the DIC payments in each month following the servicemember's death using the historical payment rules (generally updated each December) that specify amounts paid to surviving spouses and the amounts paid for each child under the age of 18. We used data from the DEERS system before the servicemember's death to determine the number of children and their ages. This information should be fairly complete, but it is possible that we missed children born after the servicemember's death, which would cause us to understate the benefit. Our lack of reliable data on remarriages means that our measure will tend to overstate payments to spouses who remarried within the first four years.

Special Survivor Indemnity Allowance

Starting in October 2008, the Special Survivor Indemnity Allowance has been paid to surviving spouses whose SBP payments were offset by DIC. Maximum monthly payment amounts are fixed for each year, starting at $50 in fiscal 2009, with scheduled increases until 2017, when they will reach $317. The actual amount is the lesser of the amount of the DIC offset (the reduction in SBP) and the maximum amount. SSIA payments are taxed as regular income.

We computed the SSIA amount paid in each month to spouses by comparing the amount of the DIC offset to the maximum SSIA amount for that month and assigning the smaller value. We have data on current DIC offset amounts, and we computed historical DIC offsets using the method to compute spouse DIC payments described below. Child DIC payments are not offset and not counted towards SSIA. Because the latest deaths in our sample were in 2006, there were no SSIA payments in the first calendar year after any death (see Table 3), and some households in our sample (i.e. those experiencing combat deaths in 2003) did not receive SSIA in the first four post-deployment years due to the relatively recent establishment of this program.

Social Security Survivor Benefits

Monthly Social Security payments may be paid to surviving spouses in certain cases. The amount paid is determined by the SSA based on the earnings history of the deceased servicemember. Spouses of any age who are caring for children of the servicemember (who are under the age of 16 or disabled) can receive 75 percent of the deceased worker's basic social security retirement amount. Monthly payments of 75 percent are also made to children under the age of 18, or the age of 19 if they are full-time students, or to children of any age who were disabled before the age of 18. Surviving spouses, including those who are not caring for young children of the deceased, can receive partial benefits starting at age 50 if they are disabled or otherwise at age 60, or full benefits at starting at their full retirement age. An additional lump-sum benefit (of up to $255) is paid by SSA to the surviving spouse who was living with the servicemember at the time of death (notwithstanding any temporary absence due to military assignment) or to surviving children. These payments are partially taxed. There is also an earnings offset for some surviving spouses (who have not reached full retirement age) so that the amount of the survivor benefit is reduced by $1 for every $2 of spousal earnings above a preset threshold, which was $14,640 in 2012.[13]

13. Surviving spouses who have their survivor benefits reduced or suspended because of their labor market earnings may later be eligible for increased benefits from SSA when they reach full retirement age.

Our data source for SSA survivor benefits is SSA's Master Beneficiary Record (MBR) file, which records payments from all Social Security trust fund accounts to all beneficiaries. We constructed a measure of annual SSA benefits paid to each of our servicemember households by summing together two sets of payments: payments made to the servicemember or his or her spouse on any Social Security account and payments made to any person (such as a child under the age of 18 or an adult disabled child) made on behalf of the servicemember's or spouse's Social Security account. We removed duplicate payments that appeared in both categories and we did not distinguish between different types of payment from the Social Security trust fund (retirement, disability, and survivorship).

We used the monthly benefit paid (MBP) amount on the MBR to compute annual SSA survivor benefits. MBP records the payment amount for which the beneficiary was eligible in that month (and we exclude monthly benefits for which the beneficiary is listed as ineligible). MBP does not necessarily reflect the actual amount paid in that month because the amounts are retroactively updated to reflect the correct payment eligibility after changes in status. In cases where there was a delay between the initial application and the determination that the beneficiary qualified for survivor benefits, the actual payments may have started later than our data would indicate (and been increased temporarily to compensate for the delay). The total payment amounts in the data should be correct, however, because our data are from June 2011, which is over five years after the combat death dates in our sample. Table 3 shows that two-thirds of the surviving spouse households received benefits from SSA. Among those receiving benefits, the average annual amount in years 2-4 was about $30,000.

Death Gratuity

The surviving spouses of the servicemembers who died in our sample would all qualify for the one-time Death Gratuity payment from the DoD. The amount of this payment was increased from $12,000 to $100,000 in May 2005. At that same time, DoD was instructed to make an additional payment of $88,000 to beneficiaries of servicemembers who died between October 7, 2001 and May 11, 2005, meaning that all households in our combat death sample received a total of $100,000. We assign all payments in the year after the servicemember's death. The death gratuity is not taxed.

Servicemembers' Group Life Insurance

Active and reserve component members are eligible to purchase life insurance through the Servicemembers' Group Life Insurance program administered by the VA. The default enrollment is for the maximum (currently $400,000), though

members may elect to reduce the amount (in increments of $50,000) or cancel coverage. Servicemembers must opt out of SGLI and so the vast majority of servicemembers participate in the program. Beneficiaries can receive payments in lump sum or in equal payments over 36 months. For deaths that occurred between October 7, 2001 and September 1, 2005, the initial SGLI amount was $250,000, but this was increased to the full $400,000 in 2005 when the DoD made an additional Death Gratuity payment of $150,000. Because servicemembers who served in the theater of operations for Operation Enduring Freedom or Operation Iraqi Freedom were reimbursed for their SGLI premiums, we assume that their surviving spouses all received the maximum amount in the first year after the death.

All servicemembers enrolled in SGLI are also automatically enrolled in Traumatic Injury Protection under Servicemembers' Group Life Insurance (TSGLI), which insures servicemembers against the occurrence of a list of specific traumatic injuries such as amputation, paralysis, burns, sight, hearing, facial reconstruction, coma, and traumatic brain injury.[14] TSGLI payments range between $25,000 and $100,000, in $25,000 increments, depending on the injury or combination of injuries incurred. All servicemembers participating in SGLI were made eligible for TSGLI beginning in December 2005 and, at that time, coverage was made retroactive to cover OEF/OIF injuries incurred between October 7, 2001 and November 30, 2005.[15] VA provided this project with a list of all servicemembers who had received TSGLI through May 2011 along with the date and amount received. Table 2.3 shows that a very small number (about 1 percent or 14 households) of the servicemembers who later died from their injuries also received TSGLI payments. We include these payments as part of their total compensation.

Combat Zone Tax Forgiveness

If a member of the United States Military Services dies while in active service in a combat zone or from injury or disease received in a combat zone, the decedent's income tax liability is "forgiven" for the tax year in which the death occurred and for earlier tax years ending on or after the first day the member served in a combat zone in active service. "Forgiven" tax does not have to be paid. Any forgiven tax liability that has already been paid will be refunded, and any tax liability at the date of death will be forgiven.

14. See http://www.insurance.va.gov/sglisite/tsgli/Schedule/Schedule.htm for a complete list of qualifying injuries and conditions.

15. Beginning in October 2011, the Veterans' Benefits Act of 2010 (PL 111-275) extends these retroactive benefits to qualifying losses incurred during this period regardless of servicemember location or prior SGLI enrollment status.

We compute the value of the tax forgiveness by estimating the amount of federal taxes paid on the servicemember's earnings in the year of death and all preceding calendar years during which the servicemember was deployed. We then assign this payment as a form of untaxed compensation in the calendar year following the death year.

Tax Advantage

Military allowances, certain military pays (e.g., those received while serving in an officially designated combat zone), VA survivor benefits, SGLI, and a portion of SSA benefits are not subject to federal income, payroll, and Social Security (i.e., FICA) taxes. We computed the value of this federal tax advantage assuming no interest or dividend income or capital gains and that servicemembers are married with one dependent child.[16] Specifically, we determined the amount of taxed income that the household would have had to receive to obtain that same amount of income after taxes. We apportioned the total value of the tax advantage to each tax advantaged earnings/disability compensation category according to the category's proportion of total earnings and compensation.

Lump-Sum Payments With and Without Tax Advantage

Income from the death gratuity, SGLI, and TSGLI are exempt from federal income taxes. Table 2.3 reports average payment amounts (for those receiving payments) for each of these forms of compensation, after adjusting for inflation and accounting for the tax advantage. For AC households, the amounts are $163,994 for the death gratuity, $655,976 for SGLI, and $129,125 for TSGLI. For RC households, the amounts are $165,085, $660,340, and $160,091, respectively. The death gratuity and SGLI amounts are substantially larger than the nominal amounts of $100,000 and $400,000. This is due in large part to the tax advantage, which is greater for lump-sum payments than for recurring payments spread over many years. Had they been taxed, these one-time payments would have increased the average tax rate paid by surviving spouse households. If we exclude the value of the tax advantage for these one-time payments, the inflation-adjusted values are significantly lower. For the AC, they are $109,113, $436,453, and $92,307. For the RC, they are $109,466, $437,864, and $105,768.

16. Recall that all servicemembers in the sample were married in the year prior to deployment. The tax imputations do not account for state taxes or other features of the tax code such as personal exemptions, the federal Earned Income Tax Credit, or special widow tax credits.

3. Empirical Model

We seek to estimate the causal effect of deployment-related fatality on earnings and other labor market outcomes. In order to do this, we must form an estimate of the counterfactual labor market outcomes of servicemembers who were killed in combat and their spouses had they never been injured. Our estimate of the causal effect of fatality on labor market outcomes is then the difference between the observed labor market outcomes of surviving spouse households and their estimated counterfactual labor market outcomes. In our analysis we estimate counterfactual labor market outcomes as the outcomes of similarly situated servicemembers who were also deployed but who were uninjured (i.e., the control group).

Our main estimation challenge stems from the fact that the incidence of fatalities is likely to be correlated with a wide range of characteristics of servicemembers that determine their exposure to physical dangers during deployment, such as military occupation and attitudes toward risk, which may also independently affect success in the labor market. We address this challenge by controlling for such characteristics as completely as possible so that the resulting conditional correlation of fatality and labor market outcomes is not affected by those other factors.

In the case of household labor market earnings, we employ an empirical model that controls for fixed characteristics of servicemembers and spouses that are potentially correlated with both injury and earnings. Our model adjusts for initial earnings differences pre-deployment and then also allows for the possibility that differences in earnings growth over time are also related to observable differences in the characteristics of servicemembers. We estimate equations of the form:

$$\Delta y_{it} = \beta Injury_i + \gamma X_i + \varepsilon_i \quad (1)$$

where Δy_{it} represents the change in earnings experienced by the household associated with individual servicemember i between the year immediately prior to deployment and year t following deployment,[17] $Injury_i$ indicates a vector of indicator variables capturing the nature of individual i's deployment-related injuries (using the injury categories described previously and including death), X_i represents a set of covariates, ε_i represents an idiosyncratic error term, and $\hat{\beta}$ measures the estimated

17. Because our earnings data are available on a calendar year basis, but deployments typically begin or end mid-year, we use the first complete calendar year immediately prior to and following the deployment start and end dates as the pre- and post-deployment years for the purposes of earnings measurement. We include fixed effects for end month of deployment and for pre- and post-deployment calendar years to account for differences across individuals in the time between redeployment and the calendar year in which earnings are measured.

effect of injury on earnings. Our main variable of interest is the indicator for combat death that is part of the *Injury* vector.

A key feature of equation (1) is the use of earnings changes rather than earnings levels as the outcome of interest. By subtracting out earnings in the pre-deployment year, we account for pre-existing differences in earnings between those who do and do not ultimately sustain an injury.[18] The potential for unobserved heterogeneity in earnings trajectories to bias estimates from equation (1) is further mitigated by the inclusion of a wide range of controls (X_i). A large body of research literature dating from Mincer (1974) demonstrates a relationship between demographic characteristics—work experience and education, in particular—and earnings growth. Thus, we include in X_i a range of demographic characteristics including age and age squared, gender, race (white, black, and Hispanic), and educational attainment. Given that exposure to injury and earnings potential may differ across individuals with varying job assignments, we also control for pre-deployment rank and military occupation (36 categories). To account for potential business cycle effects and regional economic conditions, we control for deployment end date and state of residence. Finally, we have access to data on a range of individual-level characteristics that could be correlated with earnings growth, but which are typically unavailable to researchers estimating earnings equations. These characteristics include scores on the Armed Forces Qualification Test (AFQT), an achievement test designed to measure general aptitude, and several measures of pre-deployment health, including indicators for whether the servicemember had recently sought mental health treatment, whether the servicemember reported medical problems, and self-rated pre-deployment health.[19] The inclusion of controls capturing pre-deployment health accounts for the possibility that some of the differences in earnings growth we observe between the injured and uninjured could in theory reflect health problems that existed prior to injury. Table 2.2 includes a complete list of control variables used in the analysis.

To properly measure the earnings effects of injury, we must assume that after conditioning on our control variables idiosyncratic fluctuations in earnings, ε_i, are uncorrelated with injury status. We use differenced earnings and numerous controls

18. One potential concern with estimating equations such as equation (1) is the possibility that earnings growth is also correlated with unobserved individual characteristics—for example, risk-taking attitudes—that are also correlated with injury. Heaton, Loughran, and Miller (2012) provide evidence from prior years that earnings growth trends were substantially similar across injury groups in the years before deployment. This supports the assumption in the regression model that the unobserved heterogeneity is not varying over time.

19. These pre-deployment health variables were obtained from the Pre-Deployment Health Assessment (DD Form 2795) administered by DoD to approximately 74 percent of our sample.

to account for many possible avenues through which this assumption may fail. Nevertheless, it remains possible that there are unobserved factors related to injury that also affect earnings growth, in which case our estimates might overstate or understate the true causal impact of injury on earnings.

The assumption underlying the linear model is that earnings growth is, on average, constant across households, after accounting for the additive effects of the covariates. An alternative approach would be to estimate a model of changes in log-earnings, which would require a different assumption about earnings growth. Here, the requirement about constant earnings growth would apply to log-earnings, which is equivalent to the assumption that earnings growth rates in proportion to earnings are the same across households, instead of absolute growth levels being the same. In estimation of equation (1), we prefer the specification that uses changes in earnings levels as the dependent variable, rather than changes in log-earnings, because it allows us to include observations with zero household income, which is especially relevant for our population of interest.[20]

Household earnings effects as measured using equation (1) incorporate both the direct effect of combat death on earnings that arise from the loss of the servicemember's own earnings as well as changes in productive capabilities and any participation effects for spouses, who are coping with the loss. The earnings effects for spouses may also reflect responses to the survivor benefit compensation system. In theory, the availability of survivor benefits could affect the labor market decisions of surviving spouses by increasing their "unearned income," which, in theory, can induce individuals to consume more leisure (and, conversely, supply less labor) than they would if there were no such system in place. To the extent that these benefits are lower than the lost earnings from the servicemember, this channel should not lower spousal earnings relative to the uninjured case. Nevertheless, our approach cannot disentangle the direct effect of combat death on productive capacity for spouses and the indirect effect from survivor compensation. This distinction is important for understanding how readily our results might generalize to other environments with different rules governing survivor payments. In particular, in environments offering

20. Nevertheless, the logarithmic transformation has some attractive features; it can accommodate the potentially non-normal distribution of the errors in the earnings equation, arising from the fact that earnings are never negative and that the distribution of earnings is right-skewed. We confirmed the robustness of our findings by also estimating the models with a log-earnings specification. The estimated effects of combat death on the change in the log of household earnings in each of the first four years are very large (a decline of about 2 log-points for both AC and RC) and highly statistically significant. Accounting for recurring survivor benefits reduces the negative estimated impact to a decline of 0.6 in changes in log-income for the AC and a decline of 0.5 log-points for the RC (all significantly different from zero). One reason specifications in logs and levels tend to give similar results in this context is that among the military population earnings distributions tend to more closely approximate a normal distribution than among the general population.

survivor benefits substantially above or below current levels, or with different labor market disincentives for beneficiaries, it is possible that we would observe patterns of spousal and household earnings loss that vary from those documented in this report.

4. Results

This Chapter presents the results of estimating equation (1) for a variety of financial outcomes measured in the first four years following deployment, which we observe for all servicemembers in our sample. We begin by reporting estimates of the effect of combat death on household (servicemember plus spousal) labor market earnings. We then show that household earnings effects are predominantly accounted for by the loss of servicemember earnings. Finally, we show how well survivor benefits from the various sources offset the loss in labor market earnings by reporting estimates for the effect of combat death on total household income after benefit payments.

Impact of Combat Death on Household Labor Market Earnings

Table 4.1 reports the estimated effects of combat death on household earnings in each of the first four years after the death date. These estimates ($\hat{\beta}$ in equation (1)) reflect the difference in earnings growth since the year prior to the deployment between households experiencing combat death and households with no injury in the given year, after controlling for factors that are related to both injury propensity and earnings growth potential. Assuming first-differencing and the inclusion of other controls adequately addresses the potential for omitted variables bias, the estimates can be interpreted as the average difference between actual earnings of households in which a servicemember died and expected earnings for that same household had the servicemember remained uninjured. Because their labor market experiences and opportunities are fundamentally different, we estimate separate models for active and reserve component members.

Household earnings are defined as total military and civilian labor market earnings (as reported to Social Security) for the servicemember and the spouse. The models were estimated separately for each year for members of the active and reserve components. The sample includes deployments by married servicemembers ending between June 2003 and December 2006. We exclude households with missing information (when we were unable to match military records with SSA data). In each year, the sample size is 224,977 for AC members and 122,101 for RC members.

Table 4.1—Estimated Effect of Combat Death on Household Labor Market Earnings ($2010), By Component and Year

Year after deployment	AC	RC
1	-63244**	-58701**
	(1072)	(1775)
2	-66648**	-62104**
	(1089)	(1811)
3	-66566**	-64361**
	(1107)	(1879)
4	-67297**	-64594**
	(1156)	(1949)
Observations	224977	122101

Notes: Heteroskedasticity-robust standard errors are in parentheses. ** denotes statistical significance at the 1% level.

For each component, and for each of the first four years, we find that combat death leads to sizable and statistically significant declines in household earnings. This is not surprising, of course, because of the loss of servicemember earnings. The size of the household earnings loss ranges from $63,000 to $67,000 for the AC and from $59,000 to $65,000 for the RC.

These amounts are comparable to, but larger than, average income in the pre-deployment year for servicemembers who died from combat injuries—$50,405 for the AC and $48,138 for the RC (see Table 2.2). One reason household income loss is above servicemember income before deployment is that the servicemember's own earnings would likely have increased after their deployment, had they survived. This is suggested by the earnings for uninjured servicemembers, which grew from $53,713 in the pre-deployment year to $66,769 in year 4 post-deployment for the AC ($81,931 household earnings minus $15,161 spousal earnings, Table 2.2) and $53,925 in the pre-deployment year to $64,511 in year 4 post-deployment for the RC ($86,911 household earnings minus $22,400 spousal earnings, Table 2.2).[21] A second reason for the large losses is that spousal income may have also declined. We explore this empirically in the next section.

21. The level of income growth experienced by members of the control group depends on how long they remain in the military, whether or not they are deployed again (between January 2007 and December 2010), as well as their civilian labor market opportunities. See Heaton, Loughran, and Miller (2012) for information on separation rates over the first four post-deployment years. The current study focuses on the first four years after deployment. Although initial estimation (on the sub-sample of deployments ending in 2003) suggests that the earnings effects are stable from years 4 to 7, future work will be needed to determine the long-term financial effects of combat injury and death.

From the perspective of military compensation policy, these estimates of the effect of injury on labor market earnings are valuable because they are relatively invariant to the particular set of disability policies and programs in place at a particular moment in time.[22] The estimates thus provide positive guidance regarding the amount of compensation needed to replace lost earnings over time for households experiencing combat deaths, which is different from the normative questions of how financial compensation to surviving spouses and children should be structured and of how large benefits should be relative to the servicemember's pre-injury earnings or the income the household would have enjoyed if the servicemember had not been injured.

Impact of Combat Death on Spousal Earnings

It is not obvious theoretically how combat deaths would affect the earnings of surviving spouses. On the one hand, spousal earnings may decline if the loss of their spouse has psychological effects that limit their ability to participate in the labor market, or if they face increased time demands at home, for example, related to childcare. To the extent that short-term compensation in the form of death benefits increases household income (we explore this in the next section), there may also be positive income effects that lead to lower spousal labor market attachment. Spouses receiving survivor benefits from SSA can also face high effective tax rates on their earnings after they exceed a preset threshold. On the other hand, spousal earnings may increase, possibly after some delay, if surviving spouses decide to increase their labor market participation and human capital investments in response to the income loss from their spouse. It is also possible that spousal earnings would not be affected by combat deaths, especially if spouses remarry within a few years of the loss.

Table 4.2—Estimated Effect of Combat Death on Spousal Labor Market Earnings ($2010), By Component and Year

Year after deployment	AC	RC
1	-4600**	-7673**
	(448)	(899)
2	-5459**	-8527**
	(480)	(934)
3	-5270**	-8841**
	(517)	(976)
4	-5215**	-8329**
	(547)	(1047)
Observations	224977	122101

Notes: Heteroskedasticity-robust standard errors are in parentheses. ** denotes statistical significance at the 1% level.

22. They are not completely invariant because of the incentive effects described in the previous section.

Table 4.2 shows estimates for the impact of combat deaths on the earnings of surviving spouses. The sample includes all spouses who were married to the servicemembers prior to their deployment, and does not condition on later changes in marital status. Sample sizes are identical to the previous table: 224,977 for AC members and 122,101 for RC members.

The results indicate that surviving spouses had lower earnings in the years after their spouses' deaths. The size of this loss is about $4,500 to $5,500 for spouses of AC members and $7,500 to $8,500 for RC spouses. These amounts tend to increase between the first and second year and then remain surprisingly stable through year 4 after the death. This indicates that the psychological effects or time demands on surviving spouses may remain barriers to full labor force participation for several years. It is also possible that these declines in earnings are related to an income effect response to cash compensation received through the survivor benefits described in Chapter 2, and particularly to a substitution effect from the labor market disincentive created by the reduction in survivor payments from SSA for income levels above a preset threshold.

The estimated amounts of spousal income loss are nontrivial, but they reflect only about one tenth of the overall effect of combat death on household earnings. This confirms that the *main* source of the decline in household earnings is the loss of the servicemember's earnings. It is consistent with the general pattern that spousal earnings account for less than a third of total household earnings.

Impact of Combat Death on Household Income from All Sources

The previous sections calculated the impact of combat deaths on household earnings. This section computes the impact of combat death on total household income by adding in the value of financial support to surviving spouses and children provided by the DoD, the VA, and the SSA, as described in Chapter 2.

Table 4.3 first considers net income effects after taking into account recurring but not lump-sum survivor benefits.[23] The table's first two columns focus on members of the AC while the second two focus on RC members. In each case, one column includes labor market earnings plus all recurring payments from DoD and VA (for retirement, disability, or survivor benefits) and the next adds payments from SSA as well. Sample sizes in this table are slightly lower than those in previous tables because we now exclude households in which the servicemember died for reasons that were

23. Recurring payments include the SBP, DIC and SSIA, as well as SSA benefits. Lump-sum payments are from SGLI, TSGLI, Death Gratuity, and combat zone tax forgiveness.

Table 4.3—Estimated Effect of Combat Death on Household Income ($2010), By Component, Year, and Income Definition

	Active Component		Reserve Component	
Year after deployment	with Recurring DoD and VA Payments	with Recurring DoD, VA, and SSA Payments	with Recurring DoD and VA Payments	with Recurring DoD, VA, and SSA Payments
1	-26799**	-4290**	-21487**	5255*
	(970)	(1112)	(1718)	(2115)
2	-36045**	-17387**	-30136**	-7978**
	(977)	(1049)	(1744)	(1966)
3	-36939**	-18564**	-33867**	-12647**
	(1000)	(1071)	(1821)	(2033)
4	-38441**	-20231**	-34738**	-14270**
	(1050)	(1116)	(1873)	(2069)

Notes: Heteroskedasticity-robust standard errors are in parentheses. * denotes statistical significance at the 5% level, ** at the 1% level.

not combat-related.[24] In the remaining analysis, we observe 224,121 AC households and 121,864 RC households.

The results in the table show that recurring survivor benefits from the DoD and VA, as well as those from SSA, make a substantial contribution to the financial well-being of surviving spouse households. After adding in all forms of recurring survivor payments (in columns 2 and 4), the estimated effects of combat-related death remain negative and statistically significant. However, the income losses are 70 percent smaller than the earnings losses for AC members and 78 percent smaller than the earnings losses for RC members in Table 4.1. Hence, these recurring payments are having a meaningful impact by offsetting over two-thirds of the household earnings losses. Nevertheless, the average annual decline in household income for surviving spouse households remains on the order of about $20,000 (for active component spouses) and $14,000 (for reserve component) in the fourth year after the death.

The preceding calculations do not account for the large lump-sum payments that typically are received by survivors in the first year following a combat fatality. A natural question is how to factor in these payments in thinking about the overall income loss experienced by survivors. One approach is to compute how many years of the net decline in income could be replaced using the value of the lump-sum payments. This metric is a natural one if we imagine that the surviving spouse saves

24. The reason for this exclusion is that we were not able to obtain historical information on death benefits payments to their surviving spouses. Including these individuals without accounting for all of their income would introduce a positive bias in the estimates. The bias would likely be small, because these individuals are only a tiny fraction of the sample, but we nevertheless prefer to exclude them to ensure the validity of the estimates.

the bulk of the payment in an interest-bearing account, and only withdraws the amount needed each year to cover the shortfall between actual and expected income. However, while this calculation can provide one useful benchmark, it is worth noting that it omits any changes in household expenditures related to the servicemember's death. Some expenses will likely decline (such as food and clothing), but others may increase (childcare). For simplicity, we assume the real interest rate is zero.

For members of the AC, the total impact of combat deaths on household income over the first four years, excluding lump-sum payments, is -$60,472. The annual net income loss in year 4 was $20,231 (in 2010 dollars), which we assume stays constant in real terms in all future years.[25] The average value of the lump-sum payments was $822,865 for these households. This implies that the lump-sum payments could be used to maintain household income at a level equal to what it would have been had the servicemember not been injured for nearly 42 years after the servicemember's death.

For members of the RC, survivor compensation is even higher relative to earnings losses. These households experienced income losses over the first four years after the member's death totaling $40,130, with losses of $14,270 in year 4. Their lump-sum payments amounted to $828,085. Assuming that the annual income loss remains level at $14,270, this implies that the lump-sum payment could be used to replace the annual income losses for over 59 years after the servicemember's death.

Because of the progressive tax system, the value of the tax advantage for large lump-sum payments made in a single year can be substantially larger than the value of the tax advantage for the same total amount paid over many years. To avoid overstating the value of the lump-sum payments, we also provide a lower-bound calculation that takes the very conservative approach of omitting the value of the tax advantage for lump-sum payments entirely. The value of lump-sum payments to AC spouses assuming zero tax advantage is $547,572, which could be used to maintain household income for on average 28 years after the servicemember's death. For RC spouses, the lump-sum payments are worth $551,257 without the tax advantage (the slight difference between components is due to differences in timing of payments, TSGLI receipt, and combat zone tax forgiveness amounts), which implies that households could maintain their expected income for nearly 40 years following the servicemember's death.

25. These results are not particularly sensitive to the assumption of constant income loss after year 4. For example, if we allow for future income for the comparison group to grow at 1.5 percent per year in real terms (about double average annual real income growth observed in the U.S. between 1992 and 2006), the lump sum payments would still last for over 33 years for AC households and over 44 years for RC households.

These calculations indicate that although the current lump-sum payments may not be sufficient to permanently replace the lost income associated with combat death, they are sufficient to replace lost income for surviving spouses and children for a transition period lasting several decades.

5. Discussion

The results in the preceding chapter demonstrated several patterns with respect to earnings loss: 1) household earnings losses following combat death of a household member are economically large and persistent over time; 2) most (approximately 90 percent) of these losses can be attributed to the loss of the deceased servicemember's own earnings, with the remainder attributable to declines in spousal earnings; 3) recurrent benefits replace a substantial fraction of earnings losses, but meaningful income losses remain after taking into account these benefits; and 4) accounting for both recurrent and lump-sum benefits suggests that combined benefits can fully offset household earnings losses for 20 years or more.

To what extent do these results allow us to draw conclusions about whether benefits are large or small, adequate or inadequate? Such questions are normative and the answers depend in large part on the overarching goals and constraints associated with a particular compensation system. Heaton et al. (2012), for example, argue that the structure and amount of compensation provided to families of combat casualties should adjust to reflect policymaker preferences regarding the desirability of fulfilling goals such as compensating for economic loss, ensuring a stable inflow of new personnel into the military, and appropriately recognizing the sacrifice of those who have given the ultimate sacrifice in serving the country. While normative questions surrounding benefit adequacy are important, resolving them lies beyond the scope of the present inquiry.

At the same time, our analysis does allow us to construct metrics likely to be useful to policymakers in considering whether current compensation policies meet the normative and other goals of DoD, families of servicemembers, and the public at large. One class of measures that capture the extent to which disability payments compensate for lost earnings are "replacement rates," which take ratios of income after benefits to income available without benefits. In some cases replacement rates are measured with reference to earnings prior to the injury, while in other settings replacement rates are measured relative to contemporaneous or expected future income. One reason both measures are commonly used to think about the size and adequacy of benefits is that the two measures can be used to inform different policy questions. For example, if the primary goal of a compensation policy is to ensure the injured households are no worse off economically than they were prior to the

injury, then pre-injury earnings is likely to provide an informative denominator in the replacement rate. Alternatively, if the goal of a compensation policy is to ensure that households experiencing injury are as well-off as they would have been had no injury occurred, a replacement rate that takes into account wage growth and other dynamics of earnings is likely to be preferred. Among economists, who typically think of welfare in utility rather than monetary terms, the latter approach is likely to provide a more natural starting place, but there is no consensus on this issue.

Recognizing the potential usefulness of different measures, in the discussion that follows we consider two different ways of constructing the replacement rate. Both replacement rate measures that we use gauge financial well-being using household income. As mentioned in the previous chapter, however, it is worth noting that the death of a servicemember may also affect household expenses. Some living expenses, such as food and clothing, will decline, while others, related to childcare and home repairs, may rise. Because of these changes in expenses, income-based approaches that do not account for changes in household size will provide an incomplete picture of financial well-being. Although it is not obvious how to account for the various changes in household expenditures that may follow a combat death, an expenditure-based concept can still be useful in interpreting the pattern of income-based replacement rates reported in this chapter. In particular, it provides some rationale for why higher replacement rates for households with (more) children may be appropriate. The proportional decrease in family size is smaller in those households and those households are more likely to experience increased expenses related to childcare.

Household Earnings Replacement Rates

We first consider replacement rates relative to expected household income in the absence of injury as a measure of how survivor benefits affect the financial status of the household relative to what it would have been if the servicemember has not been injured. We call this the "household earnings replacement rate", which we define as the ratio of total household income, including spouse earnings and survivor benefits, relative to predicted household income if the servicemember had not been injured. Consider a household in which a surviving spouse has $10,000 in earned income and receives $50,000 in survivor compensation, bringing their total income to $60,000. If the household would have earned $70,000 in that year had the servicemember not been injured ($50,000 for the member and $20,000 for the spouse), then the estimated replacement rate for that household in that year would be 86% = $60,000/$70,000. This replacement rate measure provides an indication of how economically well-off an injured household would be relative to a similar uninjured household.

We computed expected household income for each surviving spouse household in each post-deployment year by adding the predicted increase in household income from the regression model described in Chapter 3 to actual household income in the pre-deployment year ignoring the parameter estimates for injury. Thus, expected household income is the household income our regression model predicts a servicemember would have earned in a given post-deployment year had that servicemember not been injured. A decline in household income relative to expected household income results in a replacement rate of less than 100 percent; an increase in household income relative to expected household income results in a replacement rate of more than 100 percent.

Table 5.1 reports the median[26] household earnings replacement rates across households for AC members, with the top panel calculating these replacement rates using only recurrent payments, and the bottom panel incorporating both recurrent and lump-sum payments.

The median household earnings replacement rate for the AC decreases from 87 percent to 78 percent over the first four years after the servicemember's death. The decline is likely due to the termination of some transition benefits (from VA and SSA) as well as the increasing likelihood that the dependent children have become adults or that the surviving spouse has remarried (household size is defined based on the year before the servicemember's deployment). Consistent with the fact that some benefits are only available for households with dependent children, the replacement rates are lowest for households with no children and tend to increase with family size. These patterns are also present for members of the RC, whose median replacement rates are reported in Table 5.2. Without accounting for lump-sum payments, median replacement rates in the RC decline from 105 percent to 88 percent over the first four years after the death. The finding that replacement rates for both AC and RC households tend to be below 100 percent when only recurring payments are considered is consistent with the regression model estimates in Table 4.3 showing a negative average impact of combat death on household income, after including recurring payments from DoD, VA, and SSA.[27]

26. We report median values because they are less sensitive to outliers than the mean, and may more accurately capture the experience of the "typical" household that experiences a fatality. Because the distribution of replacement rates is right-skewed, the median is also a more conservative measure of the central tendency. For each of the household size groups and years that we consider, the mean replacement rate for that group is larger than the median rate reported in the table. The mean values of the year 4 replacement rates that exclude lump sum payments are statistically different from 100% at the 95% confidence level for both the AC and RC. The 95% confidence intervals for the mean replacement rates that include lump sum payments are larger than 100% for both the AC and RC.

27. Because the function is non-linear and replacement rates vary across individuals, there is no reason to expect that the average replacement rate would equal the ratio of average survivor benefits to average expected household income.

Table 5.1—Median Household Earnings Replacement Rates: Active Component

No Lump-Sum Payments					
		Year 1	Year 2	Year 3	Year 4
All Deaths		0.87	0.81	0.79	0.78
By number of children					
	0	0.51	0.49	0.49	0.49
	1	0.90	0.82	0.81	0.77
	2	1.01	0.93	0.92	0.89
	3+	1.11	1.01	0.99	0.96

Lump-Sum Payments Amortized over 20 Years (without Tax Advantage)					
		Year 1	Year 2	Year 3	Year 4
All Deaths		1.29	1.19	1.19	1.16
By number of children					
	0	1.05	0.98	0.96	0.93
	1	1.32	1.21	1.22	1.16
	2	1.39	1.30	1.28	1.24
	3+	1.49	1.37	1.33	1.29

Lump-Sum Payments Amortized over 20 Years (with Tax Advantage)					
		Year 1	Year 2	Year 3	Year 4
All Deaths		1.42	1.29	1.28	1.24
By number of children					
	0	1.17	1.08	1.04	1.00
	1	1.46	1.31	1.31	1.25
	2	1.54	1.41	1.37	1.32
	3+	1.62	1.48	1.43	1.39

Table 5.2—Median Household Earnings Replacement Rates: Reserve Component

No Lump-Sum Payments					
		Year 1	Year 2	Year 3	Year 4
All Deaths		1.05	0.97	0.91	0.88
By number of children					
	0	0.75	0.69	0.63	0.62
	1	0.94	0.84	0.77	0.76
	2	1.15	1.04	0.99	0.93
	3+	1.30	1.20	1.11	1.12

Lump-Sum Payments Amortized over 20 Years (without Tax Advantage)					
		Year 1	Year 2	Year 3	Year 4
All Deaths		1.49	1.33	1.29	1.22
By number of children					
	0	1.15	1.12	1.03	1.06
	1	1.43	1.29	1.18	1.15
	2	1.51	1.33	1.31	1.27
	3+	1.80	1.60	1.50	1.46

Lump-Sum Payments Amortized over 20 Years (with Tax Advantage)					
		Year 1	Year 2	Year 3	Year 4
All Deaths		1.63	1.45	1.38	1.31
By number of children					
	0	1.27	1.21	1.10	1.13
	1	1.56	1.40	1.28	1.24
	2	1.63	1.42	1.38	1.34
	3+	1.97	1.73	1.62	1.55

In incorporating the lump-sum payments into our replacement rate calculations, we must make a judgment as to how spread these payments across different years. Rather than assign them all to the first year, we include 5 percent of the value in each year. Assuming that real interest rates of about zero, this is the annual amount that the household would have available in each year if they spread the lump-sum amount over 20 years after the servicemember's death. The choice of 20 years is somewhat

arbitrary, but it is meant as an upper bound on the time it would take for a new child, born in the year after the servicemember's death, to reach adulthood.[28]

After accounting for lump-sum payments, we find overall replacement rates for both the AC (Table 5.1) and RC (Table 5.2) that are above 100 percent for a 20-year horizon, even when we omit the value of the tax advantage for the lump-sum payments.[29] Replacement rates are even higher when we add the value of the tax advantage on the portion (1/20) of the lump-sum payment attributed to each post-deployment year. This pattern is consistent with the calculations in the Chapter 4 that lump-sum income, allowing for the tax advantage or not, could replace lost earnings for over two decades.

The fact that estimated household earnings replacement rates are substantially above 100 percent may raise questions about the appropriateness of current levels of survivor compensation for these families. We note that there are economic arguments for providing replacement rates above 100 percent. First, a large body of evidence suggests that individuals typically enjoy real wage gains as they grow older, particularly early on in their careers. Survivor payments typically do not increase over time in real terms, meaning that over time the relative value of these benefits is likely to erode, and indeed the patterns in Tables 4.3, 5.1, and 5.2 suggest such erosion. Taking a lifecycle perspective, it may be logical to provide benefits above full replacement initially to account for the fact that those killed in combat will not enjoy the earnings growth expected for their uninjured peers. Economic theory also suggests that replacement rates above 100 percent can be justified for occupations (e.g., policing, fire fighting, military service) in which calculated risk-taking is desirable (Seabury, 2002), a perspective that might also rationalize higher payments for military versus civilian surviving households. Indeed, as seen here for the military, it is common for states and municipalities to provide police and firefighters with special payments in the event of disability or death above and beyond what would be given to the general public, leading to higher than typical replacement rates (LaTourrette, Loughran, and Seabury 2008). Moreover, replacement rates above 100 percent might also serve to partly compensate families for non-pecuniary losses, such as lost companionship of a loved one. Payments for such non-pecuniary losses are common in other compensation contexts involving injury and death.

28. Amortizing over a shorter horizon would increase the annual value of the lump sum payments and hence increase the replacement rate. Using a longer horizon would decrease the replacement rates.

29. The exception is for AC households with no dependent children, two or more years after the servicemember's death. Median replacement rates remain over 90 percent.

Replacement Rates Relative to Pre-Deployment Member Earnings

As an alternative replacement rate measure, in Tables 5.3 and 5.4, we consider replacement rates defined relative to the servicemember's own earnings in the pre-deployment year. We call this to "own earnings replacement rate." This measure focuses on the flows of income into the household attributable to the servicemember and allows us to assess whether households experiencing a combat death are as economically well-off following receipt of benefits as they were prior to the loss of life. The top panels of Tables 5.3 and 5.4 show that median[30] own earnings replacement rates tend to be below 100 percent when we only consider recurring payments.

The bottom two panels of Tables 5.3 and 5.4 show own earnings replacement rates that account for the value of lump-sum payments. Excluding the value of the tax advantage, median replacement rates over years 1-4 are roughly 170 percent for the AC and 190 percent for the RC. Including the tax advantage increases the median rates to about 185 percent for the AC and 200 percent for the RC. Replacement rates generally increase with the number of children. Across all family sizes, years, and components, replacement rates after accounting for these lump-sum payments are above 140 percent relative to the servicemember's own pre-deployment earnings.

30. For this definition of the replacement rate in particular, the mean replacement rate is especially likely to be influenced by outlier observations with unusually high replacement rates in cases where the servicemember had very low pre-deployment income. The mean own earnings replacement rates corresponding to the family size groups and years after deployment in Tables 5.3 and 5.4 are in all cases larger than the median rates reported in the tables. As expected, the difference between mean and median rates is larger under this definition of the replacement rate than for the replacement rate relative to household income in Tables 5.1 and 5.2. The mean year 4 replacement rates that exclude lump sum payments are not statistically different from 100% at the 95% confidence level for either the AC or RC. At the 95% confident level, the mean replacement rates that include lump sum payments are statistically different from 100%, but not statistically different from 200%.

Table 5.3—Median Own Earnings Replacement Rates Relative to Pre-Deployment Member Earnings: Active Component

No Lump-Sum Payments				
	Year 1	Year 2	Year 3	Year 4
All Deaths	0.68	0.67	0.66	0.68
By number of children				
0	0.56	0.55	0.57	0.57
1	0.72	0.68	0.67	0.67
2	0.71	0.71	0.68	0.69
3+	0.80	0.76	0.75	0.78

Lump-Sum Payments Amortized over 20 Years (without Tax Advantage)				
	Year 1	Year 2	Year 3	Year 4
All Deaths	1.74	1.70	1.70	1.70
By number of children				
0	1.41	1.40	1.40	1.40
1	1.88	1.78	1.75	1.76
2	1.84	1.82	1.83	1.83
3+	1.89	1.84	1.83	1.83

Lump-Sum Payments Amortized over 20 Years (with Tax Advantage)				
	Year 1	Year 2	Year 3	Year 4
All Deaths	1.93	1.87	1.85	1.83
By number of children				
0	1.59	1.56	1.53	1.53
1	2.07	1.95	1.89	1.91
2	2.02	1.97	1.97	1.95
3+	2.08	1.98	1.99	1.96

Table 5.4—Median Own Earnings Replacement Rates Relative to Pre-Deployment Member Earnings: Reserve Component

No Lump-Sum Payments				
	Year 1	Year 2	Year 3	Year 4
All Deaths	0.74	0.72	0.71	0.72
By number of children				
0	0.75	0.75	0.72	0.68
1	0.75	0.71	0.72	0.74
2	0.70	0.68	0.68	0.68
3+	0.78	0.78	0.76	0.74

Lump-Sum Payments Amortized over 20 Years (without Tax Advantage)				
	Year 1	Year 2	Year 3	Year 4
All Deaths	1.96	1.90	1.86	1.84
By number of children				
0	1.69	1.65	1.65	1.65
1	1.97	1.92	1.88	1.91
2	1.93	1.82	1.79	1.80
3+	2.12	2.03	1.99	2.02

Lump-Sum Payments Amortized over 20 Years (with Tax Advantage)				
	Year 1	Year 2	Year 3	Year 4
All Deaths	2.17	2.07	2.03	1.97
By number of children				
0	1.91	1.84	1.84	1.87
1	2.19	2.12	2.05	2.03
2	2.12	1.98	1.94	1.94
3+	2.33	2.21	2.17	2.17

The median own earnings replacement rates presented in Tables 5.3 and 5.4 tend to be smaller than the household income replacement rates presented in Tables 5.1 and 5.2 (though not for all sub-groups) when the lump-sum payments are not considered. This may seem surprising at first because the base (the denominator in the fraction) is larger in the earlier tables where it includes both spousal earnings and income growth over time. This decreases the replacement rates in Tables 5.1 and 5.2 compared to those in Tables 5.3 and 5.4. However, the household income measure also includes spousal income in the numerator, which increases the replacement rate, because the decline in spousal earnings after the fatality is much smaller than the total elimination of the servicemember's own earnings.

One virtue of basing the replacement rate on the servicemember's pre-deployment earnings is that it allows for a rough comparison between compensation provided to survivors of combat death and compensation provided in some other contexts. For example, family members of civilian DoD employees who die while performing their official duties are compensated based on the provisions of the Federal Employee Compensation Act (FECA) using a compensation formula based on prior earnings. Under FECA, spouses of deceased civilian federal employees are entitled to recurring payments of 50 percent of base pay if they have no children, 60 percent if one child, and 75 percent if two or more children. Civilian federal employees also receive a lump-sum insurance payment similar to the SGLI payment through the Federal Employees Group Life Insurance (FEGLI) program; the default FEGLI amount is approximately equal to the decedent's annual pay plus $2,000.[31]

One natural comparison here is to consider the median own earnings annual replacement rate for military survivors based on the military compensation system to that of civilian DoD survivors provided by the civilian compensation system described above.[32] When we consider recurring payments in year 4 only (in the last column of the top panel of Table 5.3 and Table 5.4), we see that the military compensation system provides a higher replacement rate for both actives and reserves except in the case of families with two children, for whom replacement rates are a few percentage points below those in the civilian sector. After taking into account

31. Reservists who also have civilian federal jobs who are activated and killed in combat may also be eligible for some components of FEGLI, but we ignore that possibility in the calculations that follow.

32. Although we incorporate data on military compensation received over all four of the first four post-deployment years in constructing these measures, at a conceptual level these particular replacement rates can be thought of as static over time, since neither the pre-injury earnings nor the absolute amount of the benefit would change under normal circumstances, unless there was a change in the number of dependent children (through marriage or age) or the surviving spouse remarried. In our military sample, we observe at least 627 cases of SBP benefits being terminated for surviving spouses or children because of loss of eligibility. Because we define family size for military households based on the pre-deployment year, this means that our comparison favors the civilian system (where we consider payments for a household that maintains full eligibility).

lump-sum payments amortized over 20 years (the middle panels of Tables 5.3 and 5.4),[33] we see that replacement rates for surviving families of combat casualties are substantially above those for civilian families. This difference can be traced to the higher basic coverage levels provided by SGLI ($400,000) relative to FEGLI (annual earnings + $2,000). If policymakers believe current compensation levels for survivors on the civilian side are adequate, the fact that replacement rates for military families are substantially above these for both the AC and RC suggests that military survivor compensation may also be viewed as adequate.

6. Conclusions

This report developed and estimated an empirical model measuring the financial impact of combat deaths in Iraq and Afghanistan on surviving spouses and children over a four-year horizon. We use information on earnings trajectories for uninjured servicemembers (and their spouses) who were deployed to Iraq or Afghanistan at the same time as those who were killed to estimate counterfactual earnings for what the households with combat fatalities would have earned if the servicemembers had not been injured. The key advantage of our modeling approach is the use of differenced outcome measures, which accounts for unobserved heterogeneity across individuals who ultimately do and do not suffer injury. We further control for a wide range of demographic characteristics in our analysis.

We find substantial household earnings losses following the deaths of servicemembers that increase over the first four years. For AC households the losses increase from $63,000 to $67,000 between years 1 and 4. Losses increase from $59,000 to $65,000 for RC households. Among both types of households, labor market earnings losses are primarily due to the loss in servicemember earnings, but we also observe statistically significant and practically important declines in the earnings of the spouses of fallen servicemembers.

Our discussion and analysis of survivor payments demonstrate that payments come from a variety of sources, including DoD, the VA, and SSA, and represent a mix of both recurrent and lump-sum payments. While recurrent payments alone are insufficient to fully compensate households for earnings losses following the death

33. We do not take into account the tax-advantaged nature of the lump sum payments for this comparison. Under both systems, the lump-sum insurance payments are tax advantaged, but the value of the tax advantage under the civilian system will depend on the (unknown) exact earnings of the surviving spouse. Including the tax advantage would increase the disparity between the military and civilian replacement rates because the lump sum payments are substantially larger for military combat fatalities. Another complication in making the comparison arises from the fact that we do not have data on SSA payments to civilian DoD survivors. Hence, it is worth noting that the median replacement rates for the military fatalities all remain above 100 percent even if we exclude all SSA payments.

of a servicemember, lump-sum payments from SGLI and the death gratuity, when combined with recurrent payments, are sufficient to fully replace lost earnings for several decades.

There are many possible benchmarks one might consider in assessing the magnitude or adequacy of compensation. We discuss two such benchmarks—one based upon replacement of expected future earnings, and one based upon replacement of pre-injury earnings—and present replacement rates calculated for our sample using both benchmarks. Under both approaches replacement rates are generally less than 100 percent (although above two-thirds) when considering recurrent payments only and well above 100 percent after adding in amortized lump-sum payments. We also show that military survivor benefits are generally higher than benefits for survivors in the civilian federal system.

References

Angrist, Joshua D. 1998. Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants. *Econometrica* 66(2): 249–288.

Angrist, Joshua D. 1990. Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records. *The American Economic Review* 80(1): 313–35.

Christensen, Eric, Joyce McMahon, Elizabeth Schaefer, Ted Jaditz, and Dan Harris. 2007. *Final Report for the Veterans' Disability Benefits Commission: Compensation, Survey Results, and Selected Topics.* Alexandria, VA: CNA.

EconSys. 2008. *A Study of Compensation Payments for Service-Connected Disabilities.* Falls Church, VA: EconSys.

Heaton, Paul, James N. Dertouzos, James M. Anderson, and John Mendeloff. 2012. *Compensation for Combat Deaths: Policy Considerations.* DB-633-OSD. Santa Monica, CA: RAND Corporation.

Heaton, Paul and David S. Loughran. 2011. *Post-Traumatic Stress Disorder and the Earnings of Military Reservists.* DRR-5246-OSD-RA. Santa Monica, CA: RAND Corporation.

Heaton, Paul, David S. Loughran, and Amalia R. Miller. Forthcoming. *Compensating Wounded Warriors: An Analysis of Injury, Labor Market Earnings, and Disability Compensation among Veterans of the Iraq and Afghanistan Wars.* MG-1166-OSD. Santa Monica, CA: RAND Corporation.

Karney, Benjamin R. and John S. Crown. 2007. *Families under Stress: An Assessment of Data, Theory, and Research on Marriage and Divorce in the Military.* MG-599-OSD. Santa Monica, CA: RAND Corporation.

LaTourrette, Tom, David S. Loughran, and Seth Seabury. 2008. *Occupational Safety and Health for Public Employees.* MG-792-CHSWC/NIOSH. Santa Monica, CA: RAND Corporation.

Loughran, David S., Jacob Alex Klerman, and Craig Martin. 2006. *Activation and the Earnings of Reservists.* MG-474-OSD. Santa Monica, CA: RAND Corporation.

Loughran, David S., Francisco Martorell, Trey Miller, and Jacob A. Klerman. 2011. *The Effect of the Military Enlistment on Earnings and Education.* TR-995-A. Santa Monica, CA: RAND Corporation.

Obama, Barack. 2009. "Presidential Memorandum - Eleventh Quadrennial Review of Military Compensation." White House Press Office.

Seabury, Seth A. 2002. Public Safety v. Private Risk: Optimal Injury Compensation for Law Enforcement Officers. *Ph.D. Dissertation.* New York: Columbia University, Department of Economics.

Part V

Reserve Components

Chapter 14

Tailoring Active Duty Commitments for Reserve Component Service Members

David R. Graham
Colin M. Doyle
Joseph F. Adams
Robert J. Atwell
Ayeh Bandeh-Ahmadi
John R. Brinkerhoff
William R. Burns
H. T. Johnson
Yevgeniy Kirpichevsky
Drew Miller
Timothy Ni
Michael F. Niles
Steven B. Walser

Executive Summary

The role of the Reserve Components (RC) has changed markedly since the attacks of September 11, 2001. Reservists and Guard members have been activated and deployed in large numbers, and have served as key components of the total force fighting the wars in Afghanistan and Iraq. In addition, the rates at which reservists and Guard members have been utilized are very uneven, both within and across the Military Services. The amount of active duty service expected of one reservist or Guard member may be very different from that expected of another one.

In spite of this reality, all reservists and Guard members sign the same contract to perform inactive duty for training (drill) for one weekend per month and two weeks of active duty for training (annual training) per year, and to be subject to an unspecified amount of involuntary mobilization. This contract, a relic of the Cold War, no longer conveys what Guard members and reservists are actually signing up for because the practices of employing members vary greatly between the Services. Certain military skills and certain types of units are much more in demand than others. Experience also suggests that reservists and Guard members vary widely in their willingness to volunteer for deployment.

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

The Department of Defense (DOD) is currently weighing future mission assignments for the Reserve Components—to include a variety of strategic reserve, operational, technical, and domestic support missions. It is probable that this future mix of assigned missions will sustain, and perhaps accentuate, the differences in utilization across Services, units, and occupations. Service needs could be most efficiently and effectively addressed if they were able to offer reservists and Guard members tailored commitment contracts that set the expectations for their accession and retention decision making. The ability to tailor commitments also would allow reservists and Guard members to commit upfront to specific amounts of time on active duty and time deployed. Those who are willing to serve more might choose a higher commitment, while others might choose a lower level. Reservists and Guard members could match their level of commitment to those areas in which the needs of the Services accorded with their own preferences.

The possibility of tailoring commitments raises a number of questions regarding personnel and compensation policy. The goal of this study is to examine the recent behavior of RC members to determine: (a) if tailoring commitments is feasible, (b) whether tailoring would be cost effective, (c) whether tailoring would be viewed favorably by RC members, and (d) whether major changes in DOD's compensation system would be required to support tailoring.

The study addresses these matters from two perspectives: First, the study team conducted field research with current reservists and Guard members to learn their perspectives on their deployment experience and their attitudes toward tailored commitments. Second, DOD data on deployment experiences and RC members' decisions to join, stay, or leave the military were assessed using two formal quantitative models: the Reserve Component Simulation Model (R-SIM) and the Dynamic Retention Model (DRM).

Both field research and statistical analyses confirm a wide diversity of preferences among RC members regarding the ideal amount of time spent on active duty during a career. The IDA study team found that prospective and current reservists and Guard members, if offered the choice, would separate into higher and lower levels of commitment, with substantial numbers in each category. The fact-finding conducted for this study, coupled with the findings of a prior IDA study on self-selection for active duty,[1] confirms that de facto commitment choices already happen on an informal basis.

1. David R. Graham, Joseph F. Adams, John R. Brinkerhoff, William R. Burns, Colin M. Doyle, Hansford T. Johnson, Yevgeniy Kirpichevsky, Robert B. Magruder, Steven Mortimer, Saul Pleeter, and Susan L. Rose, *Self-Selection as a Tool for Managing the Demands on Department of Defense (DOD) Personnel*, IDA Paper P-4606 (Alexandria, VA: Institute for Defense Analyses, November 2010).

Research also confirms that when offered a choice of commitments, the split between those choosing the higher and lower commitments can be altered by tying compensation to the commitment choice. The statistical analyses show that the additional compensation required to raise the percentage of personnel choosing a high commitment contract is quite modest in some components. Conversely, they show that sizable numbers of recruits would accept reduced compensation if it were paired with a lower commitment contract.

Overall, the findings suggest that the ability to tailor commitments could provide a valuable tool for managing RC members. The study team concluded that tailoring commitments would be:

1. Feasible. All of IDA's lines of research suggest that recruits and members will be willing to sort themselves into higher and lower levels of commitment. Substantial numbers of members would choose to join units in which a high optempo was necessary.
2. Cost effective for DOD. IDA's results show that many Reserve Component members would choose high commitment contracts even in the absence of additional compensation incentives. Other members would accept reduced compensation if linked to reduced commitments. Offering a choice among commitment contracts increases the total pool of individuals willing to join.
3. Beneficial to RC members. The improved understanding of commitments and the ability to choose commitments allow individuals to make better informed decisions consistent with their preferences. IDA's field research revealed that RC members wish to choose their level of commitment (and to a limited degree can already do so). Thus, individuals are better off than if they were faced with a take-it-or-leave it choice for a commitment contract.
4. Compatible with compensation policies. The study team finds that the inducements (if any) needed to realize an appropriate system of tailored commitments would be moderate, and could be administered through existing programs. It is likely that they could be accommodated through bonuses or other incentives that are compatible with current and proposed compensation policy.

Instituting a system of tailored commitments would require designing new contracts and mapping mission needs to each offer. The recruiting systems for the Guard and Reserve would need to be revamped to take into account the different commitment requirements of each unit and to set the expectations of potential recruits. Finally, a management framework would need to be put in place to design

and implement the system and to adjust compensation to match the demands of the Services with the influx of contracted recruits.

1. Introduction

The role of the Reserve Components (RC) has changed markedly since the attacks of September 11, 2001. Reservists and Guard members have been activated and deployed in large numbers, and have served as key components of the total force fighting the wars in Afghanistan and Iraq. Data will be presented later in this paper to demonstrate these unprecedented demands. The data shall also show that the rates at which reservists and Guard members have been utilized are very uneven, both within and across the Services. The amount of active duty service expected of one reservist or Guard member may be very different from that of another one.

In spite of this reality, all reservists and Guard members sign the same contract to perform inactive duty for training (drill) for one weekend per month and two weeks of active duty for training (annual training) per year, and to be subject to an unspecified amount of involuntary mobilization. In addition to this general commitment, the Secretary of Defense has issued guidance to the Military Services setting the goal that reservists and Guard members should not be required to serve involuntarily for more than one year out of every six on active duty (or the equivalent thereof).

This contract, a relic of the Cold War, no longer conveys what Guard members and reservists are actually signing up for. It has become abundantly clear that certain military skills and certain types of units are much more in demand than others. Reservists and Guard members in these high-demand fields already have very different expectations of service than those in other fields, despite signing the same contract. This study will demonstrate that the practices of employing reservists vary greatly among the Services, both in the overall amount of active duty and deployed time served, and in the frequency and length of the active spells.

It is also reasonable to assume that although all reservists and Guard members currently sign the same contract, their preferences for active duty and deployed time, and their willingness to serve, may vary greatly.

These issues could be addressed by offering tailored commitments to reservists and Guard members. Tailored commitments would allow reservists and Guard members to commit upfront to specific amounts of time on active duty and time deployed. Those who are willing to serve more might choose a higher commitment, while others might choose a lower level. Reservists and Guard members would match themselves to those units or occupations in which the needs of the Services accorded with their own preferences.

The Comprehensive Review of the Roles and Missions of the Reserve Components[2] identified a set of disparate missions for the Reserve Components in the future, each requiring different skills and patterns of usage. Tailored commitments could attract talent into specific areas identified by the Comprehensive Review, to include:

- Ongoing demand skills and units: Reservists and Guard members who can expect to be mobilized and deployed equivalent to one year in every six, in line with the current guidance.
- High demand skills and units: Reservist and Guard members who agree upfront to serve more than the typical time deployed in exchange for some additional compensation. Several types of units and occupation have been in high demand in recent years, such as Civil Affairs.
- Strategic reserve units: Reservists and Guard members who can expect to drill each year and be called up only in a time of "existential" national emergency.
- Support to civil authorities: Reservists and Guard members recruited with the expectation that they will serve short missions within the United States (U.S.) homeland.
- Skilled professionals (for example cyber- and information technology (IT)-related occupations): Reservists and Guard members with civilian skills that are relevant to military work could be offered the option to serve a certain number of weeks or months annually to balance civilian and military commitments.

The focus of this study is to determine how individuals would respond to tailored commitments. It does so by drawing on three complementary sources: First, an examination of trends in activation, deployment, accession and retention over the last decade. Second, IDA's interviews with small groups of Reserve Component service members to determine their attitudes regarding mobilization and compensation. Finally, the two statistical models IDA developed to examine the behavior of RC members over the past decade of high activation rates. These models build on and extend a substantial history of studies examining the willingness of individuals to serve in the all-volunteer force (AVF).

The Reserve Component Simulation Model (R-SIM) was developed by IDA for the Office of the Assistant Secretary of Defense for Reserve Affairs to forecast

2. GEN James E. Cartwright and Secretary Dennis M. McCarthy, *Comprehensive Review of the Future Role of the Reserve Component*, Washington, DC: Office of the Vice Chairman of the Joint Chiefs of Staff and Office of Assistant Secretary of Defense for Reserve Affairs, April 2011.

accessions and continuation rate responses to compensation and activation policies. IDA has extended the R-SIM, which was originally built for the Army Reserve Component, to all components, and expanded it to allow for multiple commitment choices. Next, the study team developed IDA's dynamic retention model (DRM), which relates the joining and staying behavior of reservists to the amount of deployment that they can expect over their careers.

The remainder of the paper is divided as follows: Chapter two examines trends in activation and deployment over the past decade. Chapter three describes the results of the interviews. Chapter four describes the results of the statistical model applications. The concluding chapter summarizes the common themes and variations across the study's lines of analysis. It also explains how the findings of the statistical analysis should be viewed in relation to prior studies.

2. Context: The Reserve Components in the Last Decade

Since September 2001, the Reserve Components have experienced a decade of high operational tempo. Activations and deployments, as well as military compensation, have seen significant changes over the last decade; therefore, it is pertinent to consider how Reserve Component members alter their accession and continuation decisions in light of these changes. Data collected in the decade following September 11, 2001 demonstrate the evolution of the Reserve Components and provide essential context for shaping future policies. Because of the new data collected during this period, it is possible to provide a unique analysis that can help to shape future force management techniques for the Reserve Components.

This chapter examines the trends over the past decade in which activations, deployments, and dwell times have changed significantly. The Global War on Terror (GWOT) caused an increased demand for troops, which resulted in more activations and deployments and decreased dwell times. Defense Manpower Data Center (DMDC) activation and deployment data make it possible to determine precisely the level of activations, deployments, and dwell times, and to relate these experiences to individual choices.

Figure 1 depicts the distribution of all active duty spells served since September 2001. The horizontal axis measures the length of an activation in months; the vertical axis measures the total number of activations of that length that have been served. Table 1 lists the percentage of time that those on active duty have spent deployed to theater. When compared to activations before the, GWOT, when relatively few Reserve Component members were activated, the thousands of members activated since the beginning of the war represent a significant increase in operational tempo.

Many members have been activated multiple times to meet wartime demands resulting in shorter dwell times for members of the Reserve Components.

Another perspective on individuals' activation experience is provided by a recent study for the Office of the Under Secretary of Defense for Personnel and Readiness that evaluates the potential for members of the reserve and active forces to self-select

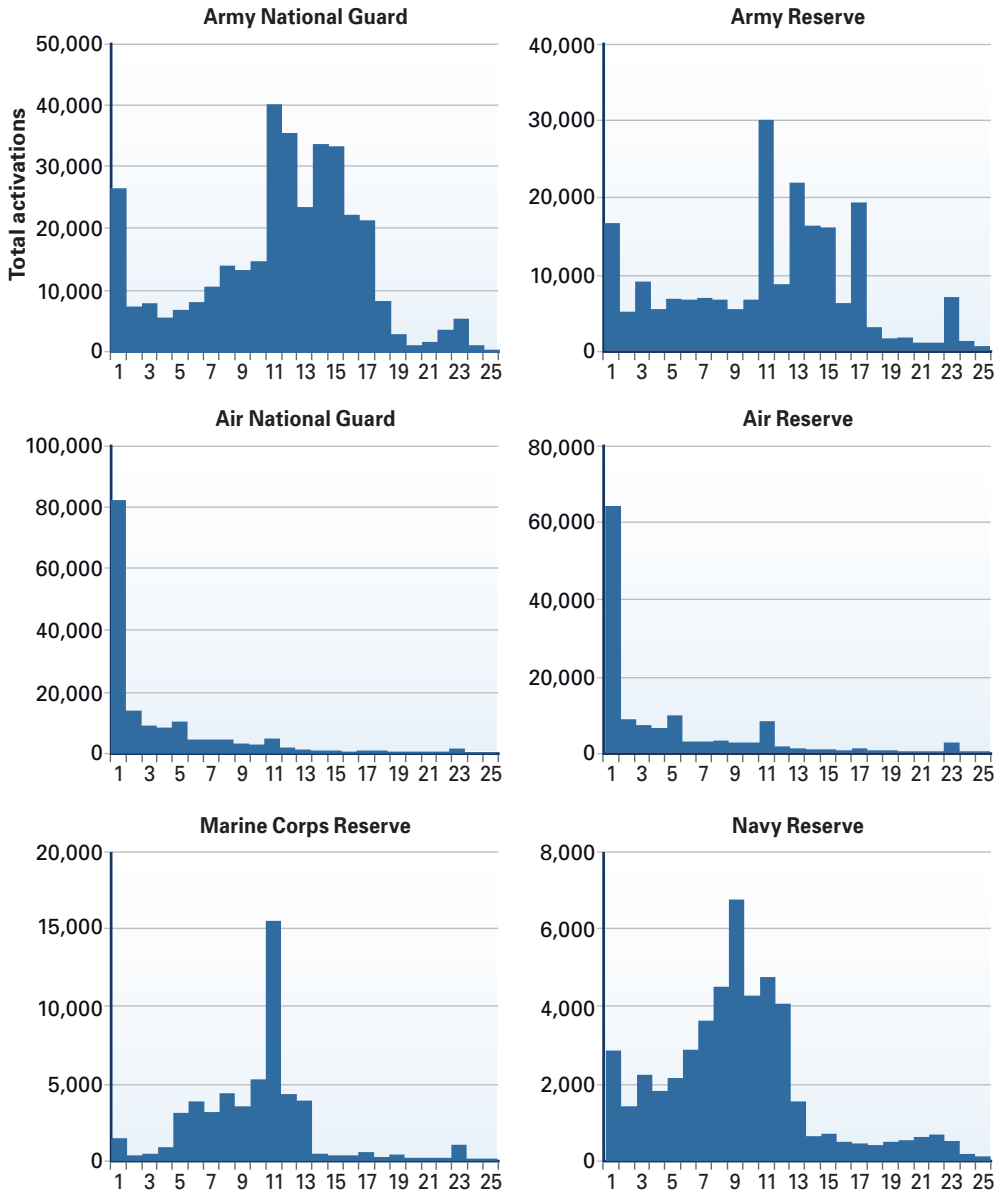


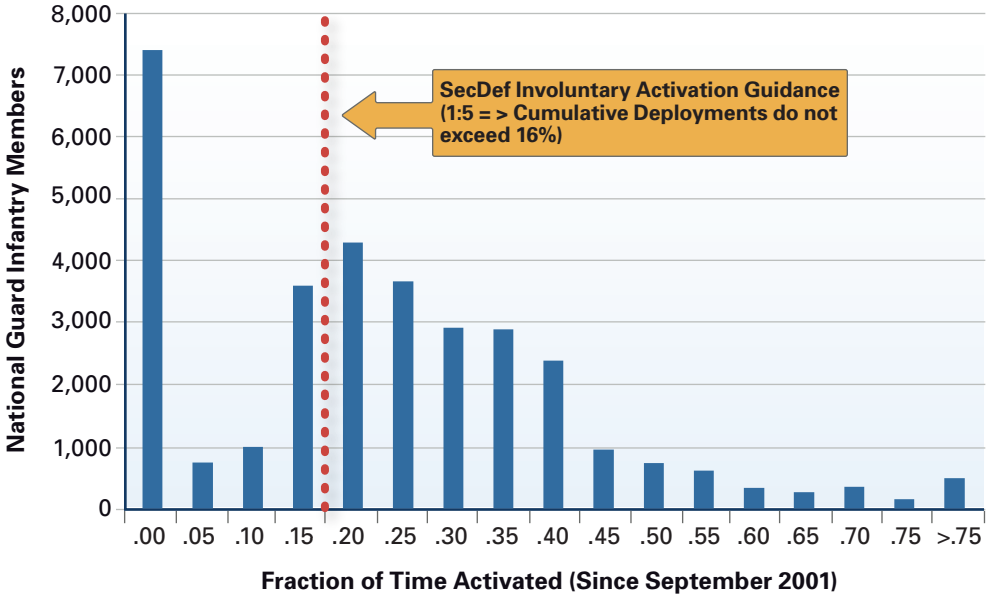
Figure 1. Numbers of Active Duty Spells by Activation Length

for deployments above the goals set by the Secretary. In the study,[3] IDA found tremendous variability in deployment duty time across individuals and that many members of the Guard and reserve are already self-selecting for active duty service beyond their minimum duty requirement.

Table 1. Percentage of Activated Time Spent Deployed

Army National Guard	56.76%
Army Reserve	42.51%
Air National Guard	37.63%
Air Force Reserve	34.36%
Marine Corps Reserve	71.34%
Navy Reserve	45.87%

For the current study, IDA examined data on activations and deployments from the DMDC, matching individual service members with their histories of active duty and deployment. IDA found that the distribution of time served among Guard members and reservists tended to be bi-modal. Figure 2 demonstrates this finding with respect to Army National Guard troops with an infantry occupational specialty. In recent years more than one sixth of this group has been activated at any given time, indicating that the Secretary's guidance that Guard members serve at a 1:5 active duty rotation is not being met in the aggregate. The chart demonstrates that not all members of this occupation have been equally utilized. The horizontal axis



Source: Graham et al., *Self-Selection as a Tool for Managing the Demands on Department of Defense Personnel*, IDA P-4606 (Alexandria, VA: Institute for Defense Analyses, November 2010).

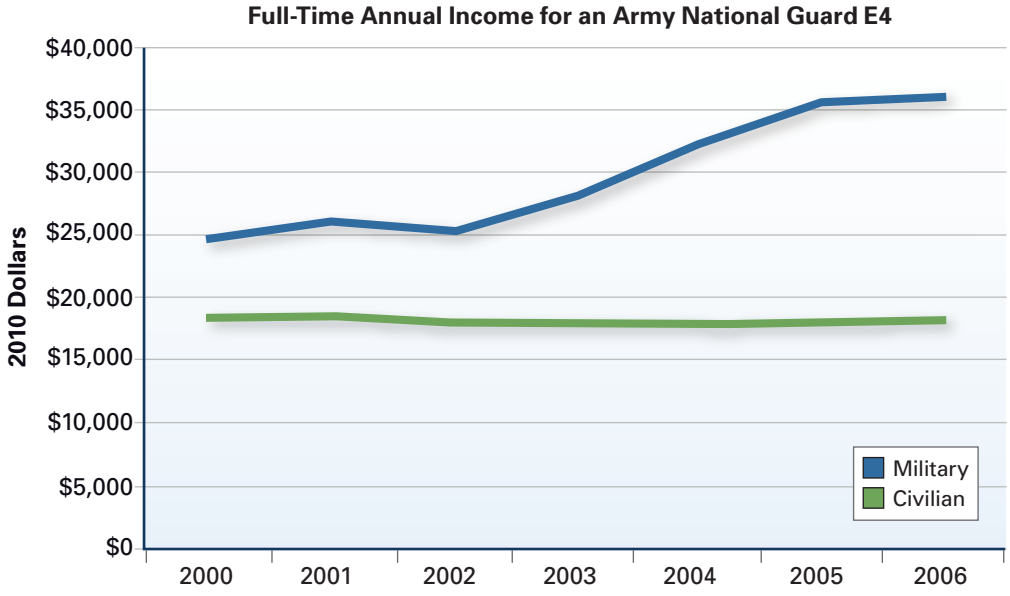
Figure 2. Activation Experience among Individuals in the Army Guard Infantry

3. David R. Graham, Joseph F. Adams, John R. Brinkerhoff, William R. Burns, Colin M. Doyle, Hansford T. Johnson, Yevgeniy Kirpichevsky, Robert B. Magruder, Steven Mortimer, Saul Pleeter, Susan L. Rose, *Self-Selection as a Tool for Managing the Demands on Department of Defense (DOD) Personnel*, IDA Paper P-4606 (Alexandria, VA: Institute for Defense Analyses, November 2010).

plots the fraction of time a member has spent on active duty. The vertical axis plots the number of soldiers (E4 and above) with that history. The red line indicates the fraction appropriate to 1:5 guidance. Many members have never served on active duty, while a substantial number have spent a much greater fraction of their time on active duty than the Secretary's guidance recommends. IDA's research on self-selection finds that at least some of these individuals are choosing to serve additional time on active duty. If offered the choice of tailored commitments, it is likely these Reserve Component members would be willing to select a higher option. Similar patterns are observed in many other occupations and in other Reserve Components.

When making the decision to join the military, individuals must consider their potential civilian and military earnings. It is, therefore, important to consider the relative earnings of military service members compared to civilians with similar qualifications. RAND compiled a data set that calculates civilian earnings and total military compensation of Reserve Component members. These RAND data directly compare the relative difference between military and civilian earnings for individual Reserve Component members; these data indicate what any grade member can expect to earn as a full-time member or as a full-time civilian.

Figure 3 shows an example of full-time military and civilian earnings for enlisted personnel of rank E4. These data show clearly that military earnings are higher than



Source: Figure generated by IDA from data provided by David S. Loughran, RAND Corporation.

Figure 3. Full-Time Annual Income for an Army Guard E4

civilian earnings, and also that military earnings are increasing while civilian earnings are staying relatively flat in real dollars terms. The relative economic value of military service, compared to civilian earnings, has greatly increased since 2000.

This upward trend in military compensation has been accompanied by a weak U.S. economy in recent years. In combination, these factors have substantially increased the financial incentives for RC membership and for active duty time.

The major question over the past decade is how the trends in operational duty time and in financial incentives have interacted to shape individual decisions regarding RC membership and active duty time. These trends are illustrated in the accompanying figures using DMDC Reserve Component Personal data for enlisted, non-prior service members over time. Figure 4 shows accessions by year. Accession

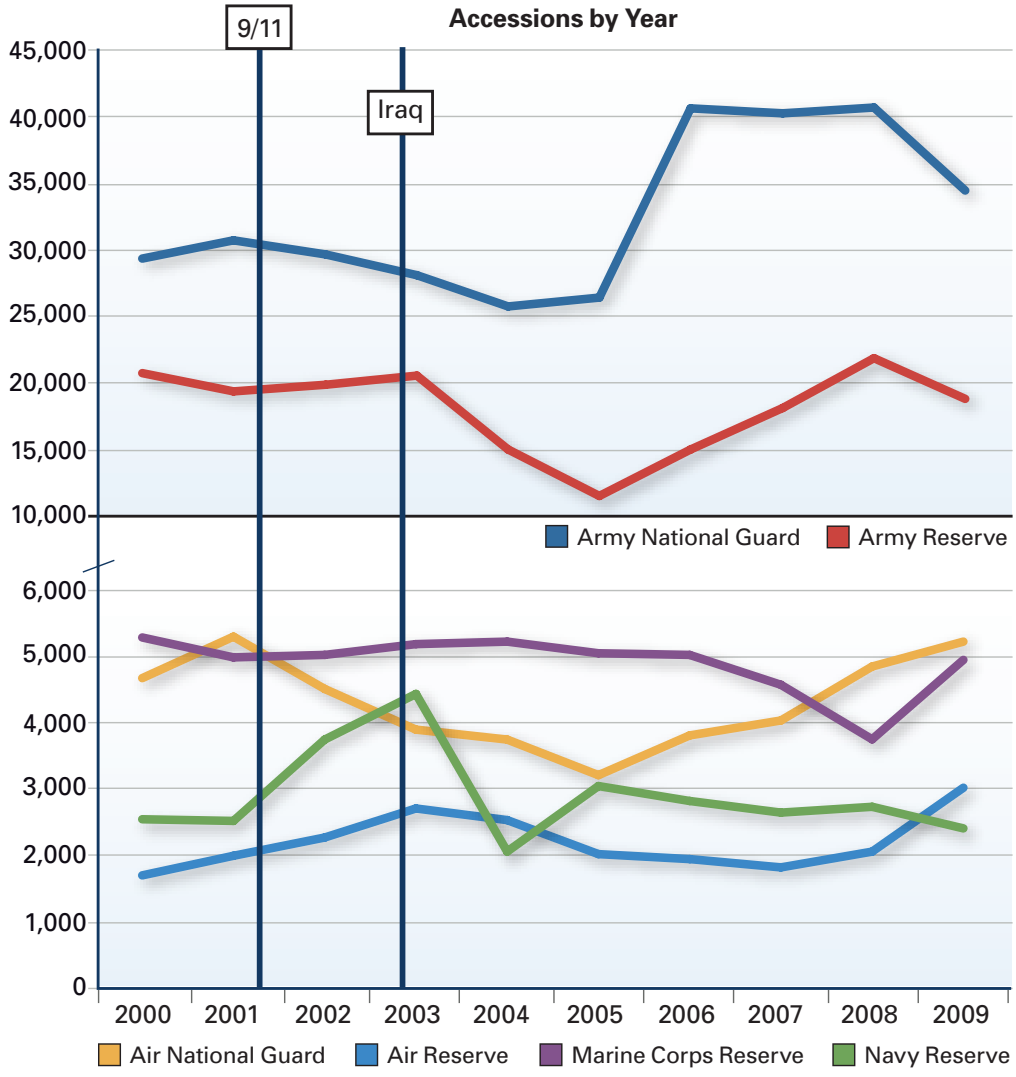


Figure 4. Accessions by Year

numbers are relatively constant through the beginning of Operation Iraqi Freedom. The numbers trended downward during the middle of the decade when fighting became very tough and casualties grew. They recovered by the end of the decade and were equal to or exceeded the levels at the beginning of the decade.

Parallel trend data on RC members' decisions to continue in service are presented in Figure 5. The chart shows the percentage of individuals who continue as RC members six years after joining. (For example, about 50 percent or more of Air National Guard members are still members six years after joining.) It is highly noteworthy from the standpoint of this study that continuation rates rose significantly after the September 2001 terrorist attacks, and that they remained at or above earlier levels throughout the decade.

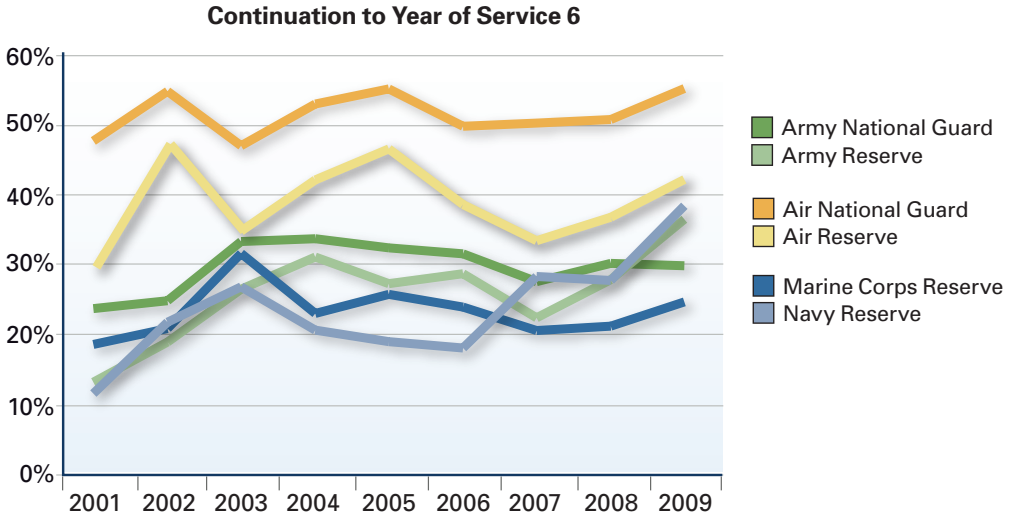


Figure 5. RC Members Continuing to Year of Service (YOS) 6

Consistent with these trends, the field research conducted for this study shows that RC members typically are strongly motivated by their sense of duty and their desire to serve. Indeed, our statistical analysis shows that the willingness to continue RC membership is positively correlated with active duty time: that is, those who are activated are more likely to continue in service.

These data tell the basic story of events and DOD's management of the AVF over the past decade:

- Activation rates are much higher and more persistent than previously reported.
- There has been substantial variability in activation experience across Services and individuals.

- Military pay has risen relative to civilian pay; this trend accelerated after 2005.
- Accessions rates dropped substantially mid-decade (particularly in the Army); they have since recovered to (or risen above) the levels of 2001.
- Continuation rates rose following the September 2001 terrorist attacks, and have remained at or above pre-2001 levels throughout the decade.

Throughout this demanding period, DOD has managed to sustain the AVF and maintain a highly effective, motivated fighting force.

From this data, we can surmise that a new temporary equilibrium has been established: expectations have adjusted; DOD pay has adjusted; the economy has weakened; and individuals have self-selected. Hence, the experience of the last decade provides a natural experiment demonstrating the feasibility of managing the RC with variable activation rates across the force.

3. Findings of the Field Research

The intent of the field research was to complement our formal statistical analysis with a first-hand understanding of individual RC members' attitudes, tastes, and preferences regarding alternative personnel utilization approaches. The primary insights that IDA wanted to determine were:

a. Is there a body of Reserve Component members that would agree to serve in excess of planning objectives (differentiated dwell)?
b. Is there a body of Reserve Component members that would agree to serve in excess of planning objectives if they were provided some additional compensation (differentiated dwell with compensation)?[4]

The results of this work are necessarily impressionistic, and do not carry the same statistical weight as a systematic survey. Nevertheless, the ability to communicate one-on-one with individuals and with small groups provided a depth of understanding regarding their views that could not have been achieved through other means.

Concurrent with this field work, the study team also participated in the DOD-directed 2010–2011 Comprehensive Review of the Roles and Missions of the Reserve Components. This enabled the study team to understand the range of mission assignments that are under consideration within DOD.

4. Definition of dwell: The period of time between the release from involuntary active duty pursuant to section 12302 of Title 10, United States Code and the reporting date for a subsequent tour of active duty pursuant to section 12302 Title 10, United States Code. Such time includes any voluntary active duty performed between two periods of involuntary active duty pursuant to section 12302 of Title 10, United States Code.

A. Approach

The field research conducted for the study benefitted from close collaboration with the Military Departments and their Reserve Components. The IDA study team worked with Pentagon headquarters' organizations to clarify study objectives, the methodology, and to establish a research timeline. Formal questions were posed to the Departments in order to document current and planned utilization philosophies with regard to Reserve Components, methods for organizing and employing Reserve Components, and anticipated demand on Reserve Components.

Working through the Departments, IDA undertook a series of visits to RC units at various locations around the country. These visits provided insights into each unit's experience. These visits permitted the IDA study team to interact with focus groups and to conduct one-on-one interviews with RC members. These visits took place during organizational drill weekends throughout the months of November 2010 to February 2011, based on when identified units and individuals were available. The Military Departments helped coordinate these visits so that members of all of the Reserve Components participated in the field study.[5]

5. **Army Guard:** 1-487 FA, 29th BCT, A Company 29th BSB, A Company 29th BSTB, B Btry 113th FAR, B Company 29th BSB, C Company 29th BSB, C Company 29th BSTB, E Co 113th, G Company 29th BSB, HHB 1-113th FA, HHC 1-293 Inf, HHC 29th BSB, HHC 29th BSTB and HHC 29th IBCT.

Army Reserve: 200th MP Command, 352nd CACOM, 354 CA BDE, 363rd MPCO and 450 CA BN.

Air Guard: 155ARW, 170th, LA ANG, NGB, 153AW and 166NWS.

Air Reserve: 512 AW and 610IOF.

Coast Guard: CF-532, CGLANT-3R5, D8 Western Rivers Division, JFCOM, Joint Staff JS, LANT, NORTHCOM, PSU 305, Sector Boston, Sector Hampton Roads, Sector New York, Sector North Carolina, Station Elizabeth City, Station Emerald Isle, Station Little Creek, USCG HQ and USTRANSCOM.

Marines: 4th CAG, 6th MT BN, HMM-774 and PRP.

Navy: AFRICOM 0166, BUMED Rapid Response, Bravo Surgical Co, CINC HQ, CNO INTEL,

CNO Management Analysis, CNO OPS and PLANS, CNR NDW ROC, DCMA HQ INTL, DIAHQ 0166, DIAHQ 0366, DIAHQ 0466, DLA-HQTR FT BELVOIR, DMA Anacostia, EUCOM J2 0166, FISC Norfolk DET 206, FISC SI-CC B, LSFO DET B, LSO NORTH CENTRAL, MM OP UNIT 206, MSC HQ Det 106, NATO Component CMD 1, NATO DJTF ALPHA, NAVSEA EOD Support, NAVSEA Strike Force Interoperability, Navy Inspector General, NCIS HQ 0166, NGA 0166, NIRR, NIRR-W, NMCB 23, NNWG VTU Washington, NPC Legal, NR Expeditionary Logistics, NR NAVSUP (OPLOG READ), NR NIOC Maryland, NR ONI 0466, NR ONI 0566, NR ONI 0766 , NR ONI 1166, NR ONR/NRL S&T 102, NR PEO (A), NR PEO (T), NR USDELMC, NR USS Emory S. Land (AS-39), NSF NDW, NSF NSWCD Indian Head, NSF NSWCD Dahlgren, OHSU Bethesda HQ, OHSU BETH DET P, OHSU BETH DET Q , OHSU BETH DET S, OHSU BETH DET Y, ONRG S&T 103, OS 6666, OSD Tech Transfer 0166, RLSO NDW, SPAWAR 0366, VR-48, VR-53, VTU 0614.

B. Findings

IDA's field study findings with the Military Departments and individual RC units underscored the phenomenal diversity in mission requirements, demographics and cultures of the Services and their components, and the desires and expectations of reservists in very different life situations. In particular, attitudes about compensation and the willingness to serve are manifested very differently in specific types of units and occupational specialties.

Table 2 highlights the major findings for each of the Military Services. Across the Services, both missions and utilization vary with the RCs providing individuals, teams, detachments, and large brigade sized formations to meet operational demands of differing duration based on Service force generation schemes. For example, many Air Force requirements were satisfied with 90 to 120 day sourcing solutions. Marine Corps Reserve deployments lasted seven months, while Army RC mobilizations of a twelve-month period resulted in actual deployments of eight to nine months. Additionally, the culture of RC utilization varies across Services in terms of their reliance on voluntary and involuntary mobilization. All of the Departments employ mechanisms to permit voluntary, or self-selected, mobilization.

Table 2. Service Approaches for Employing Reserve Components

ARMY ❖ Army Force Generation model requires total Army approach—heavy reliance on National Guard and Reserve ❖ RC contributes at individual, small unit, and brigade level ❖ Federal use of National Guard must account for significant state missions	*MARINE CORPS* ❖ Individual Ready Reserves are used actively to fill unit and individual requirements
NAVY ❖ Employing both Active and Reserve Component individuals while reducing end-strength of both ❖ Strong preference for its current strategic-reserve model	*AIR FORCE* ❖ Employs Reserve Component as an operational reserve ❖ Volunteer deployments are the norm ❖ Maintains parity in readiness across the Active and Reserve Component ❖ Strong preference for the operational reserve model
COAST GUARD ❖ Integrates reserve personnel within active units ❖ Reserve Component available to serve in response to domestic emergencies	

In the course of IDA's field research, the study team met with 1,586 Reserve Component members. Table 3 summarizes the major observations drawn from these interactions.

Table 3. Observations from RC Member Interviews

- Service and component cultures vary greatly, as to management approaches.
- Commitment requirements and operational duty experience vary substantially based upon the Service, mission, and military occupation.
- Both the taste for operational duty, and the practical constraints and availability to serve operational duty vary widely among individuals (and over time for an individual).
- A significant fraction of these individuals would consider committing to more operational duty (see statistics below).

Our interviews included scripted questions to serve as a common baseline of comparison across units and Services. Table 4 summarizes the distribution of responses to questions regarding the willingness to serve. For example, in the Army Reserve, 42 percent of the civil affairs interviewees and 46 percent of the interviewed military police service members indicated that they would be willing to serve in excess of DOD planning objectives of one year mobilized with five years demobilized. These numbers increase to 53 percent and 69 percent, respectively, when the same interviewees are asked whether they would agree to serve in excess of planning objectives if they received additional compensation to ensure their availability for federal mobilization.

Table 4 provides the statistical distribution of the responses to the same questions across all of the RCs.

Table 4. Percent Willing to Commit to Service in Excess of the SecDef Target (1:5)

	Army National Guard	Army Reserve	Navy	Coast Guard	Air National Guard	Air Reserve	Marine Corps Reserve
Without Bonus	61%	44%	46%	61%	54%	47%	69%
With Some Bonus*	72%	60%	55%	69%	68%	62%	81%

* Questions asked:

Would you consider signing a contract or entering into an agreement that would guarantee your availability to be involuntarily mobilized in excess of the current planning objectives? (circle) Yes No If not, why?

Consider that you might be offered a bonus or other compensation to guarantee your availability to serve in excess of current planning objectives. Please rank on a scale from 1 (very undesirable) to 5 (strongly desire), how a bonus or other compensation would affect your willingness to sign a contract.

The percentages include everyone who responded "desire" (4) or "strongly desire" (5) additional compensation.

The field research shows that across the Services, Reserve Component members already experience diverse operational philosophies and commitments. The RC members are also highly diverse in their willingness to serve and their operational duty experience. Given the diversity in the current utilization of RC members, the introduction of tailored commitments can be viewed as an adaptation of policy to reality—rather than a radical departure from current practice. The flexibility offered by a tailored commitment system, in fact, offers both the Services and service members the advantage of being able to create a service agreement that meets the needs of particular missions.

The interview results suggest that RC members would be open to tailoring commitments. Some would opt for current levels of commitment; others might opt for lower commitments if they were available. Up to half would be willing to commit to levels of commitment in excess of current targets. The statistical results reported in the following chapter support these findings.

4. Statistical Models of Reserve Service

The second major line of inquiry was to perform systematic statistical analyses of the behavior of RC members over the past decade.

IDA faced a basic challenge when attempting to predict the responses of reservists and Guard members to tailored commitments: forecasting how people will respond to options that no one has yet faced and that are, for now, purely hypothetical. To accomplish this goal, the IDA study team used data on the choices reservists and Guard members made in the past decade to estimate their "preferences." These data were an indication of the importance of compensation in their decision making and their willingness to serve. We then applied these preferences to predict their responses to hypothetical situations.

The work reported here builds on decades of prior research. Early work on the retention decisions of service members related the retention of active duty members to the expected future monetary benefits of their service. The Annualized Cost of Leaving (ACOL) model developed by John Warner[6] recognized that the decision to continue serving in the military involves more than pecuniary rewards. The retention decision took into account not only expected future monetary benefits, but also the individual's "taste for service." Warner's taste factor was, however, invariant across a member's lifetime. Recognizing that individual circumstances

6. John T. Warner, *Military Compensation and Retention: An Analysis of Alternative Models and a Simulation of a New Retention Model,* CRC 436 (Alexandria, VA: Center for Naval Analysis, 1981).

may change over time, Gotz and McCall[7] developed the Dynamic Retention Model (DRM) that added a transitory component to the taste for service to account for the fact that later retention decisions are affected by factors that were not present during earlier decisions. In response to Gotz and McCall's work, Black, Moffit, and Warner[8] augmented the ACOL formulation with a transitory taste for service in the ACOL-2 model. However, the DRM retains an advantage inasmuch as it accounts for more sophisticated expectations by service members, which include how they value having the option to alter their retention plans in the future in response to altered circumstances.

Formative work by Asch, Hosek, Mattock, and Panis[9] developed a dynamic retention model to assess RC members' behavior that allowed active duty members to make a three-way retention choice to remain active, join the reserves, or enter civilian life. This model allowed them to forecast the effects of changes to the active and reserve compensation systems together. Their work did not address the implications of activation duty or deployment for the RC members. Dolfini-Reed, Parcell, and Gregory[10] examined the relationship between loss rates in the Selected Reserve and activation and deployment. They did not develop a formal decision model, but they observed that loss rates had fluctuated over time by activation and deployment status and that loss rates were higher for those activated without a deployment than for those activated with a deployment. They concluded that RC members had a preference for shorter active duty tours in places outside the continental United States.

The IDA study team extended this body of work by incorporating RC activation and deployment experience into formal decision models. This allows inferences to be made about the influence of an RC member's duty experience and expectations on his or her accession and continuation decisions. This extension is essential for identifying the distribution of tastes for service among RC members and assessing their willingness to agree to higher or lower duty commitments. In addition, the inclusion of duty experience in explaining service member behavior during the recent decade of high utilization should more accurately identify the effects of compensation and other factors on RC members' decision making.

7. Glenn A. Gotz, and John J. McCall. *A Dynamic Retention Model for Air Force Officers: Theory and Estimate*,. R-3028-AF (Santa Monica, CA: RAND Corporation, 1984).
8. Matthew Black, Robert Moffitt, and John T. Warner. "The Dynamics of Job Separation: The Case of Federal Employee,." *Journal of Applied Econometrics 5* (1990): 245–262.
9. Beth J. Asch, James Hosek, Michael Mattock, and Christina Panis, *Assessing Compensation Reform: Research in Support of the 10th Quadrennial Review of Military Compensation* (Santa Monica, CA: RAND Corporation, 2008).
10. Michelle Dolfini-Reed, Ann Parcell, and Dave Gregory, "Determining Patterns of Reserve Attrition Since September 11, 2001," Annotated Briefing D0010352.A1 (Alexandria, VA: Center for Naval Analysis, 2005).

Two complementary modeling and data approaches were used: an adaptation of the R-SIM and an augmented DRM. As explained subsequently, the R-SIM model builds on earlier modeling of Army RC member behavior, reported in Doyle (2009).[11] The DRM work is a new application and adaptation of the conventional model to examine RC member behavior. Use of the two models offers the advantage of examining a common problem from somewhat different vantage points. In accounting for active duty time, R-SIM offered the advantage that it incorporated activation in the form of cycles of time away and time at home, as it is specified in policy and observed in reality. The DRM, in contrast, measured duty time using overseas deployments, by specifying the probability of a year of service being spent deployed. By utilizing two parallel modeling approaches we can have more certainty that our conclusions are generally applicable and not dependent upon one specific formulation.

Of the two modeling approaches, the DRM allows for more sophisticated expectations on the part of RC members. When choosing between tailored commitments, RC members recognize and anticipate the chance that they may, in the future, decide to leave in any year. In the R-SIM model, RC members are constrained to make a one-time commitment based on the belief that they will serve that commitment out for a full career.

The R-SIM was calibrated using longitudinal data covering the period 2000 to 2006, in which cohorts of service members are observed over time. This period provides a good natural experiment, since it includes the transition from duty demands prior to September 11, 2001 through the major buildup for Operation Iraqi Freedom. The period also saw large changes in compensation. The DRM is calibrated to the year-to-year continuation decisions of a cross-section of service members in September 2008.

The approach and findings for each model are reported in turn. The final chapter compares and contrasts the results.

A. The Reserve Component Simulation Model (R-SIM) of Reserve Service Decisions

1. Model Approach

The R-SIM forecasts accession and continuation rates for a Reserve Component by modeling the behavior over time of those young people who are eligible to join

11. Colin M. Doyle, *The Effect of Activation Policies on Accession and Continuation in the Army Reserve Components: The Annualized Reserve Component Activation Cost of Leaving Model*, IDA Paper P-4270 (Alexandria, VA: Institute for Defense Analyses, August, 2008).

the Reserve Components. Young civilians decide in each year whether to join the Selected Reserve. Reservists and Guard members decide in each year whether to stay or leave the Selected Reserve. They make these decisions by comparing the benefits of leaving in the current year with the benefits of staying. They also consider what their benefits will be in future years as well as in the present.

In the R-SIM three factors affect members' decisions to join, and to stay in, the Reserve Components. First, they value money income. Their benefit from being in the Selected Reserve includes the military income that they earn when not on active duty, and the difference between the military income that they earn on active duty and the civilian income they would otherwise have earned. Second, they care about the amount of time that they spend on active duty, and assign a positive or negative valuation to a day on active duty. Third, random events also affect their decisions; for example, a spousal illness may raise the "cost" of service temporarily. These random shocks are added to income and the valuation of active duty, giving a total measure of "utility"—the reservist's well-being. A reservist decides whether to stay or leave the Reserve Components by comparing the sums of the discounted expected values of present and future utility generated by staying or leaving. IDA also recognizes that members are motivated by a sense of duty; this may be partly captured in the taste for service calculation, but we cannot fully account for this important intangible factor.

The relationship between active duty time and the reservists' utility (their well-being) has two important features. First, the relationship is non-linear: a service member who would prefer six months of active duty to no active duty this year might also prefer no active duty to eighteen months. Second, reservists' past history of time spent on active duty affects the decisions they make today. A reservist's valuation of active duty time for his current utility includes both the number of months on active duty this year *and* the number of months in prior years.

The key feature of the model is that the relationship between active duty and utility can be different for each person. The model assumes that the individuals' attitudes follow a statistical distribution along the axis from active duty being more beneficial to active duty being more costly. Some individuals may prefer no active duty, while others may prefer to have some active duty but not too much time away from home; still others may prefer to be full-time on active duty. Figure 6 presents an illustration of such a distribution. Other parameters estimated in the model capture the importance of compensation, the non-linear effects of active duty time, and the role of the random shocks.

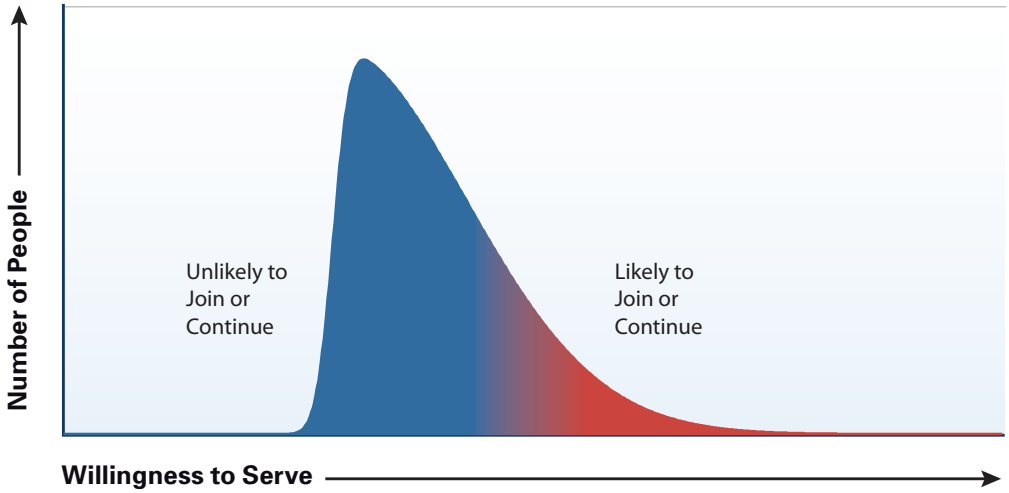


Figure 6. Illustrative Distribution

The R-SIM predicts joining and continuation rates by drawing many thousands of simulated young civilians randomly from the population distribution. Each individual is given a random history of activation based on his or her commitment, and then makes joining and staying decisions based on their parameters and the amount of active duty they receive. Aggregating all of these choices provides the joining and staying rates for the Reserve Component as a whole.

The study team chose the specific parameters of the model used in our predictions by finding the ones that best matched the actual accession and continuation rates of the past decade. We drew a set of random histories of activation for the simulation from the actual patterns of activation that prevailed during that period. We then found the predicted accession and continuations and compared them to actual data. We did this repeatedly for different sets of parameters of the model to generate different predictions. We utilized an algorithm that gradually improved the fit to actual joining and staying at each successive forecast, until we arrived at the best fit. We also accounted for the level of military and civilian earnings in each year, and added parameters for the effects of youth unemployment and war casualties. A full description of IDA's calibration method is presented in Appendix B.[12]

12. We have adopted a calibration approach because the complexity of these behavioral models makes statistical estimation difficult. Calibration is a standard approach in these cases, notably used in the work of Simon, Negrusa, and Warner (2010). We provide measures of the "goodness of fit" of our parameters in the appendices. However, the calibration method does not allow us to provide confidence intervals for the model parameters.

2. Data

The R-SIM model uses several data sources to generate estimates of future accession and continuation rates and predict how reservists will select into contracts with different levels of service. The length in months of activation, deployment and dwell periods; military and civilian compensation levels; and unemployment and casualty data are used as inputs for the model. Personnel data on accession and continuation rates are used to calibrate the model.

Frequency distributions for activation and dwell lengths, and the percentage of activation time that is served in a deployed capacity were derived from Contingency Tracking System data provided by the DMDC. Wartime activation and deployment data were used in the model; observations begin September 2001 and end January 2011. These frequency distributions were used to generate the simulated histories in IDA's calibration by combining alternating periods of active duty and dwell of random lengths.

The model includes a variety of variables that are generally found to be important in explaining accession and joining decisions. Data from a RAND study were used to compute military and civilian compensation levels for military members. The RAND data groups Reserve Component members into cells based on component, rank, and level of activation. Total yearly civilian and military earnings were derived from the Social Security Administration's Master Earnings File.[13] From this data, it is possible to derive and extrapolate expected full-time civilian and military earnings potential for Reserve Component members with differing ranks and total years of service. Youth unemployment rates were taken from the Bureau of Labor Statistics and causality data were taken from the Iraq Coalition Causality Count (http://icasualties.org/).

Accession and continuation numbers were calculated using the DMDC Reserve Component Personnel file. Numbers are based on non-prior service, enlisted members of the Reserve Component. The numbers of non-joiners were inferred from comparing recorded accessions with the size of the relevant civilian population cohort, determined from Census Bureau data. We assumed that the "eligible" population is 25 percent of any given age cohort. To calculate continuation rates, first year service members were tracked over time; if a member left the reserve or switched to another component, he/she was treated as attrition. The table of accession and continuation rates was used in the calibration process to minimize the error between actual and projected rates.

13. This data forms the basis for the paper by David S. Loughran and Jacob Alex Klerman,"The Effect of Activation on the Post-Activation Earnings of Reservists," forthcoming in *Labour Economics*.

3. Results and Findings

The IDA study team utilized the R-SIM to predict non-prior service accessions in each Reserve Component under a series of alternate scenarios. The first column of Table 5 lists the predicted average accessions under the recent rates of utilization. These are the number of civilians joining a component that is predicted by the R-SIM model when the activation rates that have been observed in the past decade are used. These wartime rates are approximately 1:9 in the Air and Navy Reserve Components, 1:4 in the Army Reserve Components and 1:3 in the Marine Corps Reserve. This means that Navy Reservists, for example will serve one month out of every ten on average; or, they will spend a tenth of their time on active duty. The model predicts that 2,931 civilians will join the Navy Reserve when they can expect to serve at a 1:9 rate.

The following two columns predict accessions under alternate demands. The second column predicts accessions when wartime demands are higher than recent history. In this scenario the wartime dwell ratio is 1:3 for the Army Reserve Components, 1:2 for the Marine Corps Reserve, and 1:7 for the Air and Navy Reserve Components. R-SIM forecasts a sizable reduction in accessions across all components. For example, Navy Reservists can now expect to serve one eighth of their time on active duty. The model predicts that 2,648 civilians will join the Navy Reserve if this is the case.

The third column predicts accessions when wartime demands are lower. The wartime dwell ratio is 1:5 for the Army Reserve Components, 1:4 for the Marine Corps Reserve and 1:11 for the Navy and Air Reserve Components. Accessions are notably higher, although the effect is small in some components, notably the Navy Reserve. Navy Reservists can now expect to serve one twelfth of their time on active duty. The model predicts that 3,057 civilians will join the Navy Reserve if this is the case.

Table 5. Annual Non-Prior Service Accessions Under Alternative Demands

	Utilization		
	Baseline	**Higher**	**Lower**
Air National Guard	5541	4569 (-18%)	6639 (+19%)
Air Reserve	2667	2160 (-20%)	2880 (+7%)
Navy Reserve	2931	2648 (-10%)	3057 (+4%)
Army National Guard	28554	25283 (-12%)	30844 (+8%)
Army Reserve	17371	15294 (-12%)	19514 (+12%)
Marine Corps Reserve	4811	3912 (-19%)	5478 (+13%)

Table 6 presents continuation rates for each scenario. These percentages are the fraction of accessions that remain in the Selected Reserve until their sixth year of service. For example, the model predicts that 38 percent of Navy Reservists will remain in the Selected Reserve until their sixth year of service. The continuation rates are better under higher utilization, as the recruits who enter in this scenario are more highly inclined toward active duty. In that case, 47 percent of Navy Reservists will stay for six years. Conversely, continuation is lower in a lower utilization scenario, as those who are less inclined to serve join in greater numbers.

Accessions are also sensitive to changes in compensation. Table 7 presents total non-prior service accessions under alternative compensation levels. The first column reproduces the predicted accessions under the current policy in Table 5. The second column presents predicted accessions in a scenario in which utilization is unchanged, and total military compensation is reduced by 10 percent. Accessions are lower when compensation is lower, as one would expect. For example, the number joining the Navy falls from 2,931 to 2,742. The magnitude of the effect is highest in the Air Reserve Components, with an 11–15 percent reduction in accessions. The effect is lowest in the Army Reserve Components, where accessions are reduced by only 2–3 percent with a reduction in compensation of 10 percent.

The focus of this study is tailored commitments. Table 8 presents predicted accessions when new recruits are offered a choice between two contracts, defined by the high and low demand cases simulated previously. No additional compensation incentive above the current pay for activation is offered for choosing the higher contract. Nonetheless, the study team found that substantial numbers of the recruits will select the higher commitment. The rate ranges from 33 percent of recruits choosing the higher contract in the Air National Guard to 67 percent opting for higher commitment in the Navy Reserve. Thus, the components can achieve higher accession by allowing recruits to self-select into higher and lower commitments.

Table 6. Continuation to the Sixth Year of Service Under Alternative Demands

	Utilization		
	Baseline	**Higher**	**Lower**
Air National Guard	0.54	0.60	0.50
Air Reserve	0.59	0.64	0.55
Navy Reserve	0.38	0.47	0.34
Army National Guard	0.65	0.68	0.61
Army Reserve	0.59	0.62	0.53
Marine Corps Reserve	0.68	0.65	0.67

Table 7. Annual Non-Prior Service Accessions Under Alternative Compensation Scenarios

		Total Compensation Reduction	
	Baseline	-10%	-15%
Air National Guard	5541	4942 (-11%)	4728 (-15%)
Air Reserve	2667	2267 (-15%)	2119 (-21%)
Navy Reserve	2931	2742 (-7%)	2771 (-6%)
Army National Guard	28554	27860 (-3%)	27919 (-3%)
Army Reserve	17371	17136 (-2%)	16787 (-4%)
Marine Corps Reserve	4811	4573 (-5%)	4575 (-5%)

Table 8. Annual Non-Prior Service Accessions with Commitment Choice

	Commitment		
	Lower	Higher	Total
Air National Guard	4370 (66%)	2218 (33%)	6588
Air Reserve	1696 (58%)	1209 (41%)	2905
Navy Reserve	969 (32%)	2057 (67%)	3026
Army National Guard	13889 (44%)	17251 (55%)	31140
Army Reserve	9561 (49%)	9706 (50%)	19267
Marine Corps Reserve	3128 (57%)	2343 (42%)	5471

Table 9 compares the continuation rates under the current utilization with those under the commitment choice. In most cases the continuation rates are lower, but the effect is small. This result suggests that strength could be maintained when commitment choices are offered.

Table 10 repeats the contract choice simulations when a signing bonus of $5,000 is offered for the higher contract. Large increases in the higher commitment choice are achieved in the Air and Navy Reserve Components and the Army National Guard. For example, the percentage of Navy Reserve recruits choosing the higher contract with the bonus is 10 percentage points higher than the percentage that choose it without a bonus. Table 8 shows that 67 percent of Navy Reservists choose the higher contract with no financial incentive. But with the bonus, 77 percent of Navy Reservists will choose the high contract. The effects are modest for the Army and Marine Corps Reserves, suggesting that greater incentives would be required to increase commitment in those components. This is consistent with our earlier finding that members of the Army Reserve Components are less responsive to changes in compensation. These results demonstrate that sizable increases in the higher commitment choice can be achieved with reasonable and feasible compensation incentives.

Table 9. Annual Non-Prior Service Continuation Under Contract Choice

	Without Choice	With Choice
Air National Guard	0.54	0.52
Air Reserve	0.59	0.55
Navy Reserve	0.38	0.41
Army National Guard	0.65	0.60
Army Reserve	0.59	0.54
Marine Corps Reserve	0.68	0.65

Table 10. Annual Non-Prior Service Accessions with Commitment Choice and $5,000 Bonus for Higher Commitment

	Commitment		
	Lower	Higher	Total
Air National Guard	3583 (-13%)	3014 (+13%)	6597
Air Reserve	1268 (-16%)	1614 (+16%)	2882
Navy Reserve	695 (-10%)	2258 (+10%)	2953
Army National Guard	13189 (-3%)	17737 (+3%)	30926
Army Reserve	9439 (-2%)	9991 (+2%)	19430
Marine Corps Reserve	3080 (-3%)	2471 (+3%)	5551

B. The Dynamic Retention Model (DRM) of Reserve Service Decisions

1. Model Approach

This section models reservists' decisions regarding deployment using a dynamic retention model based on Gotz and McCall (1984) and Simon, Negrusa, and Warner (2010). IDA's DRM characterizes the distribution of taste for deployment across the population of individuals considering military service. This taste distribution then is used to extrapolate preferences for alternative contracts, including expected take up rates and retention under each alternative. Our calibration method is described in Appendix B.

Individuals in IDA's DRM make the decision to enter a particular reserve service or remain in the civilian sector in their first year. Individuals make their annual decisions based on which option offers the highest expected utility. In assessing these expected utilities, they take into account expectations of their own likelihood of staying or leaving in future years. For example, staying in the military one more year entitles a reservist or Guard member to make a decision next year

about whether to continue in military service or leave, an option that is forfeited if the reservist or Guard member leaves for civilian life. Likewise, choosing one military commitment over another closes the door to the other contract. By evaluating the value of each option at each future year in the context of expectations regarding random events and shocks, the reservist takes his/her possible future decisions into account when making today's decision.

2. DRM Results and Findings

IDA evaluated several alternate policies in order to determine their effects on retention. The IDA study team evaluated the effect of a 10 percent reduction in the amount of compensation received by reserve members on accessions and retention. Table 11 shows that accessions in the Navy Reserve, for example, fell by 7 percent from 2,513 to 2,336.

These results can be expressed in terms of elasticities, which are the percentage change in accessions for a 1 percent change in compensation. The results reflect high compensation elasticity in comparison with past studies, as well as with deployment elasticity (in Table 12, below), with the possible exception of the Marine Corps Reserve, where compensation reductions have a significantly lower effect on accessions and retention than in other Services. We capture retention in both tables

Table 11. Decrease Compensation to 90 Percent of Current Military Compensation

Service	Baseline Accessions	Estimated Accessions at 90% compensation	Percent Decrease in Accessions (100% to 90% compensation)	Compensation Elasticity (100% to 90% compensation)	Reduction in Total Man-years Served
Army National Guard	32,797	30,318	8%	0.76%	16%
Army Reserve	19,341	17,551	9%	0.93%	23%
Air National Guard	4,677	4,121	12%	1.19%	38%
Air Reserve	1,910	1,658	13%	1.32%	39%
Marine Corps Reserve	3,745	3,631	3%	0.30%	8%
Navy Reserve	2,513	2,336	7%	0.70%	18%

by computing the total number of man-years of service that the Reserve Component will gain over the course of the career of these members.

The study team also evaluated the effect of an increase of 50 percent in the deployment rate, corresponding to an increase in activation rate from 1:5 to 1:3. As in the case of decreased compensation, Table 12 shows that we found that Marine Corps Reservists are less affected by increases in deployment rates than their counterparts in other Services. The taste distribution of the entering population of reservists varies under different contracts, so it is important to take this into account when estimating effects on retention. Those reservists who choose to enter service under higher deployment rates have higher tastes for service on average and will tend to stay longer as well. The DRM results, shown in Table 12, suggest that at 150 percent of the current deployment rate, total man-years served will fall between 11–39 percent depending on the Service, with the Air Reserve losing the most man-years.

The study team used the DRM to evaluate accessions under a scenario in which two contracts were offered, one at current levels of compensation and one at 150 percent of current deployment rates. We found that sizable numbers of members would choose the higher level of commitment. For example, Table 13 shows that 1,304 members out of a total of 2,924 accessions would choose the higher commitment. That is, 45 percent would choose the high option. The final column of the table

Table 12. Increase Deployment to 1.5 Times the Current Deployment Levels

Service	Baseline Accessions	Estimated Accessions at 150% current deployment rate	Percent Decrease (100% to 150% current rate)	Depl Elasticity (100% to 150% current rate)	Reduction in Total Man-years Served
Army National Guard	32,797	28,615	13%	-0.26%	30%
Army Reserve	19,341	17,000	12%	-0.24%	28%
Air National Guard	4,677	4,192	10%	-0.21%	33%
Air Reserve	1,910	1,656	13%	-0.27%	39%
Marine Corps Reserve	3,745	3,581	4%	-0.09%	11%
Navy Reserve	2,513	2,327	7%	-0.15%	14%

Table 13. Offer Additional Commitment at 1.5 Times the Current Deployment Levels in Addition to Status Quo

Service	Current Single Commitment Total Accessions	Multiple Commitment Accessions			% Increase over single contract
		Current rate deployment	1.5x current deployment	Total	
Army National Guard	32,797	22,384	13,256	35,639	8%
Army Reserve	19,341	13,010	8,726	21,736	11%
Air National Guard	4,677	3,099	2,475	5,574	16%
Air Reserve	1,910	1,303	832	2,135	11%
Marine Corps Reserve	3,745	2,395	2,124	4,519	17%
Navy Reserve	2,513	1,620	1,304	2,924	14%

Table 14. Offer Additional Commitment at 1:9 (0.6 Times Current Deployment Rate) and 15 Percent Reduction in Compensation in Addition to Status Quo

Service	Current Single Commitment Total Accessions	Multiple Commitment Accessions			% Increase over single contract
		Current deployment	0.6x current deployment, 85% current compensation	Total	
Army National Guard	32,797	14,533	23,248	37,780	13%
Army Reserve	19,341	11,148	11,370	22,517	14%
Air National Guard	4,677	3,109	2,202	5,310	12%
Air Reserve	1,910	1,240	918	2,158	11%
Marine Corps Reserve	3,745	2,248	2,355	4,603	19%
Navy Reserve	2,513	1,614	1,335	2,949	15%

indicates that offering two contracts would attract greater total numbers of accessions than under the single contract.[14] In the case of the Navy Reserve, total accessions are 2,924 with choice, and 2,513 without, a difference of 14 percent.

In addition to the previous scenario, the IDA study team evaluated accessions with the DRM under an alternate scenario in which current contracts were offered together with a reduced deployment option at 60 percent of the current deployment rate (analogous to a drop in activation from 1:5 to 1:9) and 85 percent of current pay. Table 14 shows that we found significant increases in accessions of 11–19 percent depending on the Service under the assumption of separate but identical shocks for each contract.

C. Observations

Several broad themes emerged from our statistical work. Across both statistical models, we observed that:

1. Accessions and retention are positively related to compensation.
2. Accessions and retention are sensitive to both activation and deployment.
3. When offered the opportunity to serve for greater levels of active duty, or deployment, many members will select this option even when no additional compensation incentive is offered.
4. The number choosing a high commitment option can be increased with additional compensation.
5. Some members will choose a lower option even if it is paired with significantly lower compensation.

5. Conclusions

This paper uses three lines of research to shed new light on RC member behavior over the last decade. IDA's quantitative work builds on models that have become a standard in the military manpower literature. The study team extended these models to allow RC members to have varying tastes for active duty time and deployment, recognizing that much more than compensation enters the participation decision, and that the willingness to serve in the Reserve Component must be related to the level of active duty time and deployment that a member expects and serves.

Our quantitative findings are novel because there has been little previous work to quantify the ways that RC members vary in their willingness to serve. Although Asch et al. estimate a taste for reserve service, it is unrelated to the levels of active duty

14. Because of the assumptions of the DRM that shocks are completely independent, these increases should be interpreted as upper bounds.

and deployment served. Dolfini-Reed et al. describe average behavior of RC members following deployment but they do not include the varying tastes of RC members. IDA was able to describe the population disposed to join the Reserve Components and to predict their response to alternative utilizations. This is a new innovation.

Several common themes emerged that are relevant for DOD compensation policy:

First, the R-SIM and DRM simulations demonstrate that non-prior service accessions are sensitive to changes in the demands on individuals. R-SIM forecasts find that plausible changes in the rate of activation result in sizable changes in accessions. Likewise, DRM forecasts demonstrate a negative effect on accessions of increases in the amount of deployment.

Second, the R-SIM and DRM simulations demonstrate that accessions are sensitive to changes in compensation. Accessions decline between 2 and 15 percent in response to a 10 percent decline in compensation. Both models predict that the effect of compensation changes is strongest in the Air Reserve Components.

Third, the field research, R-SIM simulations and DRM simulations all confirm that prospective and current reservists and Guard members would separate into higher and lower levels of commitment if offered a choice, with substantial numbers in each commitment category. We found no evidence that all or most members of a Reserve Component would choose the same option. The fact-finding conducted for this study, coupled with the findings of a prior IDA study, confirm that de facto commitment choices already happen on an informal basis.

Fourth, these three lines of research confirm that when a choice of commitments is offered, the split between those choosing the higher and lower commitment can be altered by tying compensation to the commitment choice. The R-SIM forecasts, in particular, suggest that the additional compensation required to raise the choice of the higher commitment significantly is quite modest in some components. The DRM forecasts show that sizable numbers of recruits will select an option with greatly reduced compensation if it is paired with a lower commitment.

The findings the Quadrennial Review of Military Compensation should take away from this study are that tailored commitment contracts are:

1. Feasible. All of IDA's lines of research suggest that recruits and members will be willing to sort themselves into higher and lower levels of commitment. Substantial numbers of members would choose to join units in which a high optempo was necessary.

2. Cost effective. IDA demonstrated that many members would choose high commitments even in the absence of compensation incentives. We further observed that the incentives required to entice more members into high demand units would not be unfeasibly expensive.
3. Welfare-promoting. In IDA's models, RC members are automatically selecting the level of service that best matches their preferences. They are thus better off than if they were faced with one commitment. They also benefit from the increased certainty of demand that tailored commitments offer. IDA's interviews revealed that RC members already wish to choose their level of commitment.
4. Compatible with policy. IDA found that the inducements (if any) needed to realize an appropriate system of tailored commitments are not enormous. They could likely be accommodated through bonuses or other incentives that are compatible with current and proposed compensation policy.

Instituting a system of tailored commitments would require designing new contracts and mapping mission needs to each offer. The recruiting systems for the Guard and Reserve would need to be revamped to take into account the different commitment requirements of each unit and to set the expectations on the part of potential recruits. Finally, a management framework would need to be put in place to design and implement the system, and to match the demands of the Services with the influx of contracted recruits.

Appendix A. The R-SIM Model

A. The Determinants of Active Duty Time

The national security environment can be either "wartime" or "peacetime," and it changes from year to year. The transitions between these states follow a known Markov process,[15] with a transition matrix *W*. For example, if we, the IDA study team, estimate a Markov model on the years since the American Revolution,[16] the transition matrix would be

$$W = \begin{pmatrix} p(peace|peace) & p(war|peace) \\ p(peace|war) & p(war|war) \end{pmatrix} = \begin{pmatrix} .9321 & .0679 \\ .2185 & .7815 \end{pmatrix}.$$

15. For more on the Markov process, see Ronald A. Howard, *Dynamic Probabilistic Systems* (New York: Wiley, 1971).
16. IDA designates the years of the War of 1812, the Civil War, the Spanish American War, World War I, World War II, the Korean Conflict, the Vietnam War, the Gulf War, and the current GWOT era (2002-2007) as wartime.

The elements of the matrix are the probabilities of peace (or war) occurring next year given a state of peace (or war) this year. The matrix gives a probability of 93.21 percent for the transition from peace to peace, 6.79 percent for the transition from peace to war, 21.85 percent for the transition from war to peace, and 78.15 percent for the transition from war to war. If this Markov process is applied to a long series of years, the result is a "steady state" in which 24 percent of history is spent in a state of wartime and 76 percent of years are characterized as peacetime.

In R-SIM, each year can be characterized as "limited wartime," "heavily engaged wartime," or "peacetime." In a limited wartime year, the reservist faces some probability of involuntary mobilization. In a time of heavily engaged war, the reservist faces a higher probability of involuntary mobilization. In a peacetime year, the reservist faces no chance of involuntary active duty. IDA assumes that reservists expect heavily engaged wartime mobilization rates will be similar to those of the current Global War on Terror (GWOT) era (post-9/11/2001). This includes the wars in Iraq and Afghanistan. In a period of lower-intensity wartime, the reservist will expect to be called up an average of once in six years, without knowledge of the timing of these activations.

The IDA study team has estimated this three-state Markov process on the years of the all-volunteer force (1973 to 2007). The Gulf War and the post-9/11 years are considered "heavily engaged wartime" and the years of the interventions in Grenada, Panama, Bosnia, and Kosovo "limited wartime." The resulting transitions are

$$W = \begin{pmatrix} p(peace|peace) & p(heavy|peace) & p(ltd|peace) \\ p(peace|heavy) & p(heavy|heavy) & p(ltd|heavy) \\ p(peace|ltd) & p(heavy|ltd) & p(ltd|ltd) \end{pmatrix} = \begin{pmatrix} .6876 & .0992 & .2132 \\ .1058 & .7041 & .1902 \\ .2649 & .1201 & .6150 \end{pmatrix}$$

The steady state years are 38.5 percent peace, 34.6 percent limited war, and 27 percent heavily engaged war. In order to compare this steady state with the one generated from the long historical series, we liken major wars to the historic wartime state and consider minor wars to fall under the historic peacetime state. We implicitly treat minor wars as peace years in our long historic series. The resulting steady state is close to the one generated from the long series.

During the wartime states, the lengths of a soldier's activations follow a known probability distribution. His dwell times between activations will be determined by another distribution. In R-SIM forecasts, these distributions are determined by the appropriate tailored commitment.

When calibrating the model to recent history, it is assumed that in the event of either heavily engaged or limited wartime, activation lengths will be distributed as they have been during the years 2002–2009. In heavily engaged wartime, the dwell times will also follow recent history. We account for the high number of Guard members and reservists who have never been activated by including an equivalent number of ten-year dwells to the distribution.

B. The Decision Process

Reservists' utility is determined by three factors: income, the money-equivalent utility of time spent on active duty, and random disturbances. Past active duty time matters in today's utility. The active duty time is given by

$$A_t\left(H^i\right) = \sum_{s=0}^{t} a_{t-s}^i$$

where a_t^i is 1 if individual i with a particular history of active duty (denoted H^i) serves on active duty in month t.

For notational simplicity, we denote

$$A_t^i \equiv A_t\left(H_t^i\right).$$

The one-period utility function measures an individual's well-being in the current month. It is given by

$$u(t,i) = m_t + \alpha_1 A_t^i + \alpha_2 \left(A_t^i\right)^2$$

where m_t is money income, which includes both military and civilian income. Civilian income is not earned during active duty. The utility function is linear in money income, which ensures that people are risk-neutral in money. The parameters α_1 and α_2 describe an individual's unique utility function. The utility function is quadratic in accumulated active duty time. This formulation allows active duty time to have declining marginal utility. If this is the case, any gain in utility from a second month on active duty will be less than the gain from the first month; alternatively, any loss in utility from a month on active duty will be greater than the loss from the prior month. If the marginal utility of active duty is declining, individuals will be risk-averse in active duty time.

Individuals care about their well-being in future years. They measure lifetime utility as the discounted present values of each future month's one-period utility. For an individual at the present time *t*, the expected return to staying until a future time *T* is given by

$$U_T(t,i) = E_t\left(\sum_{\tau=t}^{T}\beta^{\tau-t}u(\tau)\middle|i\right) = E_t\left(\sum_{\tau=t}^{T}\left(\beta^{\tau-t}m_t + \beta^{\tau-t}\alpha_1 A_t + \beta^{\tau-t}\alpha_2\left(A_t^2\right)\right)\middle|i\right)$$

where β is the discount factor for the present value calculation. $E_t(\ )$ is the expectations operator, capturing the individual's forecast of the future at present time *t*. It follows that:

$$U_T(t,i) = \sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(m_\tau|i\right)\right) + \alpha_1\sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(A_\tau|i\right)\right) + \alpha_2\sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(A_\tau^2|i\right)\right)$$

The values of $E_t\left(m_\tau|i\right)$, $E_t\left(A_\tau|i\right)$ and $E_t\left(A_\tau^2|i\right)$, are determined by the activation rule. $E_t\left(m_\tau|i\right)$ is the expectation at present time *t* of money income at future time τ.

We now define

$$U_T^2(t,i) = \frac{U_T(t,i)}{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}\right)} = ACOL_T + \alpha_1 S_{T1} + \alpha_2 S_{T2}$$

where

$$ACOL_T = \frac{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(m_\tau|i\right)\right)}{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}\right)}$$

$$S_{T1} = \frac{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(A_\tau|i\right)\right)}{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}\right)}$$

$$S_{T2} = \frac{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}E_t\left(A_\tau^2|i\right)\right)}{\sum_{\tau=t}^{T}\left(\beta^{\tau-t}\right)}$$

The variable $ACOL_T$ is the money cost of leaving the service, expressed as an average annual amount. The variable S_{T1} is a measure of the number of depreciated months of active duty that the individual can expect to enter into an average month's utility during his career. S_{T1} is a discounted measure of the total time that the reservist expects to spend on active duty during his career. The variable S_{T2} measures the square of the active duty months entering an average month's utility.

IDA assumes that the parameter α_1 varies across 18-year-old males in the national population according to a skew-normal distribution. We designate the location, scale and shape parameters of this distribution as ξ, ω and γ.

An individual chooses whether to join a given Reserve Component or remain a civilian. We do not model the process of choosing between Reserve Components or between the Reserve and Active Components. The individual will join if the expected lifetime utility from doing so is greater than zero,

$$JoinUtility = ACOL_T + \alpha_1 S_{T1} + \alpha_2 S_{T2} + \varphi_j > 0.$$

The individual will stay if the expected lifetime utility from doing so is greater than zero,

$$StayUtility = ACOL_T + \alpha_1 S_{T1} + \alpha_2 S_{T2} + \varphi_s > 0.$$

The variable φ is a mean-zero normally distributed random error with standard deviation σ_φ.

We calibrate the parameters α_2, σ_φ, ξ, ω and γ.

C. Calibrating the Model

IDA uses the Nelder-Mead polytope optimization method[17] to estimate values for each parameter which minimizes the squared percentage difference between predicted and actual accession/continuation data. Since the compensation data is limited to fiscal years 2000 to 2006, accessions are calibrated to those seven years. Continuation rates up to six years of service are simulated for those reservists who joined from 2000 to 2006. We calibrate continuation data up to six years of service; subsequent continuation rates are not included so that the release from contracts does not influence the model. Predicted observations are weighed in the objective function so that accessions and continuation have an equal overall effect. Table A-1 demonstrates the minimized objectives for the case of the Army National Guard. The

17. For more on the Nelder-Mead polytope optimization method, see Kenneth L. Judd, *Numerical Methods in Economics* (Cambridge, MA: MIT Press, 1998).

value of the minimized objective function is 0.031. The fits for the other components are similar in magnitude.

$$\text{Objective Function}: \text{Squared error} = \frac{20}{7}\sum_{t=2000}^{2006}\left(\frac{actual\_join_t - predicted\_join_t}{actual\_join_t}\right)^2 + \sum_{t=2001}^{2006}\left(\frac{actual\_contin_{1,t} - predicted\_contin_{1,t}}{actual\_contin_{1,t}}\right)^2 + \ldots + \sum_{t=2005}^{2006}\left(\frac{actual\_contin_{5,t} - predicted\_contin_{5,t}}{actual\_contin_{5,t}}\right)^2$$

Table A-1. Model Fit for the Army National Guard

Data Observations						
FY	**Accessions**	**YOS1**	**YOS2**	**YOS3**	**YOS4**	**YOS5**
2000	29,118					
2001	30,520	82.9%				
2002	29,465	81.6%	81.0%			
2003	27,833	83.7%	85.0%	87.2%		
2004	25,405	81.4%	83.1%	88.2%	89.6%	
2005	26,105	80.8%	80.8%	87.1%	89.4%	90.0%
2006	40,772	84.8%	80.0%	85.6%	90.3%	91.8%
Predictions						
2000	25,483					
2001	26,084	79.5%				
2002	20,318	79.8%	84.3%			
2003	21,558	89.4%	85.3%	90.1%		
2004	22,179	88.1%	91.6%	91.8%	94.3%	
2005	22,967	87.4%	91.0%	93.8%	94.7%	95.9%
2006	23,185	86.1%	90.4%	93.4%	94.8%	95.9%
Squared Percentage Errors						
2000	0.01558					
2001	0.02113	0.00175				
2002	0.09637	0.00049	0.00168			
2003	0.05083	0.00457	0.00001	0.00115		
2004	0.01612	0.00669	0.01045	0.00162	0.00277	
2005	0.01445	0.00674	0.01614	0.00595	0.00346	0.00430
2006	0.18606	0.00021	0.01692	0.00822	0.00247	0.00195

Minimizing the objective function is equivalent to maximizing a measure of fit defined as one minus the weighted sum of the squared percentage errors. That statistic will take on a value of one when the model perfectly fits the data. Since it is not bound by zero, it can take on negative values if the fit is sufficiently poor. For the Army National Guard the value of this goodness-of-fit statistic is 0.75. The fits for the other components are similar.

To account for economic conditions, which may influence an individual to join the reserves, a parameter for youth unemployment, α_U, is included in the join utility function. Therefore a parameter, α_C, for casualties is included in the join utility function of the Army National Guard, Army Reserve, and Marine Corps Reserve. We find that not only are casualties heavily concentrated in the land components, they are not correlated with accessions in the Navy Reserve or Air components. We recognize that in some years, especially in times of high unemployment and/or peacetime, accessions may be demand limited, and that many models use the official enlistment goals released by the Services themselves to constrain the number of simulated accessions. These goals are not included in R-SIM, however, because by many accounts they are set with the labor supply in mind, and thus may be endogenous to our estimation. Therefore we calibrate the parameters $\alpha_2, \sigma_{\varphi_J}, \sigma_{\varphi_S}, \xi, \omega, \gamma, \alpha_U$, and α_C.

Appendix B. DRM Model of Reserve Service Decisions

The Institute for Defense Analyses models reservists' decisions regarding deployment using a dynamic retention model (DRM) based on Gotz and McCall[18] and Simon, Negrusa, and Warner.[19] The DRM characterizes the distribution of taste for deployment across the population of individuals considering military service. Then we use this taste distribution to extrapolate preferences for alternative contracts, including expected take up rates and retention under each alternative. It is important to consider expectations about both take up rates and retention together because these allow policymakers to evaluate how total service can be expected to vary under alternative contracts, and, likewise, how much extra payments are made to individuals who otherwise would have stayed under less expensive policies in order to incentivize more reservists to join and/or stay longer in the reserves.

IDA's treatment extends past work by putting forward a framework to consider multiple alternative contracts as well as multiple states of military service (deployed and non-deployed).

18. Glenn A. Gotz, and John J. McCall, *A Dynamic Retention Model for Air Force Officers: Theory and Estimates*, R-3028-AF. (Santa Monica, CA: RAND Corporation, 1984).

19. C. J. Simon, S. Negrusa, and J. T. Warner, "Educational Benefits and Military Service: An Analysis of Enlistment, Reenlistment, and Veterans' Benefit Usage 1991–2005," *Economic Inquiry* 48 (2010): 1008–1031.

A. Specification

Individuals in IDA's DRM make a decision of whether to enter a particular reserve service or remain in the civilian sector in their first year. We evaluate these decisions for individuals considering entering at age 18 with no prior service. Past work characterizes the significantly higher stay rates for those with past prior service due to higher tastes for service and the additional pull of retirement that generally applies to this population.

As with IDA's Reserve Component Simulation Model (R-SIM), the study team models the decision to join each service separately; in other words, individuals in IDA's model do not compare different reserve Services and active duty options when choosing which to join, rather they evaluate whether they prefer a particular reserve service, say the Army National Guard, to remaining a civilian. If an alternative commitment is offered at entry, then an individual considering joining compares both contracts as well as the civilian option. Having joined a reserve service, individuals face annual decisions to stay, leave, or take an alternative reserve commitment if it is offered.

For the sake of simplicity, the IDA study team evaluated scenarios in which a take-it-or-leave-it alternative reserve commitment is offered only once, either at the time of joining or in a subsequent year. Because we are not modeling changes to promotion policies, the study team also assumes that all individuals face fixed expectations regarding their promotion path (See Table B-1) and corresponding annual compensation increases in the military sector as well as in the civilian sector. This money income is composed of military pay, reserve retirement pay, and average civilian earnings.

Since IDA is estimating individuals' propensities for making commitments—commitments to enter military service, to accepting varied deployment rates, to leaving for the civilian sector forever—it is important to consider the effect of uncertainties in the form of random events that each person faces. For example, a spouse's illness may raise the "cost" of service temporarily. A basic assumption of retention modeling is that individuals take expectations about the size of these shocks into account as they plan for contingencies. These random shocks are also expressed in dollar terms; they are added to income and the valuation of reserve deployment time, giving a total measure of the value of military service to the reservist.

Individuals make their annual decisions based on which option offers the highest expected value payoff. In accessing these expected payoffs, they take into account expectations of their own likelihood of staying or leaving in future years. For example, staying in the military one more year entitles a service member to make a

decision next year about whether to continue in military service or leave, an option that is forfeited if the service member leaves for civilian service. Likewise, choosing one military commitment over another closes the door to the other contract. By evaluating the value of each option at each future year in the context of expectations regarding random events and shocks, the DRM takes into account the option values of contracts with different levels of commitment, whereas the R-SIM does not.

For a reserve service member with deployment utility function *U(d)* and expected probability L of leaving after this year, expected payoffs from each military (m) and civilian (c) option at year y are calculated as follows:

$$EV_m(y) = U(d)(1-p_d) + U(d+1)p_d + MilPay(y) + CivPay(y) + [EV_m(y+1) + EV_r(y+1)](1-L) + EV_c(y+1)L + \varepsilon_m$$

$$EV_c(y) = CivPay(y) + EV_c(y+1) + \varepsilon_c.$$

Each option has a different uncertainty (ε_m or ε_c) associated with it, which are assumed to be identical and independently distributed following an extreme value distribution with mean zero and dispersion parameter b.

Different military contracts are differentiated by different levels of $MilPay(y)$ and probabilities of deployment, p_d. IDA assumes that any alternative military commitment offered is subject to its own shock, ε_α, which can be either the same for all military contracts ($\varepsilon_\alpha = \varepsilon_m$; comparable to R-SIM) or completely independent. The likely reality is that the uncertainty from an alternate military contract probably lies somewhere between these two extremes because the uncertainty a military commitment subjects one to is partly specific to the military experience in general and partly contract-specific. As a result, IDA is able to employ both of these shock scenarios as boundaries to its range of expectations for take up and continuation rates under alternate policies.

B. Utility specification

Individuals' different tastes for deployment are reflected in different utility functions, *U(d)*, which may take on positive and/or negative values. To characterize this variation in tastes for deployment across the population, the IDA study team made the following assumptions on these utility functions:

(1) *U(d)* is a function of cumulative deployment, *d*. In other words, an individual in the reserves gets a utility from his total number of past years in deployment.

(2) *U(0)* = 0: Individuals with no past deployment get no utility (positive or negative) from deployment.

(3) Each individual has a characteristic level of cumulative deployment, d^*, at which he or she gets his or her maximum utility. For any other level of cumulative deployment d, $U(d) < U(d^*)$.

(4) for $U_{dH}(d) > U_{dL}(d)$ for $dH > dL$: Individuals with higher peak deployment levels, d^*, have higher utilities for any positive level of deployment. This assumption yields nested utility curves that do not intersect each other, as seen in the figure below.

(5) $U(d)$ is symmetric in d and continuous, for the sake of retaining the simplicity of the model.

Together, these assumptions yield characteristic utility curves $U_{d^*}(d)$ for each individual, given his or her peak deployment level d^*, that look like those in Figure B-1.

These utility curves are characterized by parabolas given by the equation below. Here, k is a positive multiplier that produces utilities in dollars. It is an exogenously set model parameter that can be varied to yield different stay/leave retention profiles.

$$U_{d^*}(d) = kd(2d^* - d)$$

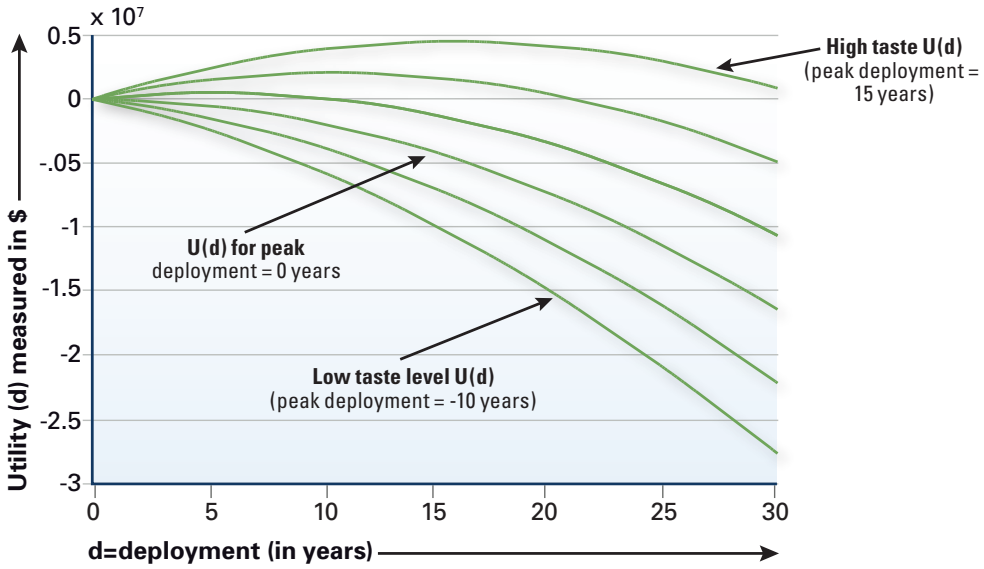


Figure B-1. Utility (d) for Different Taste Levels

Under these assumptions, an individual's peak deployment level, d^*, is enough to specify his or her utility function $U_{d^*}(d)$ for any level of deployment. It should be noted that both positive and negative d^* are allowed. Although it is impossible to be deployed a negative number of years, a negative d^* simply means that $U(d) < 0$ for all positive levels of deployment. A more negative d^* means even more negative utilities from positive levels of deployment.

IDA assumes that the population considering each military reserve service has a distribution of peak tastes for deployment, some negative and others positive. The study team estimates this d^* distribution for each reserve service, assuming it follows an extreme value distribution, calculating the stay and leave rates at each year of service and comparing these to actual retention profiles for each reserve service.

C. Calibration

Assuming existing values for civilian and military pays as well as retirement compensation policies and deployment rates, IDA calculated expected values for each option (EV_m, EV_a, and EV_c) as well as leave rates starting with year 30 and iterating to year 0 at which time the join decision is made. Based on the cumulative stay rates output by the model, the study team calibrates the mean and variance (μ_ε and σ_ε) of the extreme value distribution of ε_m and the mean and variance for the normal distribution of peak taste levels, d*, for each service, to most closely match actual retention profiles. In addition, we also calibrated the money value of utility, which is the multiplier k in the equation for $U_{d^*}(d)$ in the previous section.

IDA's approach for this calibration is simply to hand-select values for μ_ε, σ_ε, μ_d, σ_d, and k that output a stay profile for years of service, 1 through 30, that best matches actual stay rates for each service during this period. We perform these calibrations by hand. For an example, see Figure B-2 which shows the actual cumulative stay rates for the Army Guard in red and the estimated cumulative stay rates for the calibrated parameters in blue. It should be noted that the actual values reflect a sharper drop in retention around year 5; this is a common feature of actual retention profiles across the reserve Services. It seems to be indicative of selectively enforced minimum service requirements during the first five years of service. Because service members in the DRM can freely choose to leave or stay in each year, this feature is not observed in the model results.

Since there are five variables to calibrate and thus equally many degrees of freedom, there is generally more than one set of values that would generate a close fit to the actual retention profile for each Service. Accordingly, when estimating entry and retention under alternate policy scenarios, the IDA study team also checks to make

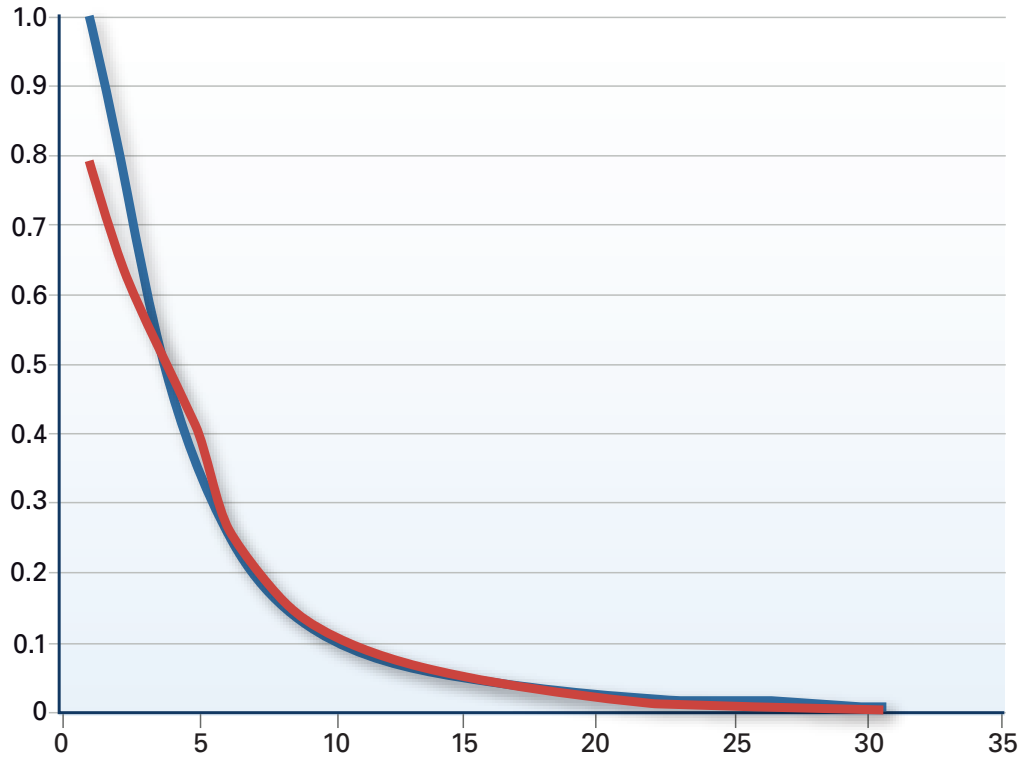


Figure B-2. Cumulative Stay Rates in Army Guard, by Year of Service (1 through 30)

sure the results are robust to variations in values for calibrated variables that yield similar retention profiles under the baseline scenario.

Civilian and military pays are estimated using data from the Social Security Administration which tracks actual civilian and military compensation for each individual. IDA received an aggregate version of this data from RAND. The average total civilian compensation received by service members with less than a month of active duty time is calculated for each reserve and paygrade. Assuming that service members follow a fixed promotion path (Table B-1, estimated compensation for each YOS is calculated by assigning each year to a particular paygrade, with 3 percent increases assumed in years without a formal promotion. Likewise, the average military compensation

Table B-1. Promotion Path Assumed for All Services

YOS	Pay Grade
1	E01
1	E02
2	E03
3	E04
4,5,6,7	E05
8,9,10,11	E06
12,13,14,15	E07
16,17,18	E08
19+	E09

Table B-2. Annual Civilian Compensation in Dollars

YOS	Army National Guard	Army Reserve	Air National Guard	Air Reserve	Marine Corps Reserve	Navy Reserve
1	14,491	16,550	12,050	15,812	18,752	14,272
2	15,634	16,603	20,561	19,377	20,155	24,293
3	20,310	19,912	25,326	25,547	24,959	29,044
4	27,868	26,082	37,157	36,830	31,833	37,551
5	28,704	26,864	38,272	37,935	32,788	38,677
6	29,565	27,670	39,420	39,073	33,772	39,837
7	30,452	28,500	40,602	40,245	34,785	41,032
8	35,352	35,020	45,640	44,744	43,842	44,182
9	36,412	36,071	47,009	46,087	45,158	45,508
10	37,505	37,153	48,420	47,469	46,512	46,873
11	38,630	38,268	49,872	48,893	47,908	48,279
12	40,581	41,256	48,446	49,771	53,422	50,758
13	41,799	42,493	49,900	51,264	55,025	52,281
14	43,053	43,768	51,397	52,802	56,675	53,849
15	44,344	45,081	52,939	54,386	58,376	55,464
16	43,413	47,443	52,218	54,970	56,009	55,414
17	44,715	48,866	53,785	56,619	57,689	57,076
18	46,056	50,332	55,398	58,317	59,420	58,789
19	48,508	53,124	53,039	56,048	59,280	59,345
20	49,963	54,718	54,631	57,729	61,059	61,125
21	51,462	56,359	56,270	59,461	62,891	62,959
22	53,006	58,050	57,958	61,245	64,777	64,848
23	54,596	59,791	59,696	63,082	66,721	66,793
24	56,234	61,585	61,487	64,975	68,722	68,797
25	57,921	63,433	63,332	66,924	70,784	70,861
26	59,659	65,336	65,232	68,932	72,907	72,987
27	61,449	67,296	67,189	71,000	75,095	75,176
28	63,292	69,315	69,204	73,130	77,348	77,431
29	65,191	71,394	71,281	75,324	79,668	79,754
30	67,147	73,536	73,419	77,583	82,058	82,147

Derived from 2007 Social Security Admin Data by Paygrade, Assuming Promotion Path in Table B-1 and 3 percent Annual Increase in Compensation in Years with No Promotion

Table B-3. Annual Military Compensation in Dollars

YOS	Army National Guard	Army Reserve	Air National Guard	Air Reserve	Marine Corps Reserve	Navy Reserve
1	22,901	19,490	23,516	18,413	18,483	14,115
2	37,483	28,281	30,357	22,302	31,708	24,117
3	54,845	42,455	46,080	43,069	35,911	38,344
4	66,130	59,810	60,865	54,062	38,508	52,108
5	68,114	61,605	62,691	55,684	39,663	53,671
6	70,158	63,453	64,572	57,354	40,853	55,281
7	72,262	65,357	66,509	59,075	42,079	56,940
8	73,928	71,299	72,135	68,803	57,629	66,109
9	76,146	73,437	74,299	70,868	59,358	68,092
10	78,431	75,641	76,528	72,994	61,139	70,135
11	80,783	77,910	78,824	75,183	62,973	72,239
12	90,214	83,317	89,184	88,926	72,549	68,756
13	92,920	85,817	91,860	91,594	74,726	70,818
14	95,708	88,391	94,615	94,342	76,968	72,943
15	98,579	91,043	97,454	97,172	79,277	75,131
16	107,817	94,779	107,455	107,153	86,199	74,592
17	111,052	97,622	110,678	110,367	88,785	76,830
18	114,383	100,551	113,999	113,678	91,449	79,135
19	133,247	115,197	126,175	123,278	104,043	80,444
20	137,245	118,653	129,960	126,976	107,165	82,857
21	141,362	122,212	133,859	130,785	110,380	85,343
22	145,603	125,879	137,875	134,709	113,691	87,903
23	149,971	129,655	142,011	138,750	117,102	90,541
24	154,470	133,545	146,271	142,913	120,615	93,257
25	159,104	137,551	150,659	147,200	124,233	96,054
26	163,877	141,677	155,179	151,616	127,960	98,936
27	168,794	145,928	159,835	156,165	131,799	101,904
28	173,858	150,306	164,630	160,850	135,753	104,961
29	179,073	154,815	169,569	165,675	139,826	108,110
30	184,446	159,459	174,656	170,645	144,020	111,353

Derived from 2007 Social Security Admin Data by Paygrade Assuming Promotion Path in Table B-1 and a 3 percent Annual Increase in Compensation in Years with No Promotion

Table B-4. Deployment Rates by Service and YOS

YOS	Army National Guard	Army Reserve	Air National Guard	Air Reserve	Marine Corps Reserve	Navy Reserve
1	1.7%	1.3%	0.1%	0.4%	1.0%	1.7%
2	11.9%	10.3%	2.7%	3.7%	9.7%	9.0%
3	16.7%	13.8%	4.9%	6.0%	14.2%	10.0%
4	15.6%	11.3%	5.8%	4.8%	15.2%	10.5%
5	13.8%	8.1%	5.0%	4.6%	13.5%	8.3%
6	17.2%	9.2%	4.9%	5.6%	11.4%	7.3%
7	15.1%	8.0%	4.6%	4.8%	11.3%	6.8%
8	14.9%	8.7%	4.7%	5.2%	15.9%	6.8%
9	14.5%	9.6%	4.5%	4.1%	17.8%	5.6%
10	15.3%	10.3%	4.9%	5.7%	19.9%	8.2%
11	14.8%	9.9%	4.5%	5.6%	18.1%	6.7%
12	13.9%	9.3%	4.4%	5.9%	21.0%	6.2%
13	13.6%	8.8%	4.1%	4.9%	18.6%	7.4%
14	13.5%	9.7%	3.8%	6.3%	19.5%	7.6%
15	14.6%	8.3%	4.5%	4.8%	17.7%	7.4%
16	14.2%	8.6%	4.0%	5.5%	13.4%	7.1%
17	13.8%	7.8%	4.5%	4.5%	15.5%	6.5%
18	13.3%	9.0%	4.5%	5.3%	16.8%	5.6%
19	13.0%	9.3%	4.1%	5.0%	11.2%	5.6%
20	13.0%	7.4%	3.6%	5.2%	12.4%	6.9%
21	13.4%	8.0%	4.8%	6.7%	12.0%	5.2%
22	13.3%	8.1%	4.0%	4.3%	13.0%	8.3%
23	12.5%	7.2%	5.1%	5.0%	14.3%	5.8%
24	12.6%	8.9%	5.0%	4.4%	8.7%	6.6%
25	15.1%	8.9%	4.9%	3.7%	9.8%	8.0%
26	13.2%	7.8%	5.0%	6.1%	18.7%	7.6%
27	13.5%	8.8%	3.7%	5.1%	13.2%	7.1%
28	13.5%	9.2%	4.8%	6.5%	13.5%	8.9%
29	12.6%	8.1%	5.5%	6.8%	19.0%	7.5%
30	11.5%	7.6%	4.3%	4.4%	16.1%	6.6%

Reflecting Average Deployment Rates from September 30, 2008 to September 30, 2009

received for service members with less than a month of service is calculated and multiplied by a factor of twelve to arrive at annual pays.

Reserve retirement compensation is estimated according to current policies as outlined by Williams.[20] The IDA study team calculated retirement compensation using the following equation, assuming that reservists earn 78 retirement points per non-deployed year and 360 points per deployed year. We substitute 96 percent of Final Military Compensation for High-Three Basic Compensation since IDA's model does not track the latter explicitly:

$$\text{Retirement Compensation} = \frac{\text{points}}{360} \times 0.025 \times .096 \times \text{Final Military Pay}$$

Expectations regarding existing deployment rates are calculated for each service for each YOS level based on the average of the population deployed at each YOS between September 30, 2008 and September 30, 2009. (See Table B-4)

D. Discussion of Model Assumptions

Following Simon, Negrusa, and Warner, the probability that an individual will select a given option x = {m, a, or c} from amongst the choices *m* (baseline military contract), a (alternative military contract) and *c* (civilian sector) is as follows, where *b* is the variance (technically, the dispersion parameter) for the shock to each contract, ε_m, ε_a, and ε_c:

$$P_x(y) = \frac{e^{EV_x(y)/b}}{e^{EV_m(y)/b} + e^{EV_a(y)/b} + e^{EV_c(y)/b}}$$

As stated, this model specification relies on a shock to each option. Here, it is assumed that the dispersion for ε_m and ε_c are the same and that any alternative commitment offered has its own uncertainty, ε_a, which follows the same distribution. If two contracts are quite different, then the assumption that they have separate draws of the shock is sensible, but if they are quite similar then one could argue they should be subject to the same shock. Since these shocks are identical and independently distributed this means we can only evaluate contracts that are sufficiently different from existing alternatives to be subject to such a sizeable relative shock. Since in actuality, there is likely to be some component of ε_a and ε_m in common with the military experience in general, we may be overestimating the shock ε_a relative to ε_m and thus the estimates of take up rates under scenarios where alternate contracts are offered are likely to be overestimates.

20. Cindy Williams, ed., *Filling the Ranks: Transforming the U. S. Military Personnel System* (Cambridge, MA: The MIT Press, 2004).

References

Asch, Beth J., James Hosek, Michael Mattock, and Christina Panis. *Assessing Compensation Reform: Research in Support of the 10th Quadrennial Review of Military Compensation*. Santa Monica, CA: RAND Corporation, 2008.

Black, Matthew, Robert Moffitt, and John T. Warner. "The Dynamics of Job Separation: The Case of Federal Employ*ees.*" *Journal of Applied Econometrics* 5 (1990): 245–262.

Brinkerhoff, John R., John C. Tilson, Fred Breaux, and Stanley A. Horowitz. *Reserve Volunteerism*. IDA Paper P-3153. Alexandria, VA: Institute for Defense Analyses, April 1996.

Cartwright, GEN James E. and Secretary Dennis M. McCarthy. *Comprehensive Review of the Future Role of the Reserve Component.* Washington, DC: Office of the Vice Chairman of the Joint Chiefs of Staff and Office of Assistant Secretary of Defense for Reserve Affairs, April 2011.

Dale, Charles. *The Determinants of Attrition From the Army Selected Reserves.* Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1989.

Dolfini-Reed, Michelle, Ann Parcell, and Dave Gregory. "Determining Patterns of Reserve Attrition Since September 11, 2001." Annotated Briefing D0010352. A1. Alexandria, VA: Center for Naval Analysis, 2005.

Doyle, Colin M. *The Effect of Activation Policies on Accession and Continuation in the Army Reserve Components: The Annualized Reserve Component Activation Cost of Leaving Model*. IDA Paper P-4270. Alexandria, VA: Institute for Defense Analyses, August, 2008.

Fugita, Stephen S. and Hyder A. Lakhani. *The Economic and Noneconomic Determinants of Retention in the Reserve/Guard Units*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1991.

Gotz, Glenn A. and John J. McCall. *A Dynamic Retention Model for Air Force Officers: Theory and Estimates.* R-3028-AF. Santa Monica, CA: RAND Corporation, 1984.

Graham, David R., Joseph F. Adams, John R. Brinkerhoff, William R. Burns, Colin M. Doyle, Hansford T. Johnson, Yevgeniy Kirpichevsky, Robert B. Magruder, Steven Mortimer, Saul Pleeter, Susan L. Rose. *Self-Selection as a Tool for Managing the Demands on Department of Defense (DOD) Personnel.* IDA Paper P-4606. Alexandria, VA: Institute for Defense Analyses, November 2010.

Grissmer, David W., Sheila Nataraj Kirby, and Priscilla M. Schlegel. *Changing Patterns of Nonprior Service Attrition in the Army National Guard and Army Reserve.* Santa Monica, CA: RAND Corporation, 1988.

Kirby, Sheila Nataraj and David W. Grissmer. *Reassessing Enlisted Reserve Attrition: A Total Force Perspective*. Santa Monica, CA: RAND Corporation, 1993.

Kirby, Sheila Nataraj and Scott Naftel. "The Impact of Deployment on the Retention of Military Reservists." *Armed Forces & Society* 26 (2000): 259–84.

Marquis, M. Susan and Sheila Nataraj Kirby. *Economic Factors in Reserve Attrition: Prior Service Individuals in the Army National Guard and Army Reserve*. Santa Monica, CA: RAND Corporation, 1989.

O'Donohue, Daniel J. "First-term Retention of Enlisted Selected Marine Corps (SMCR) Reservists." MS diss., Naval Postgraduate School, 1988.

Price, Jonathan D. "Effects of Activation on Selected Marine Corps Reserve Prior Service Enlisted Continuation Rates in the Post-9/11 Era." MS diss., Naval Postgraduate School, 2010.

Simon, C. J., S. Negrusa, and J. T. Warner. Educational Benefits and Military Service: An Analysis of Enlistment, Reenlistment, and Veterans' Benefit Usage 1991–2005. *Economic Inquiry* 48 (2010): 1008–1031.

Tan, Hong W. *Non-Prior Service Reserve Enlistments.* Santa Monica, CA: RAND Corporation, 1991.

Waite, Joseph P. "Affiliation of Naval Veterans with the Selected Reserve in the 21st Century." MBA diss., Naval Postgraduate School, 2005.

Warner, John T. *Military Compensation and Retention: An Analysis of Alternative Models and a Simulation of a New Retention Model*. CRC 436. Alexandria, VA: Center for Naval Analysis, 1981.

Williams, Cindy, ed. *Filling the Ranks: Transforming the U. S. Military Personnel System*. Cambridge, MA: MIT Press, 2004.

Chapter 15

Healthcare Coverage and Disability Evaluation for Reserve Component Personnel

Susan D. Hosek

Summary

The use of Reserve Component (RC) personnel has increased dramatically since September 11, 2001, and has remained high. Both Active Component (AC) and RC personnel serving on active duty for more than 30 days have comprehensive healthcare coverage, but other RC members are covered only for injuries or illness sustained in the line of duty. For other conditions, they must rely on their civilian healthcare coverage—if they have such coverage. A decade of combat, however, has focused the nation's attention on meeting the needs of service members—both AC and RC—whose military service has led to disability.

Legislation passed in 1965 required the President to review military compensation every four years. In light of the critical role the RC has played and is likely to continue to play in the future, the President asked the 11th Quadrennial Review of Military Compensation (QRMC) to examine compensation and benefits for RC personnel. As part of this review, RAND was asked to provide supporting analyses of the healthcare coverage provided for RC members, including participation in the TRS program, the potential effects of national health reform on coverage rates, and disability evaluation outcomes for RC members.

Findings on Healthcare Coverage

To assess the rates of health insurance coverage among RC members, we relied on the Status of Forces Survey of Reserve Component Personnel (SoF-R). This survey is administered to a sample of Selected Reserve members twice a year; every two years, the survey asks respondents whether they have health/medical insurance. The most recent SoF-R, fielded in January 2011, indicated that 30 percent of Selected Reserve members lack health insurance. Uninsured members are more likely to be unemployed or to work part time or for a small firm; they are also younger

The views expressed in this paper represent those of the author and are not necessarily those of the Department of Defense.

and have less education than those with insurance. The percentage of uninsured in the Selected Reserve population closely mirrors the percentage in the comparable civilian population.

We obtained data on TRS enrollment from the Defense Enrollment and Eligibility Reporting System (DEERS), the official enrollment file for TRICARE, the healthcare program serving active-duty service members, National Guard and Reserve members, retirees, families, and survivors. DEERS information about members is more limited than that provided by the SoF-R, but DEERS is more current and its TRS enrollment data are more reliable. The TRS program was initiated to offer insurance for RC members who lack a civilian option, and both TRS eligibility and affordability have changed significantly in recent years. Our analysis finds that TRS enrollment grew rapidly after the changes were implemented and included 8 percent of the eligible population in June 2010. While it is possible that insurance coverage in this population has not declined because of TRS, the evidence suggests that quite a few enrollees have access to civilian insurance that they find less attractive. Further, the characteristics of TRS enrollees do not match well with the characteristics of uninsured RC members.

Although at present the TRS program may not be significantly reducing the number of uninsured RC members, this may change if an individual insurance mandate and associated penalties are implemented in 2014 in accordance with the Patient Protection and Affordable Care Act (PPACA). To gain insight into the potential effects of PPACA on health insurance coverage of RC members in the absence of TRS, we applied results from the RAND COMPARE microsimulation model of health reform to estimate the changes in the percentage of RC members with insurance and in the sources of insurance. The model predicts how individuals and firms are likely to respond to healthcare policy changes, including those in PPACA, based on the economic theory of health decisionmaking and accumulated evidence from more modest policy changes (e.g., changes in Medicaid eligibility). Our analysis finds that health reform can be expected to increase the rate of insured RC members to 89 percent. The model projects that 12 percent will be eligible for Medicaid once eligibility is expanded, and another 12 percent will purchase coverage through state-level health insurance exchanges. Four-fifths of the latter will be eligible for a subsidy.

These projections do not factor in the availability of TRS. Many RC members who would otherwise purchase coverage from the health insurance exchanges are likely to find TRS more attractive financially. The TRS costs compare favorably with those of the health insurance plans that will be offered by the state health exchanges, even for members at income levels eligible for subsidies in the exchanges. In addition,

some fraction of the 11 percent of RC members predicted to remain uninsured by the COMPARE model would enroll in TRS instead. TRS premiums for single and family coverage are, at worst, only slightly higher than the penalty for having no insurance under health reform. Therefore, there is a good chance that health reform will induce a further increase in TRS enrollment. This increase would be in addition to any increase in the number of RC members enrolling in TRS instead of taking up their employer coverage and could make it very difficult to achieve the goal of controlling the health costs of the Department of Defense (DoD).

DoD is already providing healthcare coverage to a majority of working-age military retirees and will have to assume a substantial role in covering RC members as well. In 2007, the DoD Task Force on the Future of the Military Heath System called attention to the increasing number of non–active-duty beneficiaries who choose TRICARE instead of employer benefits. The task force recommended considering a pilot program to test a benefit that would supplement rather than substitute for employer benefits. Such an initiative should include RC members in addition to retirees.

Findings on Disability Outcomes for RC Members

To examine the disposition of disability outcomes for RC members, we used data provided by the Army, Navy, and Air Force on all disability cases that were initiated in fiscal years 2007–2010 and for which an informal board decision had been made. The data capture the early effects of the important changes in the DoD and Department of Veterans Affairs (VA) disability evaluation systems that were made during that time. Our analysis finds that, as with healthcare, the major difference in disability evaluation of RC and AC members results from the line-of-duty requirement. AC members are considered to be continuously on duty, so the health problems that arise while they are in service are almost always a basis for disability benefits. RC members are not covered for disabilities that are not incurred or aggravated as a result of training or active service. Furthermore, RC members are only approximately one-third as likely to be referred to the Disability Evaluation System (DES) as AC members. Given this difference, war-related medical conditions are more common among RC members, but it is not possible to conclude from the available data whether all RC members with line-of-duty conditions are identified and evaluated for disability.

The rates of referral for post-traumatic stress disorder (PTSD) for RC and AC members who have deployed since 2001 are 1.4 per 1,000 members and 3.0 per 1,000 members, respectively. This difference is hard to understand given the evidence

that the incidence of PTSD is at least as high in the RC. The identification of RC members who experience health consequences leading to disability resulting from deployment merits further investigation.

Once referred for disability evaluation, the process is the same across components, and there is little difference between RC and AC dispositions. For those with PTSD, the strict policy guidance of placement on the Temporary Disability Retirement List (TDRL) ensures equal outcomes. For others, once the medical condition captured by the Veteran Affairs Schedule of Rating Disabilities (VASRD) code is controlled for, the differences are only a few percentage points at most.

1. Introduction

Background

After September 11, 2001, the utilization of reserve component (RC) personnel increased dramatically and has remained high. At the beginning of 2011, more than 91,000 RC members were serving on active duty; over the decade, there have been roughly 800,000 activations. To put these numbers in context, there were only slightly more than 1 million individuals serving in RC units or as individual augmentees as of September 2010.[1]

At the same time, a decade of combat has focused the nation's attention on meeting the needs of service members—both active component (AC) and RC—whose military service has led to disability. In 2007, several study groups drew attention to inadequacies in the Disability Evaluation System (DES) and the Department of Veterans Affairs (VA) veterans disability system. Study recommendations included a major overhaul of the disability rating schedule used by the Department of Defense (DoD) and the VA, better integration of the two departments' disability evaluation processes, and a fundamental restructuring of disability compensation (Veterans' Disability Benefits Commission, 2007).

AC and RC personnel serving on active duty for more than 30 days have comprehensive healthcare coverage, but other RC members are covered only for injuries or illness sustained in the line of duty. For other conditions, they must rely on their civilian healthcare coverage—if they have such coverage. Once the necessary treatment has been provided, those whose injuries or illnesses leave them with a disability are evaluated by the DoD DES to determine whether they can continue in service or should be separated and provided with disability benefits.

1. These figures were obtained from a 2011 DoD review of the future role of the RC.

Legislation passed in 1965 required the President to review military compensation every four years. In light of the critical role the reserve components have played and are likely to continue to play in the future, the President asked the 11th Quadrennial Review of Military Compensation (QRMC) to look at compensation and benefits for RC personnel. More specifically, the memo directing DoD to conduct the 11th QRMC lists four focus areas, which are important elements supporting service members who are injured or become ill:

1. Compensation for service performed in a combat zone, combat operation, or hostile fire area, or while exposed to a hostile fire event
2. Reserve and National Guard compensation and benefits in terms of how consistent they are given their current and planned utilization
3. Compensation benefits available to wounded warriors, caregivers, and survivors of fallen service members
4. Pay incentives for critical career fields, such as mental health professionals, linguists/translators, remotely-piloted-vehicle operators, and Special Operations personnel.

Objectives

As part of the 11th QRMC, RAND was asked to analyze the healthcare coverage of RC members,[2] including participation in the TRICARE Reserve Select (TRS) program, the potential effects of national health reform on coverage rates, and disability evaluation outcomes for RC members. Any consideration of healthcare coverage for RC members must take into account national health reform, specifically, the complex provisions of the Patient Protection and Affordable Care Act (PPACA). Some PPACA provisions have already taken effect—e.g., requiring coverage of young adults up to age 26 on their parents' health plans. Other provisions, including an individual insurance coverage mandate and state-run insurance exchanges, will be phased in over the next five years.

This report documents RAND's research addressing the following questions:

- What fraction of RC members have civilian healthcare coverage when they are not serving on active duty, and how do insured members differ from uninsured members? How many are getting their coverage through the TRS plan for RC members?

2. Dental insurance is not considered in this report. For information on dental insurance and dental readiness of RC members, see Brauner, Jackson, and Gayton, 2012.

- What are the implications of national health reform for members' health-care coverage? Will health reform affect TRS enrollment?
- What are the disability outcomes for wounded/injured/ill members, and are there differences in outcomes for RC and AC personnel?

Approach

To answer these questions, we analyzed survey data on RC members' health insurance coverage, data on enrollment in TRS, and the records of disability cases in recent years. The analysis of health reform effects draws on a microsimulation model developed to predict the effects of the individual elements of health reform on insurance status and other outcomes. These analyses are supplemented with information drawn from the relevant research literature.

Organization of This Monograph

Chapter Two discusses healthcare coverage, including current coverage, TRS enrollment, and the implications of health reform. Chapter Three describes the DES and its integration with the VA disability system and analyzes data on DES outcomes and processing time. Chapter Four presents the major findings of the study.

2. Healthcare Coverage

Introduction

All AC members have comprehensive healthcare coverage through the Military Health System while they are in service. In contrast, as part-time military personnel, RC members are guaranteed healthcare coverage only when they are activated for a period of more than 30 days and for health conditions that can be linked to their military service. At other times and for other health conditions, they must arrange for their own coverage through employer programs or other public and private options for which they may be eligible. Health insurance coverage of RC members is of public concern for two reasons: First, without insurance, members may not be able to pay for healthcare needed to maintain their medical readiness to continue in service. Second, the nation has an obligation to ensure the well-being of those who volunteer to serve in the military. Beginning in 2004, the military's health program, TRICARE, was made available to certain RC members who are willing to pay a portion of the premium. Eligibility and the terms of participation in the TRS program have gradually changed to make the program more available and attractive to members. With these changes, TRS has the potential to be an important element of the RC compensation package.

This chapter begins with background on military coverage for RC members, compares that coverage to that of AC members, and examines the relationship between medical readiness and insurance coverage. It then looks at (1) how many RC members have insurance when not activated and which members are more or less likely to be insured, (2) participation in TRS, and (3) the potential for future changes in coverage through TRS and health reform.

Eligibility for and Sources of Military Healthcare Coverage

The sources of healthcare for AC and activated RC personnel differ markedly from those for non-activated RC members. As noted above, the military services provide comprehensive healthcare for AC personnel and RC personnel serving on active duty for more than 30 days, and for their dependents. For other RC personnel, care is provided only for medical conditions sustained in the line of duty (i.e., that are caused or aggravated by the member's military service) and only for the member (not for dependents).

Healthcare for AC personnel and RC personnel activated for more than 30 days is provided through DoD's TRICARE program; all members are enrolled in the program's health maintenance organization (HMO) option, TRICARE Prime. Most healthcare for active-duty personnel is provided in military treatment facilities (MTFs); referral to a civilian provider is arranged when appropriate MTF care is not available. The cost of care, regardless of where it is provided, is fully covered by TRICARE.

Full TRICARE coverage for the activated RC members and their dependents begins when their orders are issued or up to 180 days before activation and remains in effect for 180 days after deactivation. Continuing care after the 180-day post-activation period is available only for health conditions that are determined to be line-of-duty, consistent with the policies for non-activated RC members. Members must arrange follow-up care for conditions not in the line of duty through their civilian health plans, if any.

Non-activated RC members with line-of-duty conditions are usually cared for through TRICARE's civilian provider network. This network is extensive in geographic areas that have sizable TRICARE beneficiary populations (including active-duty dependents and retired military and their dependents); it is less extensive in some other geographic areas, although many VA health facilities also belong to the TRICARE network.

Finally, RC members who return from deployment to the Iraq and Afghanistan theaters are immediately eligible for care in VA facilities for up to five years.[3] They must enroll in the VA system, but enrollment is now done automatically as part of the demobilization process. Once enrolled, they are eligible for a full range of healthcare services in the VA's 152 medical centers and 798 outpatient clinics.[4]

Line of Duty

As described in Chapter Three, the line-of-duty rule governs AC members' eligibility for disability separation or retirement (and associated benefits); however, it is rarely a factor in eligibility for healthcare, because most AC members enter with a clean bill of health and are always on duty while they are in service. Thus, the line-of-duty requirement for healthcare eligibility applies primarily to health conditions RC members develop when they are not activated or are activated for 30 days or less.

Determining whether an RC member's health condition was incurred (or aggravated) in the line of duty is relatively straightforward when he or she is injured during a period of active military service or while in training or participating in inactive-duty training or active-duty training. Similarly, injuries incurred at other times may be readily ruled out unless they are linked to a service-related condition. Some non-injuries may also be easily linked to service—e.g., post-traumatic stress disorder (PTSD) among members who have been deployed to a combat theater or conditions resulting from known exposures or infectious diseases endemic in a location where the member served. However, many medical conditions, including common chronic conditions such as diabetes, are not considered service-connected unless there is evidence that the condition was aggravated by service. Others, such as chronic musculoskeletal conditions that develop over time (bad backs and knees), may be difficult to attribute to military service. How many RC members can get a line-of-duty decision that makes them eligible for care through TRICARE and how many must rely instead on their other insurance or self-financing is unknown, but RC members clearly need their own health insurance to ensure healthcare coverage.

TRS Eligibility and Enrollee Cost

In 2004, premium-based TRICARE coverage was temporarily extended to non-activated reservists who were unemployed or ineligible for employer-sponsored

3. The period of eligibility was extended from two years to five years in 2008. Eligibility continues after the five-year eligibility period ends, although the VA does reevaluate individuals' enrollment status according to enrollment policy and priority.
4. The focus of this discussion is *member* health insurance coverage. A member's dependents are also covered by TRICARE when he or she is activated, and TRS enrollees may elect to cover their dependents as well as themselves. Otherwise, dependents are not covered by either TRICARE or the VA.

insurance, and TRS was established as a permanent benefit the following year. As Table 2.1 shows, eligibility requirements and the premium contribution required for enrollment varied during the program's initial years. Since 2007, all Selected Reserve members who are not eligible for Federal Employee Health Benefits (FEHB) through their civilian employment may enroll in TRS for individual or family coverage. TRS is based on the preferred provider option (PPO) in TRICARE (TRICARE Standard/Extra) and requires a premium contribution equal to 28 percent of the estimated total plan cost. Initially, premium levels for individual and family coverage were based on the costs of the nationwide Blue Cross/Blue Shield Plan in FEHB. The premiums decreased in 2009 (as shown in Table 2.1), when experience showed that actual TRS costs were considerably lower than costs in the FEHB plan and in response to low rates of enrollment (Government Accountability Office, 2007; TRICARE Management Activity, 2011).

Table 2.1. TRS Eligibility and Premium Contributions, 2005–2011

Year	Eligibility	Annual Premium
2005	Members of the Selected Reserve who • Served on active duty in support of a contingency operation on or after 9/11 for ≥ 90 days • Agree to serve in the Selected Reserves for the entire period of TRS coverage chosen (up to 1 year of coverage for each 90 days of active service) • Use the one-time enrollment opportunity at the end of active service unless called to active duty again	$900 for individuals, $2,796 for families
2006	Restructured with tiered premium subsidies: • Tier 1: Same as in 2005 but enrollment period is expanded to 90 days post–active duty • Tier 2: Unemployed or ineligible for employer insurance • Tier 3: All other Selected Reservists not eligible for FEHB	*Tier 1: 28%* $972 for individuals, $3,036 for families *Tier 2: 50%* $1,743 for individuals, $5,417 for families *Tier 3: 85%* $2,964 for individuals, $9,209 for families
2007–2008	All Selected Reserve members who are not eligible for FEHB	$972 for individuals, $3,063 for families
2009	All Selected Reserve members who are not eligible for FEHB	$570 for individuals, $2,162 for families
2010–2011	All Selected Reserve members who are not eligible for FEHB	$638 for individuals, $2,373 for families

TRS enrollees are eligible for care in the MTFs when space is available for them or for care from civilian healthcare providers. MTF care may not be practical for enrollees who live too far from an MTF. Even for those who live in an MTF service area, the MTF may not have availability to treat them. The MTFs allocate their treatment capacity according to prescribed beneficiary-group priorities. DoD policy establishes a hierarchy of five priority groups for MTF care; TRS enrollees are in the fourth category, below AC members, RC members serving on active duty or seeking care for a line-of-duty problem, and all other beneficiaries who have enrolled in TRICARE Prime (the HMO option). Given their relatively low priority, TRS enrollees rarely have MTF care available to them; thus, their usual source of care is civilian providers. The out-of-pocket costs for civilian care in TRS are the same as those for active-duty dependents electing the same PPO option (Standard/Extra):

- $50/$100 annual deductible for individuals/families for junior enlisted personnel (E-4 and below); $150/$300 for all others
- 15/20 percent cost-sharing for in-network/out-of-network providers, respectively
- $1,000 catastrophic limit on out-of-pocket costs (excluding premium contribution) per family.

Relationship Between Health Insurance Coverage and Health

As mentioned earlier, one motive for offering health insurance to RC members may be the expectation that insurance will enhance the members' medical readiness to perform their military duties. A key medical readiness requirement is having no deployment-limiting medical condition; a second requirement, completing an annual self-report health status form, is designed to identify any such problem for evaluation and treatment. Members with health insurance may be more likely to be medically ready if they get regular preventive care leading to early identification and effective treatment of health problems or if they seek care earlier when symptoms of a health problem arise. However, in a largely healthy population such as the RC, health insurance may have little effect on health status.

The effect of health insurance on the medical readiness of RC members has not been studied (Hosek, 2010). However, there are hundreds of observational studies that examine insurance status and health outcomes, most of which do not address the causal effect of insurance on health. Three decades ago, a random, controlled trial—the RAND Health Insurance Experiment—measured the effects of different levels of cost-sharing on healthcare utilization and health outcomes in a representative population under the age of 65. The main health finding was the following:

> For persons with poor vision and for low-income persons with high blood pressure, free care brought an improvement (vision better by 0.2 Snellen lines, diastolic blood pressure lower by 3 mm Hg); better control of blood pressure reduced the calculated risk of early death among those at high risk. For the average participant, as well as for subgroups differing in income and initial health status, no significant effects were detected on eight other measures of health status and health habits. (Brook et al., 1983)

Two articles that review more recent evidence for a causal effect of health insurance on health outcomes (Freeman et al., 2008; Levy and Meltzer, 2008) also find some evidence of positive health effects of insurance in vulnerable populations. Levy and Meltzer focused on studies of natural experiments (e.g., arising from major policy shifts such as the enactment of Medicare and expansions of Medicaid). They report:

> The evidence available to date conclusively demonstrates that health insurance improves the health of vulnerable subpopulations such as infants, children, and individuals with AIDS and that it can improve specific measures of health such as control of high blood pressure for a broader population of adults, especially those with low income. For most of the population at risk of being uninsured (adults ages 19 to 50), we have limited reliable evidence on how health insurance affects health. This lack of evidence and the resulting lack of consensus indicate that to summarize the effects of health insurance on health is, inevitably, to misrepresent.

Freeman et al. cite two studies with more objective measures of health outcomes that show health insurance causes an improvement in self-reported health status in a general population of adults; the studies consider subpopulations with specific health problems, and they similarly find positive health effects of insurance.

The Institute of Medicine has published a series of reports on health insurance in the United States. The most recent report updates its earlier assessments of the decline in the number of Americans with health insurance and the effects of not having insurance on healthcare utilization and health outcomes (Institute of Medicine, 2009). That report concludes that children benefit substantially from health insurance, adults with health insurance are more likely to get effective preventive care and be diagnosed with later-stage cancers, and individuals with chronic illness and no health insurance have worse outcomes.

These reviews provide considerable evidence that health insurance leads to better health outcomes for children and adults at risk for poor health. Insured adults are more likely to seek care and discover that they have developed (chronic) health conditions. However, most of the evidence linking health insurance to health outcomes comes from subpopulations that are not similar to most RC members, especially to

uninsured RC members (see below). Therefore, the current evidence does not support a conclusion about the likely effects of health insurance on the medical readiness of RC members.

A study currently under way may add new information about the effects of health insurance in a non-aged adult population. Taking advantage of a lottery employed in a recent expansion of the Oregon Medicaid program, a research team is conducting the equivalent of a controlled trial on the effects of insuring previously uninsured, non-aged adults with incomes just above the federal poverty level. Initial results indicate that newly insured adults substantially increase their healthcare use and report less financial strain and improved health and well-being (Finkelstein et al., 2011). Future results will provide objective measures of the effects of Medicaid coverage on health.

The research literature does not yet address the relationship between health insurance and medical readiness of RC members. However, the literature does suggest that their children are likely to be in better health if they have insurance.

Rate of Health Insurance Coverage Among RC Members

Status of Forces Survey

The Status of Forces Survey of Reserve Component Personnel (SoF-R) periodically includes a question about RC members' health insurance coverage. The survey is administered to a sample of Selected Reserve members twice a year; every two years, the survey asks respondents whether they have health/medical insurance.[5] Respondents who are activated at the time of the survey are asked whether they had health insurance before they were called to active duty. The most recent survey that includes information on health insurance coverage was fielded in January 2011 by the Defense Manpower Data Center (DMDC).[6] A stratified random sample for the module containing the health insurance question included 120,724 members who had at least six months of service and were below the rank of flag officer. Of the sample, 90.8 percent were located, and the completion rate of the located respondents was 20.5 percent. One-third of the original sample received a survey module that included questions on health insurance coverage. We deleted the respondents who were not given this module and two groups of respondents who serve full time for an extended period in the military as military or civilian personnel: Active Guard Reserve (AGR) members, who are covered by TRICARE, and Military Technicians,

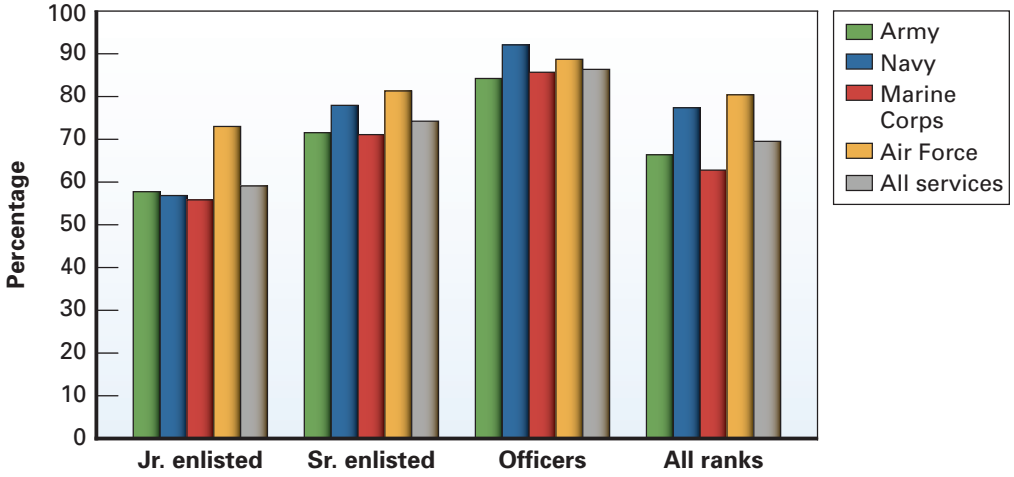
5. The question does not specify the sources of insurance the respondent should consider when answering. TRS enrollees do report having insurance on this question.

6. The survey fielded in January 2011 is not publicly available. RAND was provided with an early release of the database and an interim codebook for this study.

who are covered by the FEHB program. Our final working sample comprised 7,825 respondents who had responses for health insurance coverage and the other variables used in our analyses. Weights provided with the data adjust for differences across subgroups in the sampling rate and nonresponse rate.[7]

The survey results show that 70 percent of Selected Reserve members, excluding AGRs and military technicians, had health insurance in 2011. Figure 2.1 plots the percentage that reported having insurance, by military service, for junior enlisted personnel (E-1–E-4), senior enlisted personnel (E-5–E-9), and all warrant and commissioned officers. There is some variation across the services, especially for junior enlisted personnel, and the rates of insurance coverage are higher for senior enlisted personnel and officers in all the services.

Health insurance coverage rates in the RC population mirror the rates in the general population. We compared the 2008 SoF-R data with data for the general adult population from the Current Population Survey (CPS) for the same year. In the CPS, the insured rate varied from 71 percent for adults 18 to 24 years of age to 84 percent for those 45 to 54 years of age (U.S. Census Bureau, undated). To compare health insurance coverage in the RC population with that of a roughly comparable U.S. population, we multiplied the percentage with health insurance by age group in the CPS by the percentage of Selected Reserve members in



Source: SoF-R, 2011 (weighted).

Figure 2.1. Selected Reserve Members with Health Insurance Coverage, by Service and Rank, 2011

7. Detailed documentation of this survey is provided in Defense Manpower Data Center, 2009. The weights adjust for observed differences in response rate (e.g., by rank, gender) but not for unobserved differences. If nonrespondents would not have answered the questions the same way respondents with the same observed characteristics did, the weights do not eliminate nonresponse bias in the results.

the same age group. In the reweighted CPS data, 76 percent were insured—the same fraction that reported having insurance in the SoF-R for the same year.[8]

Considerable public attention has focused on declining rates of health insurance in the United States. The CPS data (matched to the age distribution in the Selected Reserve) show a decrease in the insured rate from 80 percent in 2000 to 76 in 2008. In contrast, the insured rate among members of the Selected Reserve remained constant over the same time period—in the 2000 Survey of Reserve Component Personnel, 74 percent of respondents reported that they had insurance (Hosek, 2010)—the same as in 2008.[9] More recent CPS data show a further erosion of insurance coverage in the civilian population between 2008 and 2009 as economic conditions worsened during the recent recession. Similarly, the SoF-R shows a decline in coverage rates over the two years between survey waves (from 74 percent to 70 percent).

Factors Associated with Having Health Insurance Coverage

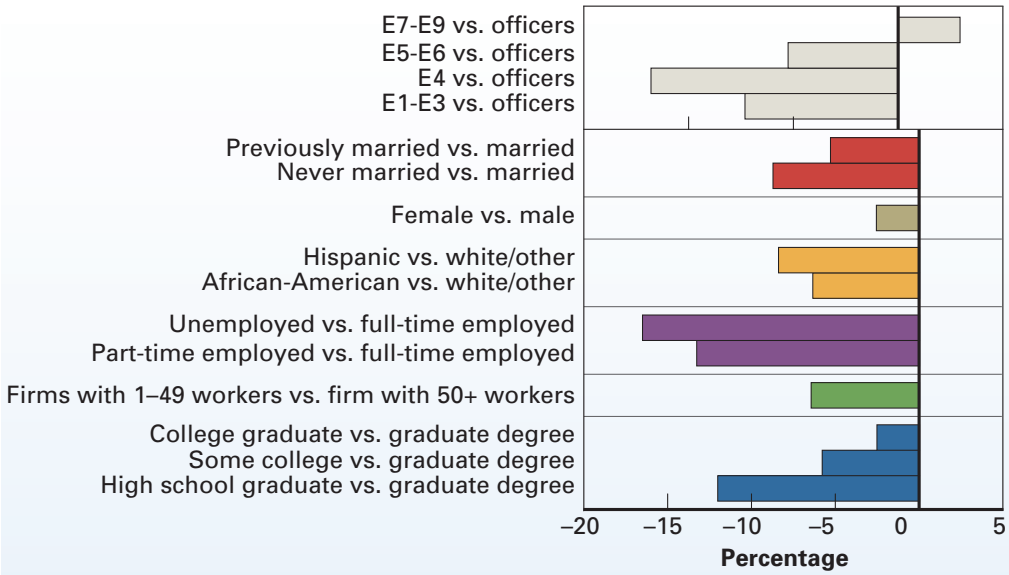
We used multivariate regression to determine the association between member characteristics and health insurance coverage. The dependent variable indicated whether each respondent to the SoF-R survey reported having health insurance, and the explanatory variables were service component, rank, gender, race/ethnicity, education, marital status, whether the respondent had children ages 0–13 or 14–22, employment, type and size of firm if employed, and whether the respondent was a student. Variable means and regression coefficients and standard errors, which were estimated in a linear probability model, are shown in Tables A.1 and A.2 in the Appendix.

Figure 2.2 shows selected results from the regression analysis. Each set of bars in the figure represents the difference between the indicated group and the comparison group. For example, the top bar indicates that personnel in the top three enlisted ranks are four percentage points *more likely* than officers to have health insurance.[10] However, lower-ranking enlisted personnel are less likely to have health insurance. The survey file used for this analysis did not include age or income, so these results for rank reflect the strong relationship typically seen between the characteristics of these rank groups and insurance coverage—namely, that young adults and

8. A more detailed comparison controlling for age, gender, marital status, number of children, and income also showed that the rates for reservists are the same as those for the comparable general population (see the analysis of the effects of health reform below).

9. A change in the health insurance questions may have affected responses over time. The 2000 survey included several questions about specific sources of health insurance that may have led to more complete reporting of coverage.

10. Standard errors for all regression coefficients are included in the Appendix tables. This coefficient just misses being statistically significant at the 0.05 level.



Source: SoF-R, 2008.

Figure 2.2. Differences Between Categories of RC Members Who Have Health Insurance

lower-income individuals (unless they are eligible for Medicaid) are less likely to be insured. In earlier years of the SoF-R, the most junior enlisted personnel (E-1–E-3) had the lowest coverage rate, but in 2011 their coverage rate was somewhat higher than that for personnel in the next higher rank (E-4). They were also the only rank group that did not experience a decline in health insurance coverage rate between the 2008 and 2011 surveys. A provision of the federal health reform legislation implemented in September 2010 mandated that health plans offering dependent coverage extend eligibility to age 26. Previously, eligibility varied by state but typically did not include young adults unless they were financially dependent or attending college. It seems likely that more of the lowest-ranking RC members are now insured because they have been able to continue their parents' coverage.

In employer-based health insurance systems, employment status is strongly associated with being insured, as one might expect. Benefits are often unavailable to part-time workers, and among RC members, the difference between full-time and part-time workers in the proportion with health insurance was 18 percentage points. Members who were unemployed at the time of the survey were also less likely to have insurance, but the gap was smaller than it was for part-time workers. Those working for very small employers were also less likely to have insurance. Small employers are much less likely to offer their employees health insurance than large employers

are. In 2010, only 55 percent of firms employing fewer than ten workers offered health benefits of any kind, whereas 76 percent of firms with ten to 24 workers and 90 percent of larger firms offered benefits (Kaiser Family Foundation and Health Research and Educational Trust, 2010). Finally, controlling for employment status and employer size, there was no difference associated with the type of employer (i.e., public, nonprofit, private, own or family business).

Personal and family characteristics also were associated with members' probability of having health insurance. As shown in Figure 2.2, previously married and single members were less likely to have insurance than married members. Men were less likely than women to have health insurance, as were those who had less education. Controlling for all these other variables, whether the member had children was not associated with having insurance; in simple tabulations, however, those with children are more likely to be insured. Like military rank, these personal characteristics are related to characteristics not included in the SoF-R data, especially income. Other studies have shown a strong relationship between income and being insured (Gruber, 2008; Abraham and Feldman, 2010). The SoF-R also lacks information on health status, another important factor in health insurance decisions.

To summarize these results, the SoF-R data show that RC members without health insurance in late 2008 tended to be in the junior enlisted ranks, less well-educated, single, likely to have lower incomes, and likely to be working part time or for a small employer. Many of them lacked insurance either because they were not offered employer-based health insurance or because they chose not to participate in their employer's plan. The most likely reason for nonparticipation is the size of the premium contribution, which has been increasing. Across firms of all sizes in 2010, the average annual premium was $900 for single coverage and $5,000 for family coverage (Kaiser Family Foundation and Health Research and Educational Trust, 2010).

Enrollment in TRS

To examine TRS enrollment, we used data from the Defense Enrollment Eligibility Reporting System (DEERS), the official enrollment file for TRICARE. DEERS has less information about members than the SoF-R survey has, but it is more current and its enrollment data are more reliable. We use DEERS enrollment information, along with member and dependent characteristics, for June 2008 and June 2010. This was 6 months before and 18 months after a 30- to 40-percent decrease in premium contribution, which probably accelerated the increase in enrollment in what is still a new program. Using consistently scrambled individual identifiers, the DEERS file was linked to a DoD civilian personnel data file for the same

months to identify RC members who, as DoD civilian employees, are eligible for the FEHB and not for TRS. We excluded these individuals from the eligible population in calculating enrollment rates.

TRS enrollment increased by 239 percent in the two years between 2008 and 2010 to over 60,000 Selected Reserve members (Figure 2.3). There was almost no voluntary disenrollment between the two years; most of the 2008 enrollees who left TRS were either activated and had their enrollment switched to TRICARE or left the Selected Reserve and became ineligible. Most of the added enrollees in 2010 were already serving members, but a sizable number were new RC entrants. Six percent of members who entered between June 2008 and June 2010 enrolled in TRS, and 8 percent of members who were already serving in 2008 had enrolled by 2010. TRS enrollment continues to increase; by December 31, 2010, it had risen to 67,259 members.[11]

Enrollment rates are highest for commissioned officers and among those who are married and have children under the age of 14 (Table 2.2). This is not the population of RC members likely to be uninsured in the SoF-R survey data.[12]

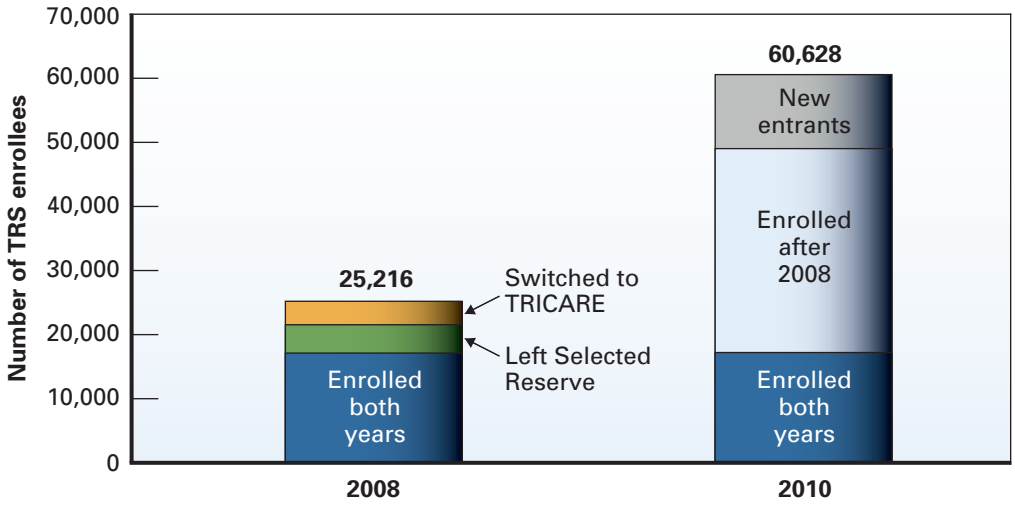


Figure 2.3. TRS Enrollees in 2008 and 2010

11. Jody W. Donohoo, "Total Force + TRICARE® = MHS Commitment to . . . Reserve Warriors and Their Families: Before, During and After Activation," unpublished survey results presented at the 2011 Military Health System Conference.

12. More direct evidence of the value of TRS for uninsured RC members comes from the 2000 SoF-R, which asked about willingness to pay for DoD-sponsored health insurance if it were offered. At that time, only 10 percent of the respondents who were uninsured valued an insurance option at more than $100 per month ($131 in 2011 dollars). This is more than the TRS premium for single coverage but considerably less than the premium for family coverage.

Among respondents to a spring 2008 survey of Selected Reserve members conducted by the TRICARE Management Activity (TMA), the most common reason for enrolling in TRS, cited by 69 percent of enrollees, was that it was "more affordable."[13] Only 31 percent indicated that they had "no other healthcare alternatives." Approximately half of the enrollees who responded to this survey reported that they had another health insurance option, compared with 70 percent of the respondents not enrolled in TRS. These results indicate that TRS was more attractive to members who lack other options, but that a substantial fraction of enrollees are opting for TRS instead of employer-provided coverage.[14]

Table 2.2. TRS Enrollment Rate, by Member Characteristics, June 2010

Characteristic	Percent Enrolled
Rank	
E-1–E-4	4
E-5–E-9	10
Warrant officer	10
Commissioned officer	13
Gender	
Female	4
Male	8
Marital status	
Single	1
Married	14
Child age 0–13	
No	3
Yes	16

The cost of public health insurance is higher when there is a crowd-out of private health insurance, which occurs when individuals pass up or drop private health insurance they are eligible for and enroll in the public program instead. Crowd-out has been studied primarily for Medicaid, and the studies have produced differing results; data from an expansion of the State Child Health Insurance Program (SCHIP) to higher income levels (Gruber and Simon, 2008) show a substantial rate of crowd-out, approximately 60 percent. There is also evidence of crowd-out in military retirees under the age of 65, the other military population likely to have a civilian health insurance option. A 2006 survey of civilian health insurance eligibility and coverage of non-elderly retirees, all of whom are enrolled in TRICARE, showed that almost four-fifths are eligible for civilian insurance, but only half of them actually enroll in a civilian plan (Mariano et al., 2007); most of those not selecting civilian insurance enroll in TRICARE's Prime option, which requires a small annual premium but has only minimal cost-sharing.

13. Unpublished survey results presented at the 2011 Military Health System Conference.

14. The response rate for this survey was only 18 percent, and these appear to be unweighted results. The SoF-R results, collected six months later, indicate that three-quarters of all Selected Reserve members have health insurance—a higher fraction than reported having any civilian option in the TMA survey. Health insurance questions can be difficult for respondents to answer accurately, and these two surveys word the health insurance questions differently.

Overall, although TRS may be enrolling some Selected Reserve members who would otherwise be uninsured, the rapidly growing number of enrollees appears to include a significant fraction who take up TRS instead of employer insurance because TRS is more affordable. Recall that the premium contribution for TRS is roughly half the average contribution for employer plans. Enrollment in TRS can be expected to increase further as eligible RC members learn about it.

DoD's annual cost per RC member enrolling in TRS is almost $2,300 for single coverage and almost $8,500 for family coverage. To put this cost in context, an enlisted member joining the reserves after an initial term of active service (e.g., rank E-4, four years of service) is paid about $4,600 for one drill day per month and 14 days of summer training. If significant numbers were to enroll in TRS, this would represent a large increase in the cost of compensation. For RC members, the added benefit would equal the difference between the premiums and out-of-pocket costs for care in TRS and those of their other sources of health insurance (for those willing to pay the premium cost). It is not clear whether TRS will have a significant impact on recruiting and retention. However, research has generally shown some relationship between health insurance and job decisions in the civilian labor market.[15]

Potential Effects of Health Reform on Health Insurance Coverage for RC Members

PPACA contains several provisions that expand the health insurance options relevant to RC members (The Commonwealth Fund, 2011). The first of these provisions allows young adults up to age 26 to be covered under their parents' insurance, effective immediately. The others will be effective in 2014:

- Medicaid eligibility for all individuals at up to 133 percent of the federal poverty level (FPL)
- Health insurance exchanges offering a choice of standardized plans to small businesses and individuals without employer coverage
- Sliding-scale subsidies for insurance purchased through the exchanges for families with incomes of up to 400 percent of the FPL
- Mandated coverage for individuals and businesses with at least 50 employees, with penalties for noncompliance.

15. For example, recent studies have shown that fathers whose children became eligible for SCHIP were more likely to change jobs (Bansak and Raphael, 2008) and that job turnover is higher in industries with higher rates of employer health insurance (Ellis and Ma, 2011). Earlier, Gruber and Madrian (2002) reviewed the literature and concluded that availability of health insurance does affect job decisions.

The subsidies will be set at a level that caps the cost of health plans offered in the exchanges to a percentage of income that increases with the level of income relative to the FPL (Table 2.3).

The individual penalty for failure to insure will be phased in over three years; in 2016, it will be equal to $695 or 2.5 percent of applicable income, up to a maximum of three times that amount per family, or $2,085. There are exemptions from the penalty for individuals who (1) cannot find coverage at a cost to them of less than 8 percent of income, (2) have incomes below the threshold for paying income taxes (currently $9,350 for single coverage and $18,700 for a couple), or have been uncovered for less than three months. The individual mandate is being challenged in the courts, with differing decisions at the lower court levels that will

Table 2.3. Premium and Out-of-Pocket Limits in State Health Insurance Exchanges Under PPACA

	Maximum Share of Income for	
Percentage of FPL	Premium Contribution (%)	Annual Out-of-Pocket Cost
Up to 133	2.0	
133–150	3.0–4.0	$1,983 for individuals, $3,967 for families
150–200	4.0–6.3	
200–250	6.3–8.05	$2,975 for individuals, $5,950 for families
250–300	8.05–9.5	
300–400	9.5	$3,967 for individuals, $7,933 for families
Above 400	No limit specified	$5,950 for individuals, $11,900 for families

require a Supreme Court decision about whether the provision is constitutional. The employer penalty is expected to have little impact because almost all employers with 50 workers or more already offer insurance; however, some employers may be forced to improve the coverage they now offer.

Figure 2.4 plots the maximum cost for TRS and the maximum annual cost of health insurance that will be purchased through the state exchanges when they are implemented in 2014 for those eligible for subsidies. The premium calculations are based on the 2011 FPL to make them comparable with the current TRS premiums. TRS costs are lower than the subsidized costs in the health exchanges at all income levels above 150 percent of the FPL ($16,000 for a

single person and $34,000 for a family of four in 2011). For single coverage, the current TRS premium is $100 lower than the penalty for not having coverage under health reform, and for family coverage, it is approximately $300 higher. It seems reasonable to expect that if this provision is ultimately implemented, many currently uninsured RC members will turn to TRS instead of paying the penalty. A similar mandate and penalty in Massachusetts was effective in inducing previously uninsured and healthy individuals to purchase insurance (Chandra et al., 2011).

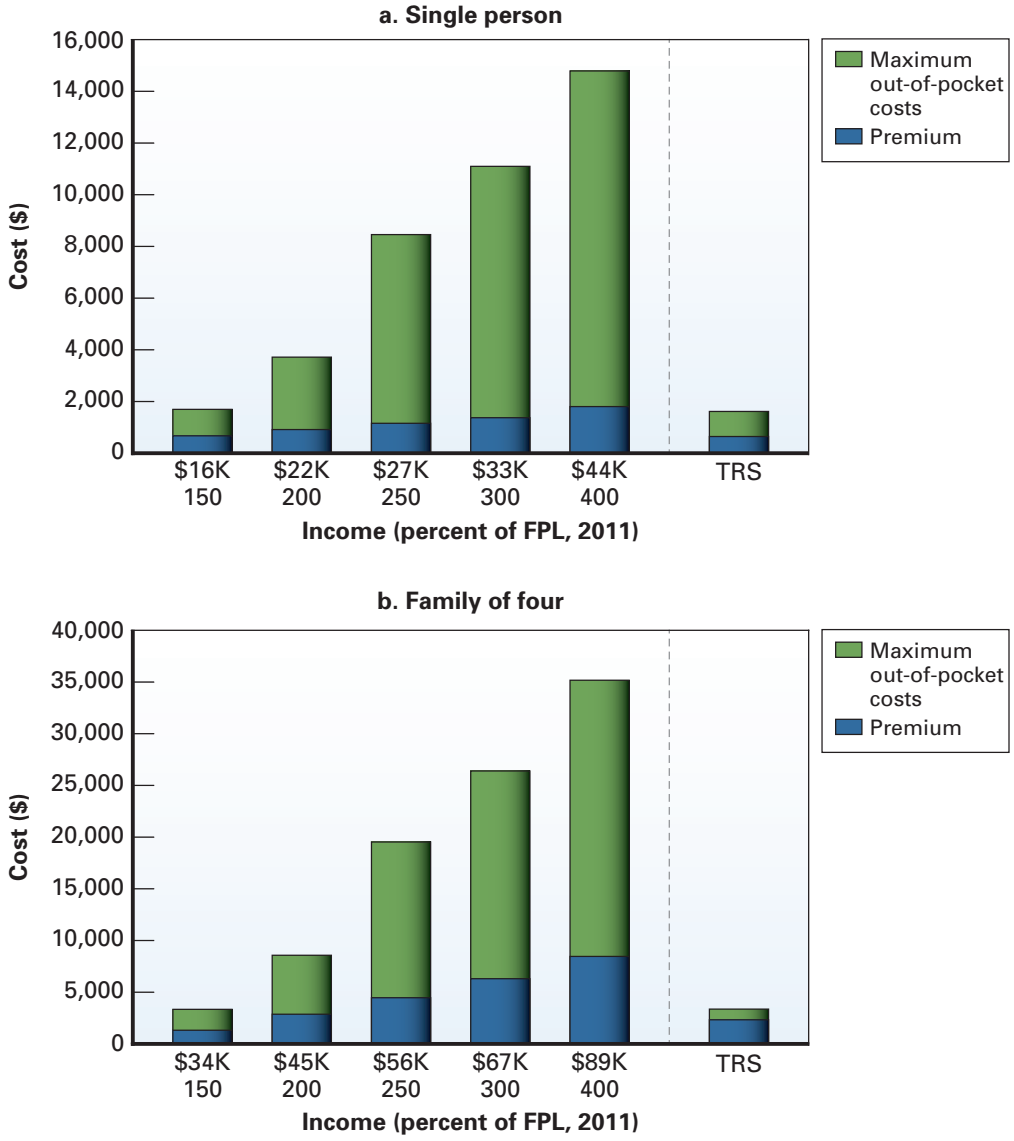


Figure 2.4. Comparison of Maximum Cost per Year of Health Exchange Plans and TRS

To examine the potential effects of health reform on health insurance coverage of RC members, we used the RAND COMPARE microsimulation model of health reform (Girosi et al., 2009). The model projects how individuals, households, and firms are likely to respond to healthcare policy changes, including the ones included in PPACA, based on the economic theory of health decisionmaking and accumulated evidence from more modest policy changes (e.g., changes in Medicaid eligibility).

The COMPARE model's simulation of the effects of PPACA was used to predict the change in the rate of health insurance coverage for RC members. The calculation was based on a decomposition of the RC population into subgroups defined by age (under 25, 25–34, 35–44, 45 and over), gender, marital status (single or married), number of children (0, 1, 2, 3, 4, 5, 6+), and rank (enlisted or officer). After combining subgroups with fewer than 100 members, we had 137 subgroups. For each subgroup, we obtained information on combined member and spouse earnings from a dataset created at the Social Security Administration (SSA) by merging DoD personnel records with Medicare earnings data. For each subgroup of RC members, SSA provided the percentage whose annual family (member plus spouse) earnings were in each of ten earnings groups defined relative to the FPL: up to 1.33 times the FPL, 1.34 to 1.50, 1.51 to 2.00, 2.01 to 2.50, 2.51 to 3.00, 3.01 to 3.50, 3.51 to 4.00, 4.01 to 5.00, 5.01 to 6.00, and over 6.00. Using this information, the 137 subgroups were subdivided by income level. The COMPARE model yielded predictions of the change in the percentage of RC members with health insurance after health reform in each subgroup. In most cases, the insurance coverage of dependents is the same as that for RC members. Here, we report only the predicted coverage rates for members.

First, we generated an estimate of the current (pre-reform) health insurance coverage rate for RC members. This provided a test of the applicability of the micro-simulation model to the RC population and a baseline estimate to compare with the post-reform estimate. For the overall population, the microsimulation model estimated an insured rate of 76 percent—the same rate that was estimated from the 2008 SoF-R. The model's post-reform insured prediction is substantially higher, at 89 percent. This prediction does not factor in the availability of TRS; it considers only the standard insurance options after reform is implemented.

Figure 2.5 shows the predicted post-reform sources of health insurance for RC member households. Employers will remain the primary source of health insurance, but some employers will arrange for employee coverage through the

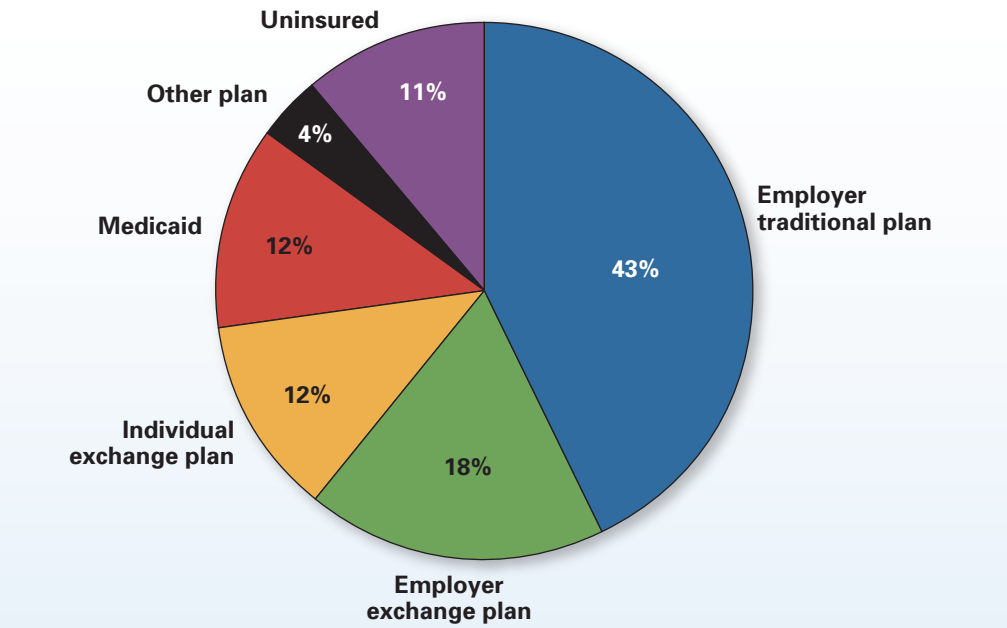


Figure 2.5. Predicted Source of Post-Health-Reform Health Insurance for RC Member Households

health insurance exchanges instead of traditional sources.[16] Individual purchases through the exchanges and expanded Medicaid eligibility account for most of the remaining coverage. Of those predicted to purchase individual coverage through the exchanges (12 percent of RC households), four-fifths would qualify for a subsidy based on SSA family earnings data. Nevertheless, almost all of these households would be better off taking up TRS instead. As is true today, many predicted to be in employer plans may also find TRS more attractive. Some who would newly qualify for Medicaid may prefer to pay the premium for TRS. Finally, as discussed above, those who pay income taxes will face a penalty for not having insurance. RC members would be better off enrolling in TRS than paying the penalty.[17]

Summary

When activated for more than 30 days, RC members have the same comprehensive healthcare coverage that AC members have through TRICARE. TRICARE eligibility begins when the order to activate is processed and ends 180 days after deactivation. For RC members who are not activated for more than 30 days, the

16. The fraction of households obtaining health insurance through employers is predicted to increase slightly, consistent with most analyses of the effects of health reform.

17. Those eligible to enroll in the VA health system may be able to avoid paying a penalty for their own lack of health insurance, but they would still face a penalty if they have uncovered family members.

military provides care only for health problems that are incurred or aggravated in the line of duty. RC members must rely on civilian health insurance for other health problems. The 2011 SoF-R reveals that 30 percent of Selected Reserve members lack health insurance. The rate for RC members is the same as that for a comparable civilian population.

The TRS program was initiated to offer insurance for RC members who lack a civilian option, and both TRS eligibility and affordability have changed significantly in recent years. TRS enrollment grew rapidly after the changes were implemented and was 8 percent of the eligible population in June 2010. While it is possible that insurance coverage has not declined in this population because of the availability of TRS, the evidence suggests that quite a few enrollees have access to civilian insurance that they find less attractive. Further, the characteristics of TRS enrollees do not match well with the characteristics of uninsured RC members.

Although at present TRS may not be significantly reducing the number of uninsured members, this may change if an individual insurance mandate and associated penalties are implemented in 2014–2016 in accordance with PPACA. By itself, health reform would substantially increase the coverage rate in the RC population. However, financially, TRS compares favorably with the health insurance plans that will be offered by the state health exchanges, even for those at lower income levels who are eligible for subsidies in the exchanges. TRS premiums for single and family coverage are, at worst, only slightly higher than the penalty for not having insurance under health reform. There is a good chance that once health reform is implemented, TRS enrollment will increase substantially. This could make it very difficult to achieve the goal of controlling DoD's health costs.

3. Disability Outcomes for Reserve Component Members

Introduction

Military personnel—both AC and RC—who develop a medical condition that may interfere with their ability to meet medical standards for continued service are referred to their service Disability Evaluation System (DES) for further evaluation, and if they are found to be no longer medically fit, for disability evaluation leading

to possible compensation. Personnel who have a disability because of their military service are also eligible for disability benefits from the VA after they leave service.

This chapter begins with an overview of the multistage military DES, including evaluation of medical fitness to serve, disability evaluation and rating, and disability benefits awarded based on DES outcomes. This overview concludes with a brief description of the VA's disability system and recent efforts to coordinate the evaluation processes of DoD and the VA. Finally, we present an analysis of the dispositions and processing times for DES cases initiated in fiscal years 2007–2010.

Overview of the Military Disability Evaluation System

The secretary of each branch of the military is responsible for conducting disability evaluations of that service's personnel.[18] As Figure 3.1 illustrates, the process involves a number of steps, including, in some cases, a line-of-duty investigation, a Medical Evaluation Board (MEB), and a Physician Evaluation Board (PEB). For active-duty personnel (including RC members serving on active duty), the disability evaluation process generally begins at the MTF providing care for the medical condition. Once the medical provider determines that a service member has received the maximum benefit from medical care for his or her injuries, it refers the member to the DES. Members referred to the DES have one of four basic outcomes. They are either

- Medically fit and returned to duty
- Medically separated from the military but not eligible for disability benefits
- Separated with a lower disability rating qualifying for disability severance pay
- Retired with a higher disability rating qualifying for lifetime disability benefits.

Line-of-Duty Investigation

A formal line-of-duty investigation may be required prior to referral to the DES to determine whether the condition was incurred or aggravated by military service and qualifies for military disability benefits. A formal investigation is required if the medical condition may have

18. Policies and procedures for the Physical Disability System are provided in DoD Instruction 1332.38, dated November 14, 1996, and incorporating Change 1, July 10, 2006. A later revision is contained in a memorandum, Directive-Type Memorandum (DIM) on Implementing Disability-Related Provisions of the National Defense Authorization Act of 2008 (Pub L. I 10-181), from the Under Secretary of Defense for Personnel and Readiness, dated March 13, 2008.

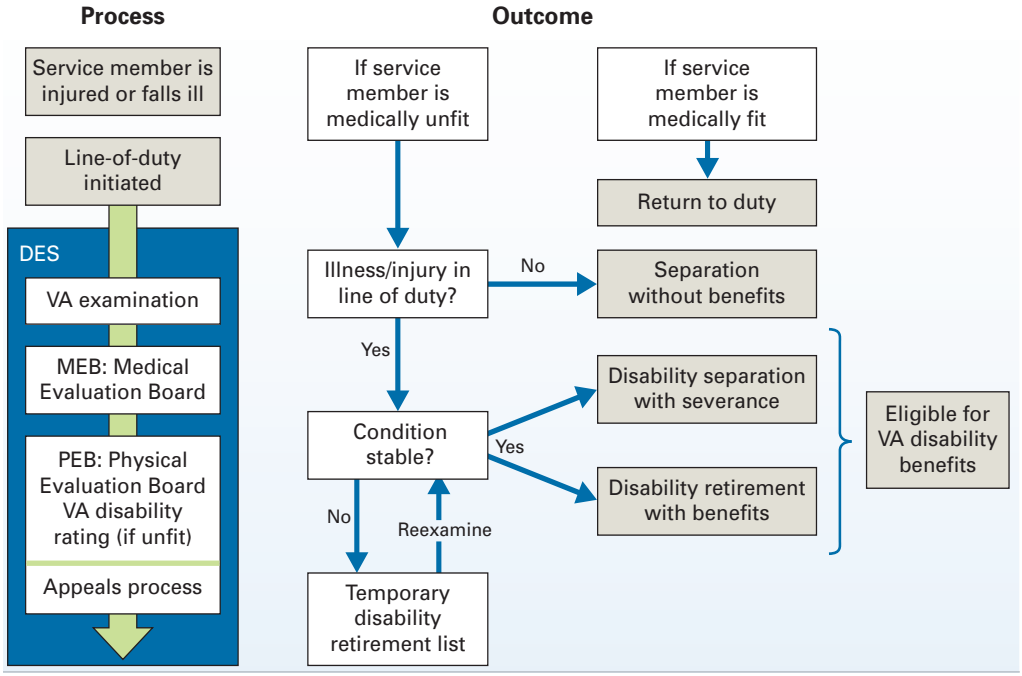


Figure 3.1. Military DES

- Developed in "doubtful" circumstances or may be the result of misconduct or negligence, including alcohol or drug abuse or conduct leading to charges under the Uniform Code of Military Justice
- Occurred while the member was absent from duty
- Existed prior to service.

As discussed in Chapter Two, the requirement for a determination that the medical condition was sustained in the line of duty constitutes an important difference in applying the DES for RC members. Line of duty is presumed for both AC and RC personnel and is rebutted if an investigation concludes that one of the three circumstances above applies. Since AD members are continuously in service from the time they are found fit at accession, it is unlikely that their medical conditions are preexisting and not aggravated during their service. Among RC members, intermitent service means that their medical conditions are more likely to be preexisting.[19] In 2008, the policy was altered to require "compelling" evidence

19. For RC members who have accumulated at least eight years of active service, conditions are considered to be preexisting if the member becomes unfit during active service of more than 30 days.

to set aside the presumption for conditions identified after 30 days of active service for members with more than six months' active service. The same presumption does not exist for RC members identified as having a medical condition when not on extended active service.

Procedures for determining line of duty are established by each military service. Except when an investigation is required, the unit commander makes the line-of-duty determination. An investigating officer selected by the chain of command is appointed to conduct the investigation, if necessary. There are provisions for review of line-of-duty determinations; for example, the PEB may ask for a re-review of the decision.

Medical Evaluation Board

Any service member who is discovered to have a medical condition that calls into question his or her ability to meet medical standards for service is referred first for a complete physical examination, the results of which are submitted to an MEB. RC members not on active-duty status are referred for medical evaluation when their ability to meet medical standards comes into question. This may occur, for example, when a "medical profile" is entered in the member's record indicating a condition that limits the duties the member can perform. The MEB process is the same for all military personnel, regardless of component or active-duty status.

The MEB consists of at least two physicians from an MTF, often the MTF where the member is being treated but not always, especially for RC members not serving on active duty. On the basis of the results of the medical examination and other information, the MEB evaluates whether the member meets medical standards for continuing in service. MEB cases can result in full return to duty, limited duty for up to six months, or referral to the PEB for a determination of fitness and, in many cases, a disability evaluation. The MEB provides a narrative summary of its findings to the PEB for use in its deliberations.

In addition to the results of the medical examination, the MEB receives a report from the member's commanding officer on the performance of assigned duties, the results of any line-of-duty investigation, and information from the medical examination conducted when the member entered, if it is available.

Physical Evaluation Board

The PEB determines a member's fitness to continue in military service (i.e., whether the medical condition precludes the member from reasonably performing

the duties of his or her military occupation and rank).[20] For those found unfit, the PEB assigns a disability rating by applying the Veterans Affairs Schedule for Rating Disabilities (VASRD). Only the medical conditions determined by the PEB to affect fitness are rated.

The Navy and Air Force each have a single PEB, whereas the Army has three PEBs that are assigned cases on a regional basis according to where the MEB is located. Trained personnel, generally including a physician and two line officers or civilian equivalents, adjudicate each case. The PEB conducts an initial review, termed *informal*, based on the narrative summary provided by the MEB and other relevant information, including the results of a line-of-duty investigation if there was one. Service members who do not concur with the informal board findings may request reconsideration and submit new medical information or additional supporting evidence. If found unfit, a member may request a formal PEB hearing for which he or she is allowed legal representation and can appear in person. If found unfit again, the member may petition the relevant service secretary for relief.

Physical Evaluation Board Liaison Officers (PEBLOs) are available at all MTFs to counsel service members on their legal rights and benefits during each step of the disability evaluation process. These liaison officers inform service members of the PEB's findings and help them complete an "election of options" form, indicating whether or not they accept the findings. The liaison officer then notifies the PEB about how members have decided to proceed.

The VASRD has been the basis for military DES ratings for a long time. It lists more than 700 disabilities in 14 body systems and provides evaluation criteria for each. The schedule's rating outcomes range between 0 and 100 percent, at ten-point increments, depending on severity. The last comprehensive revision of the basic VASRD occurred in 1945; in accordance with the recommendation of the 2007 Veterans Disability Benefits Commission, the VA has established a schedule for revising all sections of the VASRD over six years and for subsequent periodic updates.

In 2008, Congress mandated strict application of the VASRD, except when alternative criteria resulting in a higher rating level have been established by DoD and the VA. Prior to 2008, the PEBs had somewhat more discretion in their use

20. DoD Directive 1332.18 states, "The sole standard to be used in making determinations of unfitness due to physical disability shall be unfitness to perform the duties of the member's office, grade, rank or rating because of disease or injury." The directive also specifies the requirements for medical separation and retirement. For members with less than eight years of service, the medical condition must have arisen during service after 30 days or in the line of duty during the first 30 days. Members who have more than eight years of active service are eligible for disability compensation even if the disabling condition existed prior to service. Conditions must be permanent and not the result of misconduct or neglect.

of the VASRD. Also in 2008, DoD established the Physical Disability Board of Review to ensure fairness by reviewing the ratings assigned to personnel who were previously found to be unfit and who received a disability rating below 30 percent. These cases initially resulted in a medical separation instead of a medical retirement, and as described below, the benefits for the two outcomes differ significantly.

Military Disability Compensation

A service member's combined disability rating for all conditions rated by the PEB determines whether he or she receives a lump-sum disability severance payment or lifelong disability retirement payments. Service members with 0-, 10-, or 20-percent disability ratings and less than 20 years' service receive a lump-sum payment upon separation from the military according to the formula:

Years of creditable service × highest monthly base pay × 2.

The largest number of enlisted personnel referred to the DES are at the rank of E-4. At 2011 base pay rates, an E-4 with four years of creditable service would receive a severance payment of about $17,000 at separation. An officer at the most common rank, O-3, with eight years of service would receive a severance payment of $83,000.

Members awarded combined disability ratings of at least 30 percent receive disability retirement compensation. The monthly benefit is the higher of two calculations, where the base-pay amount used is the average of the highest 36 months of base pay prior to discharge:

Percent disability rating × monthly base pay, or

Years of creditable service × 2.5 percent × monthly base pay.

In most cases, disability retirement pay is capped at 75 percent of the base-pay amount.[21] A rough estimate based on the pay tables for 2009–2011 shows that an E-4 who is separated in 2011 with four years of service would receive from $600 per month with a 30-percent rating to a maximum of $1,500 per month. The range for an O-3 with eight years of service is $1,550 to $3,900. These calculations use the first method above because it results in a higher amount. Relatively few of those who are medically retired benefit from the second method; an individual with a 30-percent rating has to have more than 12 years of service to benefit from the second method.

21. Members with more than 30 years of service can receive more than 75 percent. While on the Temporary Disability Retirement List (TDRL), discharged personnel receive a minimum of 50 percent times their base retirement pay.

Disability retirees receive the other benefits of military retirement, including lifetime TRICARE eligibility for themselves and their dependents. Like regular retirement pay, DoD disability retirement pay is taxable unless the disability is combat-related.

Coordination with the VA Disability System

Any veteran can apply for VA disability benefits. The VA rates all medical conditions that it determines to be service-connected, regardless of whether or not the condition made the individual unfit for military service. Research for the Veterans' Disability Benefits Commission found that 80 percent of veterans who had received a DoD disability rating subsequently applied for VA benefits (Christensen et al., 2007). In general, the VA ratings of those veterans were higher than their DoD ratings; more conditions were reflected in the VA ratings, and the VA ratings of the same conditions were somewhat higher, on average. Unlike DoD's rating, the VA's rating is not permanent and may be adjusted over time as a veteran's condition changes.

Until recently, military personnel with a line-of-duty or service-connected disability had to navigate the DoD and VA systems sequentially, undergoing two comprehensive medical examinations. This was a time-consuming process, and as a result, eligibility for VA benefits was often not established for some time after discharge from military service. To simplify the overall process, the departments developed the Integrated Disability Evaluation System (IDES), which they piloted in 2008 and phased in at other locations in 2009–2011. The IDES involves a single medical examination and disability rating procedure for use in the DES and by the VA. The examination and rating are currently being done by VA personnel or by staff under VA contract. The results of the medical examination are submitted to an MEB, and a PEB determines whether the member is fit to continue in service. The DoD disability rating is based on the ratings established for all disabling conditions incurred or aggravated in the line of duty, and the VA rating is based on the ratings for all service-connected conditions. Under this system, consistency in the rating of individual medical conditions is ensured, but the overall DoD and VA ratings may factor in different medical conditions. Members who are medically separated or retired from service leave with their VA disability rating established and should receive any VA compensation to which they are entitled a month after separation.

DoD and the VA have established goals for the amount of time needed to complete each phase of the IDES process: 100 days for the MEB phase, 30 days for the informal PEB phase, 30 days for the formal PEB phase if there is one, and up to 60 days for appeals and to complete PEB administrative processing (Government Accountability Office, 2010). The dates recorded in the DES data provided by the

services for this research cannot be used to evaluate reliably how well these goals are being achieved, but other analysis indicates that cases completed in March 2011 averaged one-third more days than the combined goals specify (Government Accountability Office, 2011).

The initial sites that piloted IDES experienced higher rates of satisfaction among service members going through the system, but processing times have been long because of staffing shortages and heavier-than-expected caseloads, along with other start-up problems (Government Accountability Office, 2010).

DoD and VA disability compensation are also coordinated. Veterans given a combined VA disability rating of 10 percent or higher receive tax-exempt monthly compensation that depends on the percent rating and, for those with a rating of 30 percent or higher, whether the veteran has a spouse and dependents. Congress authorizes the payment amounts annually. In 2011, the monthly payment is $123 for veterans with a 10-percent disability rating (with or without dependents) and $2,932 for veterans with a 100-percent disability and a spouse and one child. The VA also increases the amount provided to veterans with specific impairments through a schedule of Special Monthly Compensation payments.

In general, individuals cannot receive disability pay from both DoD and the VA. Lump-sum severance payments from DoD are offset by initial VA payments, and there is a dollar-for-dollar reduction in monthly military disability pay for individuals who also receive VA disability pay. In effect, the higher of the two amounts is paid.

There are two exceptions to the general rule that VA payments offset DoD payments: The Concurrent Retirement and Disability Payment (CRDP) program is phasing out the offset to military pay for all retired members who qualified for regular military retirement after 20 years of creditable service and have a combined VA disability rating of at least 50 percent. The phase-out, which began in 2004 and ends in 2014, eliminated 50 percent of the offset in 2007 and 94 percent in 2010. The Combat-Related Special Compensation (CRSC) program provides a special monthly payment equal to the amount of the offset to military retired pay resulting from the receipt of VA disability compensation attributable to combat-related disabilities. The payment under this program also depends on years served and retired pay base, so the amount received is less for members who were medically retired after only a few years of service.

In addition to monthly disability pay, the VA provides healthcare and other benefits. Eligibility for these benefits depends on a number of factors, including disability rating. Individuals eligible for TRICARE and VA healthcare may use either or both systems.

DES Outcomes for Fiscal Years 2007–2010

To determine whether DES outcomes for RC members differ from those for AC members, we analyzed the records of disability cases that were initiated in fiscal years 2007–2010 in the Army, Navy, and Air Force disability systems. The services provided information on all cases for which an informal board decision was made during this four-year period. The data capture the early effects of the important changes described above in the DoD and VA disability evaluation systems. Analysis of data from earlier years is available in the reports of the Veterans' Disability Benefits Commission (Veterans' Disability Benefits Commission, 2007) and the Government Accountability Office (Government Accountability Office, 2006).

The format and content of the data provided to us by the services differed. It was possible to create comparable data records for Army and Navy disability cases, but as described below, the Air Force data were more limited and required separate analysis.

The Army dataset included the final records for all cases handled by Army MEBs during 2007–2010 and the corresponding informal- and periodic-review PEB records that matched these MEB cases. There was one record for each MEB case and one for each completed informal board review and each periodic review for individuals originally put on the TDRL. A total of 54,320 individuals had both MEB and PEB records.[22] Records for 8,118 individuals who were initially put on the TDRL before FY 2007 and for whom the dataset included only periodic-review information were deleted. An additional 4,000 records were deleted because of duplicate, missing, or inconsistent data. Our final analysis file for the Army therefore consisted of 42,189 records.

The Navy data included all the individual administrative (transaction) records generated for each PEB case. The PEB records included information about the date and location of the MEB for each case. Most cases had multiple records. Using individual identifiers that were scrambled to protect individual identity, a single record was constructed for each unique case, and variables were constructed describing the informal board review, the appeal if there was one, and any periodic reviews associated with those the informal board put on the TDRL. The file contained records for 9,718 Marine Corps personnel and 10,582 Navy personnel. Of these, 2,833 were individuals for whom the only action during FY 2007–2010

22. Almost all the MEB records that did not match a PEB record were coded ACTIVE (cases that have had an MEB initiated but have not reached PEB adjudication and disposition; these may have been stopped or terminated, were still in the MEB phase, or were forwarded to but not completed by the PEB); EPTS (medical condition determined to be existing prior to service); or IET (medical separation during initial entry training).

was a periodic review. After deleting about 1,200 more records because of incomplete or missing information, the final Navy analysis file contained information on 16,268 individuals.

The Air Force dataset contained a single record for each individual who had a PEB decision during FY 2007–2010, for a total of 16,020 cases. The information recorded included the MEB date and location and the most recent disposition of the case. Unlike the Army and Navy files, the Air Force data files do not include complete information for each stage of the PEB process for those initially put on the TDRL. The data allow identification of individuals who were put on the TDRL after the informal review only if a subsequent periodic review had not been completed by the end of FY 2010. As we show below for the Army and Navy cases, a final disposition is unlikely to have been made for cases that entered the system in 2009–2010. Therefore, our analysis of informal outcomes for the Air Force focused on data from the most recent two years—a total of 5,399 observations.

Descriptive statistics for all the variables used in our analysis data files are presented in Tables A.5 through A.9 in the Appendix.

DES Caseload, Disposition, and Process Time

The probability that a service member will be referred to the DES varies widely across the services and across components within the services. Table 3.1 compares the number of disability cases per 1,000 members in each service and component, focusing on those who have been deployed at least once since 2001. The rates were calculated by dividing the number of FY 2009 disability cases for AC and RC members with deployment experience by the total number of AC and RC members serving at the end of FY 2008. The calculations show that Army personnel are at least twice as likely to be referred as personnel in the other services. Referral for RC members is only about one-third as frequent as it is for active-duty members of the same service.

To further explore the difference in the rates of DES referral of AC and RC members, we compared the distributions of VASRD codes for AC and RC members by service and by whether the member has been deployed since 2001. A complete listing is given in Table A.4 in the Appendix. For members who have not been deployed, the most common codes account for about the same fraction in the AC

Table 3.1. Disability Cases per 1,000 Service Members Deployed Since 2001, FY 2009

	Active	Guard/ Reserve
All cases		
Army	17.7	5.4
Navy	7.4	2.8
Marine Corps	9.3	2.5
Air Force	15.0	5.4
Cases involving PTSD (all services)	3.0	1.4

and RC; one exception is spinal conditions, which are more heavily represented among RC members. The AC-RC differences are somewhat more pronounced for members who have been deployed. In particular, RC members are more likely to have conditions linked to combat exposure, such as PTSD, major depression, anxiety disorder, and traumatic brain injury; the frequency of these conditions is one-quarter to one-half higher for RC members than for AC members, and it is twice as high in the Air Force. Research shows that the incidence for Guard/Reserve members who have deployed is at least as high as it is for active-duty members.[23] Therefore, the fraction of RC members referred to the DES who have a diagnosis of PTSD in Table 3.1 should be considerably higher, but instead, as the last row in the table shows, the number of RC disability cases involving PTSD is half that of AC cases.

What are some possible explanations for the differences in disability referral rates? Unlike other disability systems (including the VA system), members do not apply to the DoD disability system. They are referred by a medical provider or at the initiative of their unit. RC members are less likely to be in treatment by a military provider who is trained to identify individuals with potentially duty-limiting medical conditions. These conditions thus may be less likely to be identified by their units or civilian providers. Alternatively, members who believe they may have a compensable medical condition may ask for a referral, but RC members may be less likely to seek a referral, for several reasons. They may be deterred by the requirement for a line-of-duty decision. If they want to remain in service, RC members may find it easier

23. In a 2007–2008 survey of previously deployed military personnel and veterans, RC respondents were twice as likely to report symptoms of PTSD (Adamson et al., 2008). The 95-percent confidence interval for this estimate is large, but the difference is statistically significant at the 0.05 level. This result is consistent with the results of other studies of PTSD prevalence.

to perform the more limited duties of part-time service when they are not activated. Also, an in-depth analysis may show that these simple statistics are misleading.[24]

The Army has by far the largest number of disability cases (Table 3.2). Few of those who formally enter the DES and are referred to a PEB receive a disability disposition other than separation or retirement. This is not surprising, because the MEB should identify most individuals whose medical condition does not preclude their continuing to serve. Also, few cases end in a separation without benefits. Benefits are denied only to those who were found unfit for duty by the PEB because of a medical condition that was ruled not in the line of duty, a result of negligence or misconduct, or for another specified reason. For our analysis of DES outcomes, the few cases that did not result in a disability separation or retirement were omitted.

Table 3.2. Number and Initial Disposition of Cases: Army and Navy PEBs, Cases Initiated in FY 2007–2010

Fiscal Year	Total	Disability Separation or Retirement	Non-Disability Separation	Fit, Limited Duty, or Other Outcome
Army				
2007	10,564	9,233	473	858
2008	11,523	10,328	247	948
2009	12,446	11,306	126	1,014
2010[a]	7,656	7,018	68	570
Total	42,189	37,885	914	3,390
Navy and Marine Corps				
2007	4,843	3,154	473	1,216
2008	4,745	3,467	377	901
2009	4,414	3,319	330	765
2010[a]	2,266	1,655	174	437
Total	16,268	11,595	1,354	3,319
Air Force				
2009	3,128	2,207	94	827
2010[a]	2,271	1,723	106	442
Total	5,399	3,930	200	1,269

a. Excludes cases with no informal PEB decision.

24. An in-depth analysis would require the collection of medical records for RC members, a difficult undertaking.

Informal PEB Disposition

Figure 3.2 shows the informal PEB result for cases that ended in a disability separation or retirement. Since 2007, the fraction of cases resulting in separation has decreased, probably because of the criticisms of DES outcomes described above and the congressional directives on rating practices. The IDES system was piloted and expanded during the same time period, but only 13 percent of the cases in FY 2007–2010 were in IDES. Therefore, it is unlikely that the change in disposition observed over this time period was the result of IDES.

Individuals initially placed on the TDRL are reexamined after they have been on the list for 18 to 24 months; those with a diagnosis of PTSD are reexamined for that condition after six months and again after 18 to 24 months for any other medical conditions. All TDRL cases must receive a final disposition after five years on the list. The Army and Navy data were adequate for tracking TDRL cases over time, but the Air Force data were not. Just over half of the Army and Navy cases that entered the DES in 2007 had received a final disposition by the end of 2010 (Figure 3.3). In the 2008 DES cohort, only 30 percent were resolved by 2010, and very few entering after 2008 had a final disposition.

Eighty-four percent of the TDRL cases in our dataset that had a final disposition were put on the permanent retirement list (Figure 3.3). However, it is unlikely that the one-half of FY 2007 TDRL cases that were resolved were representative of all TDRL cases in that year. Those that were resolved may have been more or less serious than those that were not resolved until after FY 2010. A review of the final disposition of all cases put on the TDRL in 2000–2003 found that three-fifths of them ended up on the Permanent Disability Retirement List (PDRL), one-quarter had their disability rating lowered and received a disability separation, and most of the remainder were separated without benefits (Government Accountability Office, 2009). At the same time, a DoD report to Congress on the TDRL concluded that the purpose of the list has shifted over time from maximizing the number of injured or ill service members who can return to duty to allowing more time for recovery before a final disability determination is made (Office of the Under Secretary of Defense [Personnel and Readiness], 2008). DoD reported that half of all the TDRL cases from 2000 to 2007 with a final disposition had the same final rating they received initially, 39 percent received a lower final rating, and 11 percent received a higher final rating. The same report found that almost three in five of the TDRL cases from 2000–2002, all of which had been finalized, ended up as permanent disability retirements. However, the report indicated that of the 2005 cases finalized by the end of 2007, a higher fraction (two-thirds) ended up on the PDRL. Given how long it takes to resolve TDRL cases, it is not possible to

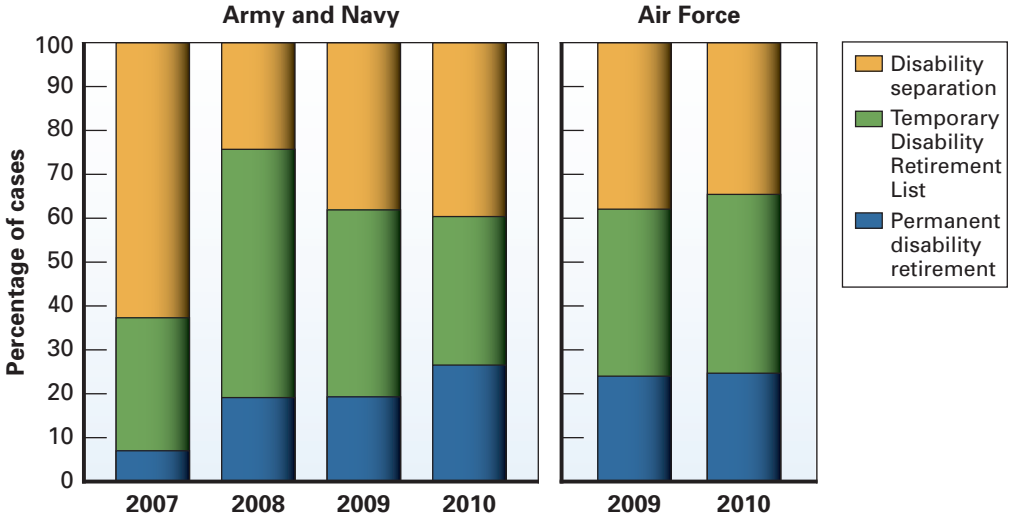


Figure 3.2. Initial Disposition of Cases Ending in a Disability Separation or Retirement, by Fiscal Year

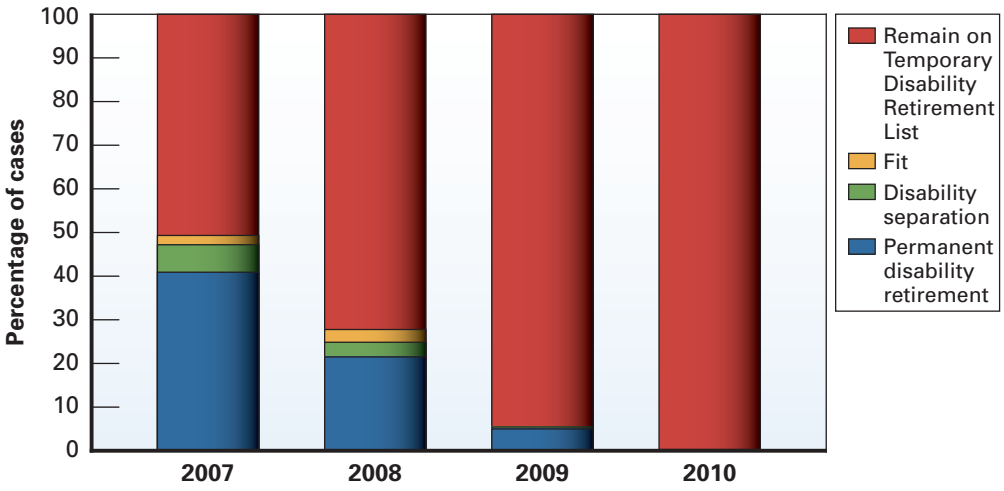


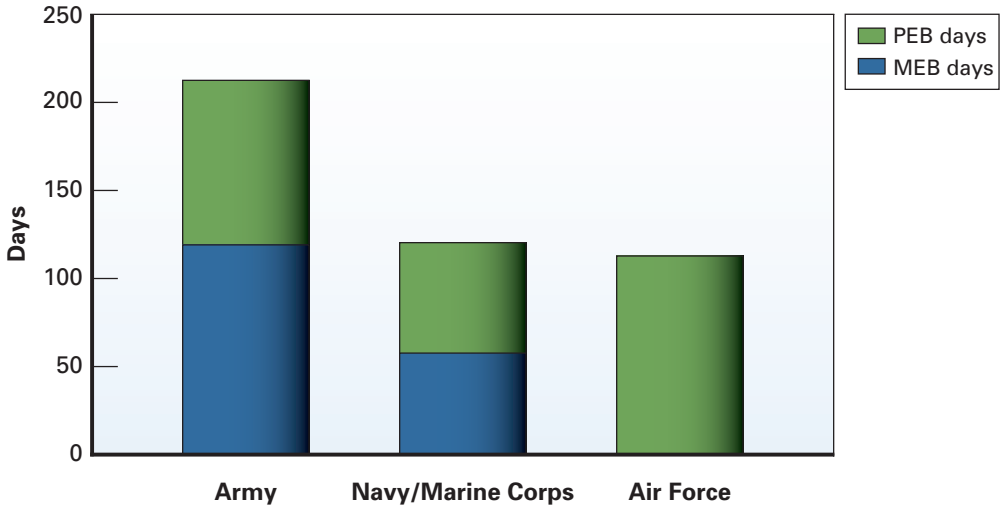
Figure 3.3. Status of Army and Navy 2007–2008 TDRL Cases at the End of FY 2010

determine whether the higher completion rate of TDRL cases from 2007–2008 in the dataset used for this study represents a shift in final disposition or an increased ability in recent years to resolve permanent disability retirement cases. It is too early to tell whether the shift in disability rating policy that occurred in 2008 will affect the final disposition of TDRL cases and lead to more disability retirements.

The data show that, as policy requires, essentially all PTSD cases referred to the DES in 2009 and 2010 were put on the TDRL; this was also true for almost all the PTSD cases in 2007 and 2008. After the policy memo directing a minimum temporary rating of 50 percent, the ratings for cases involving PTSD increased in 2009 and 2010 to a minimum of 50 percent in every service. Since the disposition of PTSD cases, especially in more recent years, has been uniform for RC and AC members, those cases are excluded from the analysis of informal PEB disposition below. However, the cases are retained in the analysis of the informal PEB rating percentage.

DES Process Times

The average number of days to complete the MEB and PEB phases of the DES is shown in Figure 3.4 for Army and Navy cases. The figure does not include cases that involved an appeal of an informal PEB decision or a formal PEB hearing; on average, across the services, these cases take about 70 days longer than cases that are not appealed. As discussed above, DES dates are likely to be captured differently in the service DES data systems. The Army data are the most accurate, and they show the longest average times to complete both the MEB and PEB phases of the DES. The Navy legacy system data records the date the physician's MEB referral was entered



Note: Air Force MEB days not available.

Figure 3.4. Mean Number of Days for MEB and Informal PEB: Army and Navy Cases Initiated in FY 2007–2010

into the administrative record. This may have occurred some time after the referral was actually initiated. The Navy now records the date the physician signs the MEB referral for IDES cases. The Air Force provided the date the narrative summary of the MEB review was received by the PEB, not the date the case was referred to the MEB.

The processing time for an individual case depends on the complexity of the case and the completeness and quality of the information provided for adjudication. It also depends on how well the services resource their processes, given their workloads. The service differences shown here reflect the resources devoted to the DES process, relative to the service's disability workload.

Differences in Outcomes for RC and AC Personnel

To estimate the differences in DES outcomes between AC and RC personnel, we used regression analysis, controlling for the medical condition as represented by the VASRD codes, the military service, and the fiscal year the case entered the DES. The data included up to four VASRD codes that were in the PEB rating. Half of the Army and Navy cases were coded with a nonspecific DoD-unique code for musculoskeletal or muscle condition, and these are captured by three broad codes. We combined less common diagnoses by type of condition, as shown in the Appendix. Since the VASRD codes do not fully describe the medical information available to the PEB for rating, the regressions included variables for individual characteristics that might be expected to convey additional information about the individual's health condition: age, gender, and military occupation.[25] Marital status and rank (enlisted versus officer) were also included as covariates, but in general, they were not statistically significant.

The regressions model provides three outcomes: informal PEB disposition, informal percentage rating, and processing time (MEB and informal PEB time modeled separately). The analysis focuses on informal PEB outcomes, because so few of the cases in our dataset had final outcomes, and, as discussed above, final outcomes are highly correlated with initial outcomes. Separate analyses were conducted on the combined Army and Navy DES data for all years (FY 2007–2010) and on Air Force

25. If military occupation is strongly correlated with component status, it could be difficult to separately identify the effects of RC status from the effects of occupation. There are some differences in the distribution of military occupation between components. AC members in the DES are more likely to be in a combat occupation. The most significant differences are the following: 29 percent of AC members are in the infantry, gun crew, seamanship occupation versus 18 percent in the RC, and 11 percent of AC members are in communications and intelligence versus 5 percent of RC members. These differences should not pose a problem for the estimation of the RC-AC difference.

data for 2009–2010 only.[26] In light of the more limited time period and smaller sample size for the Air Force analyses, this discussion emphasizes the Army and Navy results and summarizes any differences in the results for the Air Force separately.

Informal board disposition is analyzed with a multinomial probit to account for separation, PDRL, and TDRL. We employed ordinary least squares (OLS) estimation for the informal board rating (0 to 100 percent) and (log) MEB and PEB process times. The MEB and PEB time data are distributed with a long tail that fits a lognormal distribution. Detailed results including coefficients and standard errors for the explanatory variables in each equation are provided in the Appendix.

DES Outcomes for the Army and Navy

Informal PEB Disposition. Figure 3.5 shows selected regression results for Army and Navy informal PEB disposition. Panel a plots the difference in the percentage of cases receiving a permanent disability retirement, temporary disability retirement, or disability separation in each service. Panels b and c show results for other member characteristics and the year and type of DES (IDES or legacy) and for selected VASRD codes related to deployment, respectively. The charts in the first two panels employ the same scale to facilitate comparison, but the scale in the third panel is different to account for the larger differences in outcomes across medical conditions.

There are only modest differences in disposition between RC and AC members after the diagnoses recorded by the VASRD codes are controlled for. RC members are slightly more likely to receive a temporary disability retirement than a permanent disability retirement, and Navy personnel are somewhat more likely to receive a disability separation.

The differences between AC and RC are small relative to the shift in the types of decisions over time, as illustrated by the differences between FY 2009 and FY 2007 in panel b of Figure 3.5. Further analysis shows that the Army accounts for most of the change in dispositions in recent years. The early IDES cases in our dataset are also somewhat more likely to result in a permanent retirement decision, but the difference is small. Retirement decisions are more common among older members and those who have been deployed. It is not surprising to find that older members present with disabilities that are more likely to exceed the 30-percent rating threshold for a disability retirement. Panel b compares the dispositions for members deployed within a year of being referred to the DES and those who have not been

26. Separate analyses of the Army and Navy data revealed few differences, so only the combined results are reported.

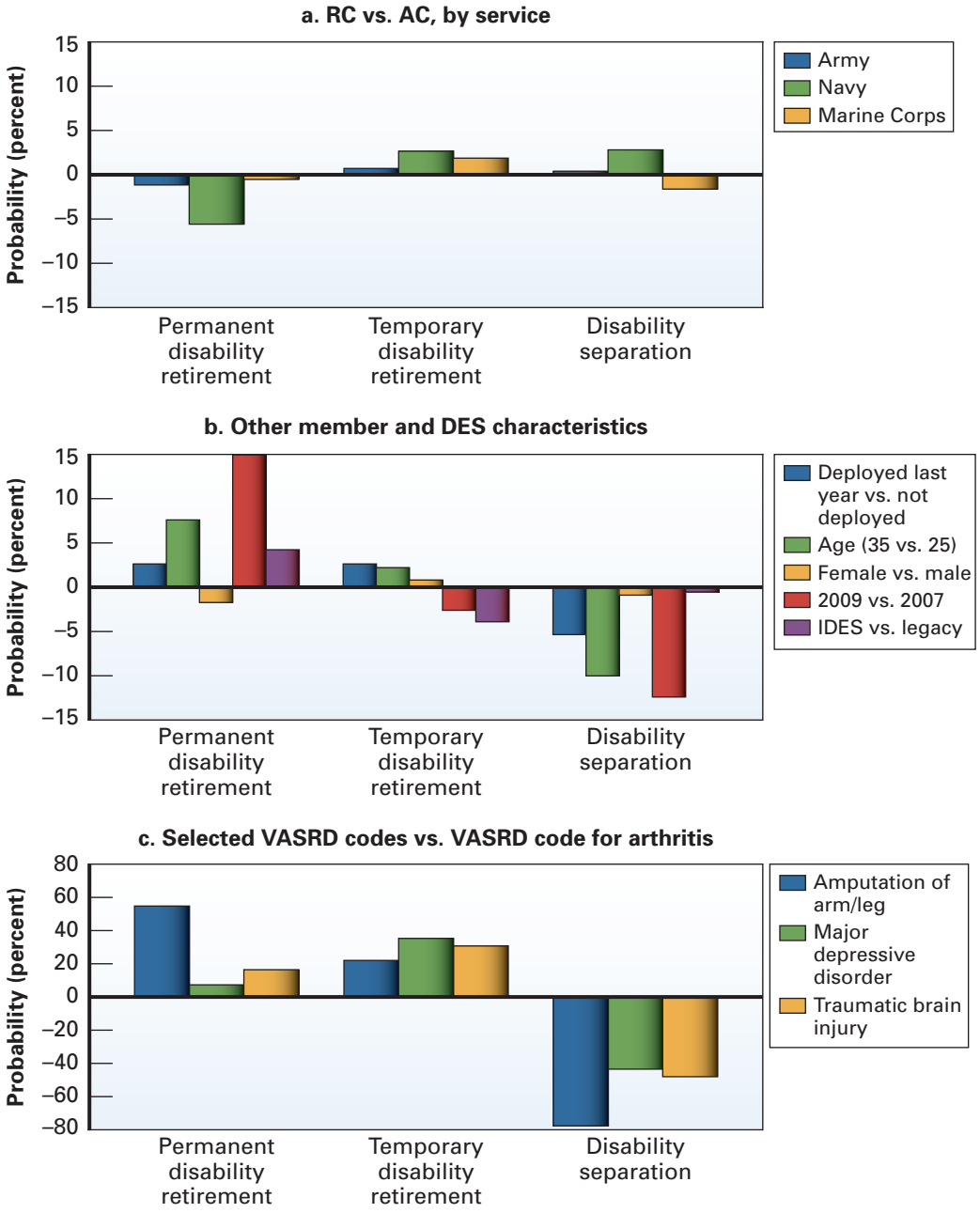


Figure 3.5. Differences in the Probability of Informal PEB Dispositions: Army and Navy Cases Initiated in FY 2007–2010

deployed since 2001. Cases arising soon after deployment may be more likely to be combat-related and to differ in unobserved ways in the medical conditions documented. However, the more complete results in the Appendix do not support a conclusion that outcomes differ with the timing of DES entry after deployment.

As expected, the differences in outcomes attributed to VASRD codes are sizable compared with differences attributed to individual characteristics. Panel c compares outcomes for cases with selected VASRD codes associated with the current conflict, compared with a common condition, arthritis, which is associated with a low probability of retirement. Recall that PTSD cases were omitted from this analysis because their outcomes became deterministic in FY 2009.

Disability Rating. Analysis of disability ratings reveals a modest, positive difference in ratings between RC members and AC members in the Army and Navy/Marine Corps (Figure 3.6). Compared with the mean rating for the Army and Navy/Marine Corps of 32.7[27] and the difference in ratings across VASRD codes in panel c of Figure 3.6, the differences shown in panel b by type of DES system, service, deployment history, and age are also modest.

DES Process Time. To estimate DES process time, separate regressions were run for the Army and Navy disability systems because of the substantial difference in mean times shown in Figure 3.4 and the Government Accountability Office audit cited earlier that found differences in how the PEBs record processing dates. Cases involving an appeal of the informal PEB decision or a formal PEB hearing are not included in this analysis. The results provide estimates of the percentage change in the number of days to complete the MEB and PEB phases of the DES associated with each of the explanatory variables. Controlling for VASRD codes and other individual and system characteristics, there are differences between AC and RC process times in both services (Figure 3.7). Process times for Army RC disability cases are shorter, whereas the opposite is true for the Navy and Marine Corps. The differences are more pronounced at the PEB phase than they are at the MEB phase.

Process times—DES process times, in particular—are longer in more recent years, and the IDES is taking longer in the Army system but not in the Navy system.[28] Consistent with the hypothesis advanced earlier that older members present

27. The average informal board rating for cases initiated in FY 2007–2010 was 33.0 for the Army and 31.6 for the Navy/Marine Corps. The ratings in the Air Force data for the same years averaged 32.9; the vast majority of these are informal board ratings, but some reflect changes made after a periodic reexamination.

28. The Government Accountability Office (2011) also found that the IDES system has been taking longer in recent years.

more-complex cases, the process time for older members is slightly longer. Finally, the time to evaluate cases for members who have been deployed is somewhat longer overall (panel b), and cases involving a war-related condition take longer than cases involving a more routine condition such as arthritis (panel c).

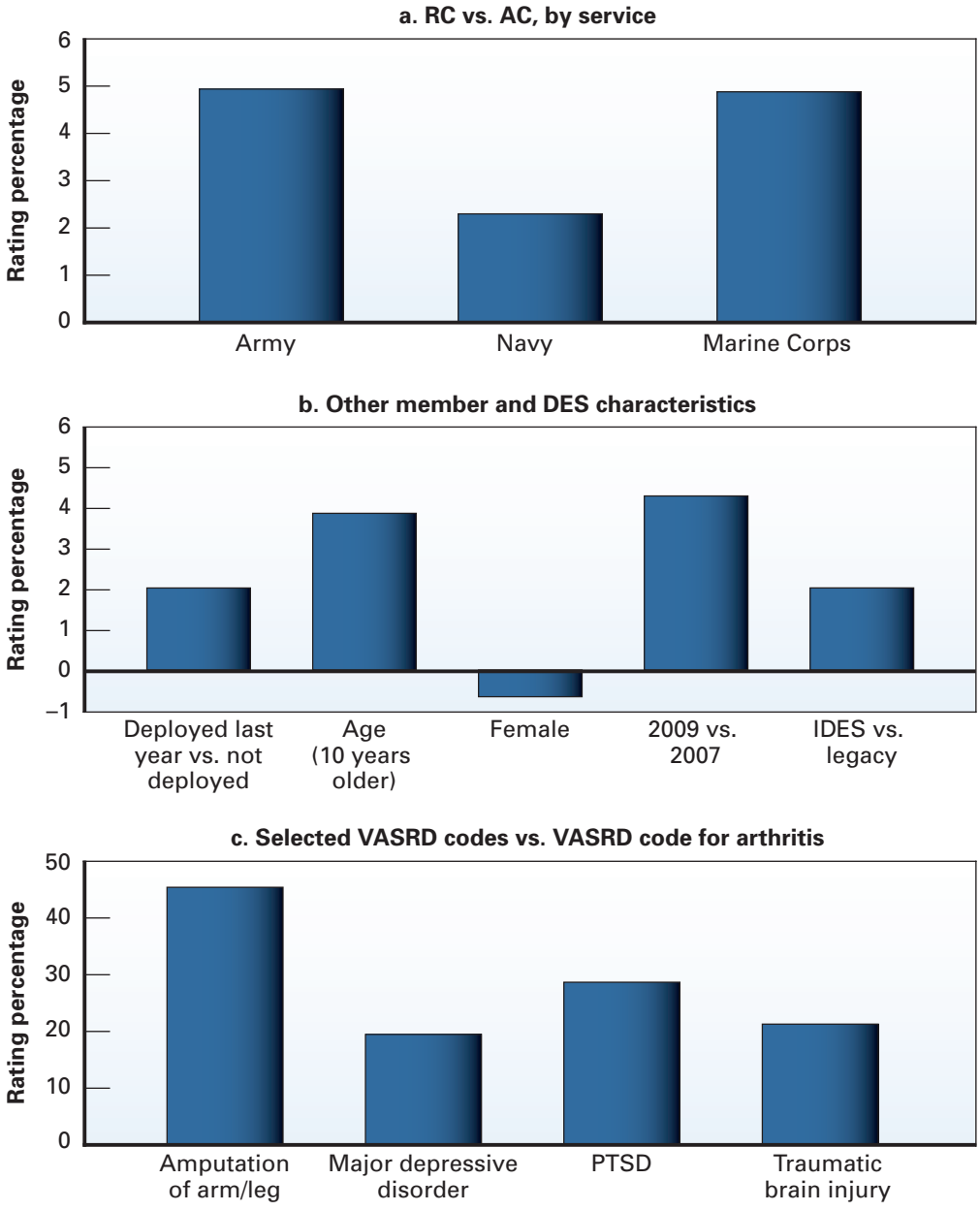


Figure 3.6. Difference in Informal PEB Ratings: Army and Navy Cases Initiated in FY 2007–2010

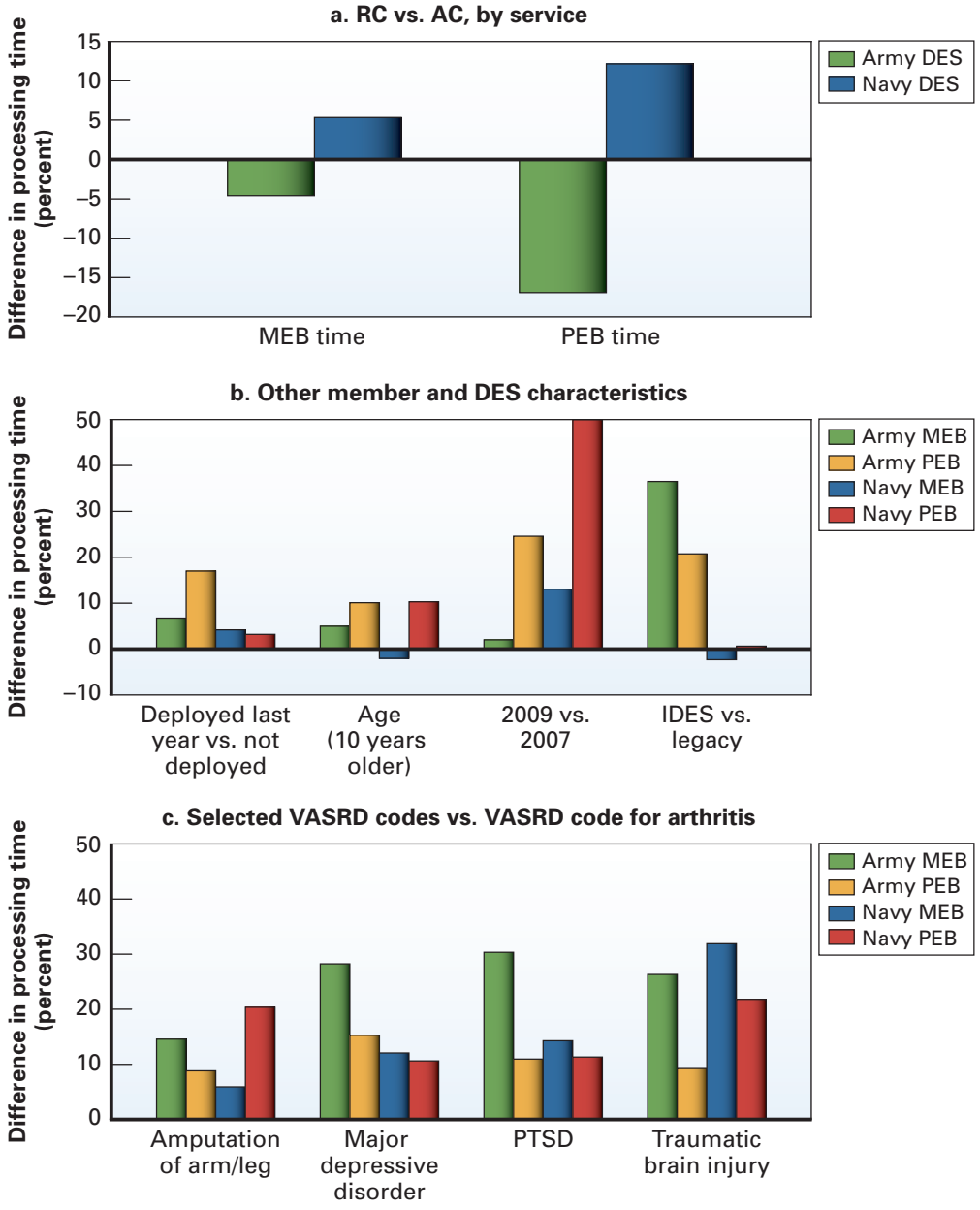


Figure 3.7. Difference in DES Processing Time: Army and Navy Cases Initiated in FY 2007–2010 with No Appeal or Formal PEB

Within a service, MEB times vary considerably depending on which MTF handles the medical evaluation (these results are given in the Appendix). The regression analysis controls for this variation, so the RC-AC difference in MEB time is not driven by the members' geographic locations.

DES Outcomes for the Air Force

For our analysis, we used Air Force data for FY 2009–2010. To apply the multinomial probit method to estimate the regression for informal PEB disposition (PDRL, TDRL, disability separation), the smaller Air Force sample size dictated the use of fewer explanatory variables. Indicator variables that were not statistically significant in our initial Air Force analysis using other methods—for officer, deployment more than two years prior to DES entry, and occupation—were omitted. The VASRD code indicators were combined based on the preliminary results, as described in the Appendix. The variables in the analysis of disability rating and PEB time were unchanged; MEB time was not included in the analysis because the data contain only a measure of the time to forward the MEB results to the PEB.

Figure 3.8 shows the estimated RC-AC difference in disposition and PEB time for the Air Force; not shown is the difference in the percentage rating, which was small (one percentage point) and not statistically significant. The results indicate that RC members in the Air Force are less likely to be put on the PDRL by the informal board and more likely to be separated or put on the TDRL. Overall, Air Force RC members received a slightly lower disability rating during the two years analyzed. These results should be viewed with caution, however, given the limited sample size.[29] In the raw data, unadjusted for the condition(s) rated, Air Force RC members were less likely to go on the PDRL and more likely to get a TDRL or separation decision. More data are needed to obtain a reliable picture of disability dispositions in the Air Force.

29. Results using a logit specification (one equation for retirement—PDRL or TDRL—versus separation and another for PDRL versus TDRL, conditional on being retired) were similar. Although this logit specification does not allow for joint estimation of all three outcomes, it produced similar results for all the services and could be estimated using all variables with the Air Force data. Therefore, limiting the variable list in the multinomial probit specification does not appear to affect the results.

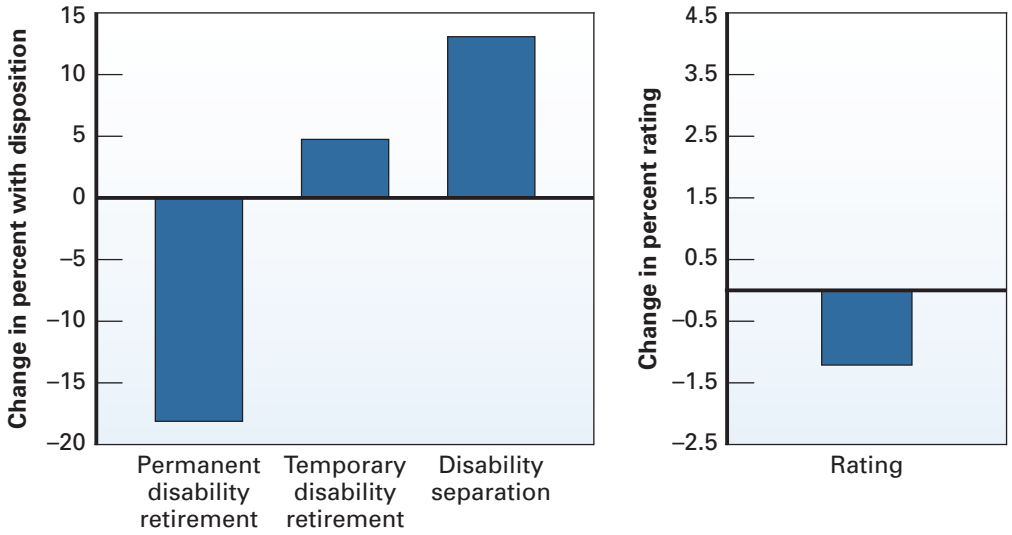


Figure 3.8. Differences in DES Outcomes: Air Force Cases Initiated in FY 2009–2010

Summary

As with healthcare, the major difference in the treatment of RC members and AC members in disability evaluation results from the line-of-duty requirement. AC members are considered to be continuously on duty, so the health problems that arise while they are in service are almost always a basis for disability benefits. RC members are not covered for disabilities that are not incurred or aggravated as a result of training or active service. Moreover, they are only approximately one-third as likely to be referred to the DES. As expected, given this difference, war-related medical conditions are more common among RC members, but it is not possible to conclude from the data available for this study whether all RC members with line-of-duty conditions are identified and evaluated for disability. The rates of referral for PTSD for service members who have deployed since 2001 suggest that some RC members may be missed.

Once referred for disability evaluation, the process is the same across components, and there is little difference between RC and AC dispositions. For those with PTSD, the strict policy guidance of TDRL placement ensures equal outcomes. For others, once the medical condition captured by the VASRD code is controlled for, the differences are at most only a few percentage points.

4. Conclusion

The important operational role the RC has assumed since 2001 raises questions about the structure of RC compensation and benefits, including the benefits provided through DoD health and disability programs. The research reported here supports consideration of this issue by the 11th QRMC. The major findings are:

- Thirty percent of RC members lack health insurance to cover care for non–service-related conditions. The TRS program offers the option of purchasing health insurance through the military on terms that compare favorably with typical employer benefits. Although an increasing number of eligible members are enrolling in TRS, the program does not appear to be effectively targeting those most likely to be uninsured.
- Health reform would be expected to decrease the fraction of uninsured to 11 percent in the absence of TRS. However, TRS costs will compare favorably with the new options available with health reform (PPACA), so the individual mandate is likely to increase TRS enrollment.
- RC members are referred to the DES at one-third the rate of AC members, at least in part because those who are not serving full-time on active duty have more difficulty meeting the line-of-duty requirement. However, DES referral rates for PTSD for previously deployed RC members are also lower despite evidence that the incidence of PTSD is at least as high in the RC.
- RC members referred for disability evaluation receive dispositions (and thus benefits) that are similar to those for AC members referred to the DES. The times to complete the MEB and informal PEB steps in the process are also similar.

These findings suggest that DoD may want to consider ways to better coordinate TRS with other insurance options that will be available to RC members and that the identification of RC members who experience health consequences from deployment leading to disability merits further investigation.

Appendix. Variable Definitions, Descriptive Statistics, and Detailed Regression Results

Table A.1. Health Insurance Regressions: Variable Means

Variable	Unweighted Mean	Weighted Mean
Have Medical Insurance or Had Insurance Before Current Deployment	0.7964	0.6975
Army National Guard	0.1796	0.4348
Army Reserve	0.2037	0.2578
Navy Reserve	0.1921	0.0860
Marine Corps Reserve	0.1378	0.0534
Air National Guard	0.1191	0.0966
Air Reserve (omitted)	0.1677	0.0714
Female	0.1991	0.1866
E-1–E-3	0.0740	0.1677
E-4	0.1509	0.2733
E-5–E-6	0.1895	0.3081
E-7–E-9	0.0647	0.0940
Officers (omitted)	0.5209	0.1569
Never Married	0.2633	0.3965
Previously Married	0.1201	0.1343
Married (omitted)	0.6166	0.4770
Non-Hispanic Black	0.0962	0.1361
Hispanic	0.1113	0.1265
Non-Hispanic White/Other (omitted)	0.7925	0.7374
No Children under 23	0.4404	0.5243
Part-Time Employed	0.1300	0.1773
Not Employed (for Pay)	0.3542	0.4239
Full-Time Employed (omitted)	0.5158	0.3988
Full-Time Student	0.1384	0.2234
Part-Time Student	0.0984	0.0995
Not Student (omitted)	0.7632	0.6771
Private/Public Employer	0.3554	0.3439
Self/Family Employment	0.0573	0.0512
Firm Has	0.0717	0.0820
No College	0.0745	0.1736
Some College	0.3167	0.5186
Bachelors Degree	0.3289	0.1994
Graduate Degree (omitted)	0.3544	0.2820

Table A.2. Health Insurance Regressions: Coefficients and Standard Errors

Variable	Coefficient	Standard Error
Intercept	1.01370	0.01403
Army National Guard	–0.06015	0.01475
Army Reserve	–0.02213	0.01413
Navy Reserve	–0.01419	0.01432
Marine Corps Reserve	–0.04369	0.01595
Air National Guard	0.02790	0.01618
Female	0.03420	0.01114
E-1–E-3	–0.07405	0.02216
E-4	–0.11917	0.01751
E-5–E-6	–0.05329	0.01515
E-7–E-9	0.02954	0.01980
Never Married	–0.08816	0.01286
Previously Married	–0.05286	0.01370
Non-Hispanic Black	–0.06373	0.01490
Hispanic	–0.08465	0.01373
No Children under 23	–0.02204	0.01037
Part-Time Employed	–0.13385	0.01443
Not Employed (for Pay)	–0.16566	0.01025
Private/Public Employer	–0.00331	0.00977
Self/Family Employment	0.02157	0.02350
Firm Size 1–49	–0.06377	0.01636
Full-Time Student	0.01515	0.01357
Part-Time Student	0.01129	0.01455
No College	–0.12041	0.02212
Some College	–0.05829	0.01627
Bachelors Degree	–0.02657	0.01131

Table A.3. Categorization of VASRD Codes for Regression Analysis

VASRD Category		VASRD Codes	Number of Observations	AF Multinomial Probit Variable
1	DoD-specific code musculoskeletal disease	5099	6,494	1
2	DoD-specific code musculoskeletal injury	5199	4,708	1
3	DoD-specific code musculoskeletal injury	5299	532	1
4	Anxiety disorder	9412–9413	800	5
5	Arthritis	5002–5010	1,352	—
6	Asthma	6602	861	6
7	Bipolar disorder	9432	812	6
8	Cardiovascular condition	7000–7199	715	4
9	Digestive condition	7200–7399	879	5
10	Endocrine condition	7900–7999	603	3
11	Epilepsy	8910–8999	665	5
12	Extremity amputation or loss	5104–5125, 5160–5199	516	—[a]
13	GYN condition	7610–7699	115	6
14	Genitourinary condition	7500–7599	360	
15	Hemic condition	7700–7799	174	6
16	Infectious disease	6300–6399	157	5
17	Major depressive disorder	9434	1,428	6
18	Muscle injury	5301–5399	446	3
19	Other		133	6
20	Other mental disorder	Other codes 9201–9299, 9400–9521	582	5
21	Other musculoskeletal injury	Other codes 5100–5299	1,246	4
22	Other musculoskeletal disease	Other codes 5000–5099	3,886	2
23	Other neurological condition	Other codes 8000–8799	3,232	4
24	Other respiratory condition	6502–6899	541	4
25	Other spinal injury		783	2
26	PTSD	9411	7,370	—
27	Schizophrenia	9201–9299	617	8
28	Sense organ condition	6000–6299	608	4
29	Skin condition	7800–7899	433	4
30	Lumbosacral or cervical strain	5237	2,366	3
31	Spinal fusion	5241	1,188	5
32	Degenerative arthritis	5242	1,667	2
33	Intervertebral disc syndrome	5243	1,711	3
34	Traumatic brain injury (TBI)	8045	1,206	7

a. Insufficient number of cases for analysis.

Table A.4. Distribution of VASRD Codes in the AC and RC

VASRD Category	Percentage of Cases with Code			
	Deployed Since 2001		Not Deployed Since 2001	
	AC	RC	AC	RC
DoD-specific code musculoskeletal disease	22.6	23.6	16.8	21.1
DoD-specific code musculoskeletal injury	15.5	19.6	10.4	12.6
DoD-specific code musculoskeletal injury	2.2	1.5	1.3	1.3
Anxiety disorder	0.9	1.3	2.7	3.5
Arthritis	9.8	10.5	7.3	11.3
Asthma	2.5	1.6	2.3	1.2
Bipolar disorder	2.5	1.5	1.8	0.9
Cardiovascular condition	1.8	2.9	1.7	2.7
Digestive condition	2.8	2.0	2.4	2.1
Endocrine condition	1.7	2.1	1.5	1.5
Epilepsy	2.4	1.2	1.6	0.8
Extremity amputation or loss	0.3	0.3	2.0	1.3
GYN condition	0.4	0.3	0.3	0.2
Genitourinary condition	1.2	1.1	1.1	1.1
Hemic condition	0.5	0.7	0.4	0.4
Infectious disease	0.5	0.6	0.3	0.2
Major depressive disorder	3.5	4.8	3.5	5.5
Muscle injury	1.5	1.0	2.5	2.1
Other	0.6	1.0	1.1	1.2
Other mental disorder	1.7	1.5	1.5	2.2
Other musculoskeletal injury	5.8	5.8	2.8	4.7
Other musculoskeletal disease	15.2	16.0	11.9	11.6
Other neurological condition	11.6	11.6	12.7	15.6
Other respiratory condition	1.2	1.9	1.6	2.3
Other spinal injury	2.3	2.7	2.6	2.2
PTSD	1.5	3.0	26.1	34.9
Schizophrenia	1.8	0.6	1.2	0.8
Sense organ condition	1.4	1.2	2.8	2.7
Skin condition	1.2	0.9	2.8	1.7
Lumbosacral or cervical strain	6.8	7.8	7.5	11.7
Spinal fusion	2.5	5.5	3.2	7.6
Degenerative arthritis	4.5	8.3	6.4	12.1
Intervertebral disc syndrome	4.0	6.3	5.8	9.2
Traumatic brain injury (TBI)	1.2	1.5	8.4	10.4

Table A.5. Disability Regressions: Sample Size and Variable Means, by Service

Variable	Army	Navy	Marine Corps	Air Force
No. of observations	37,885	5,386	6,212	3,730
FY07	0.2438	0.2900	0.2567	0.2917
FY08	0.2726	0.2991	0.2988	0.2658
FY09	0.2984	0.2746	0.2962	0.2485
FY10	0.1852	0.1363	0.1483	0.1940
Age_yrs	29.274	28.685	24.560	30.382
Female	0.1758	0.2351	0.0893	0.3217
Reserve_comp	0.1989	0.0921	0.1141	0.1438
Officer	0.0339	0.0509	0.0179	0.0714
Married	0.6344	0.5752	0.4910	0.6172
Appeal	0.0974	0.2490	0.2635	0.2081
IDES	0.1347	0.1896	0.2457	0.0472
Not Deployed Since 2001	0.3652	0.5357	0.4691	0.5288
Deployed within 1 year of MEB	0.2523	0.0900	0.1515	0.0840
Deployed within 1-2 years of MEB	0.2076	0.1281	0.1892	0.1256
Deployed within 2-3 years of MEB	0.0878	0.0863	0.0998	0.0880
Deployed within 3-4 years of MEB	0.0476	0.0583	0.0465	0.0642
Deployed 4+ years before MEB	0.0395	0.1016	0.0439	0.1094
Infantry, Gun Crews, Seamanship	0.2644	0.1134	0.3445	0.1231
Electronic Equip Repairers	0.0454	0.1285	0.0457	0.0647
Communications, Intelligence	0.0974	0.0561	0.0600	0.0694
Health Care Specialists	0.0801	0.0945	0.0182	0.0795
Other Technical & Allied Specialists	0.0281	0.0115	0.1082	0.0390
Functional Support & Admin	0.1119	0.0993	0.1151	0.1846
Electrical/Mechanical Equipment Repairers	0.1176	0.2724	0.0201	0.1906
Craftsworkers	0.0305	0.0646	0.0963	0.0436
Service and Supply Handlers	0.1658	0.0917	0.1698	0.0816
Non-Occupational	0.0167	0.0147	0.0061	0.0516
Tactical Operations Officers	0.0115	0.0130	0.0006	0.0181
Intelligence Officers	0.0026	0.0022	0.0023	0.0032
Engineering & Maint Officers	0.0054	0.0087	0.0008	0.0066
Scientists and Professionals	0.0021	0.0046	0.0000	0.0047
Health Care Officers	0.0060	0.0110	0.0014	0.0231
Administrators	0.0037	0.0054	0.0026	0.0054
Supply, Procurement Officers	0.0047	0.0041	0.0064	0.0068

Table A.5—Continued

Variable	Army	Navy	Marine Corps	Air Force
Non-occupational	0.0044	0.0026	0.0064	0.0033
DoD-unique musculoskeletal diseases	0.2198	0.0960	0.1386	0.0521
DoD-unique musculoskeletal injuries	0.1346	0.1001	0.1248	0.0259
D0D-unique muscle injuries	0.0160	0.0137	0.0167	0.0086
Anxiety disorder	0.0242	0.0154	0.0064	0.0172
Arthritis	0.0547	0.1643	0.2226	0.1039
Asthma	0.0243	0.0134	0.0142	0.0751
Bipolar disorder	0.0150	0.0444	0.0206	0.0321
Cardiovascular condition	0.0186	0.0290	0.0142	0.0397
Digestive condition	0.0195	0.0590	0.0243	0.0495
Endocrine condition	0.0146	0.0301	0.0122	0.0259
Epilepsy	0.0124	0.0379	0.0288	0.0290
Extremity amputation or loss	0.0125	0.0061	0.0171	0.0023
GYN condition	0.0027	0.0072	0.0019	0.0063
Genitourinary condition	0.0100	0.0195	0.0127	0.0191
Hemic condition	0.0030	0.0123	0.0048	0.0090
Infectious disease	0.0033	0.0072	0.0035	0.0095
Major depressive disorder	0.0355	0.0631	0.0301	0.0641
Muscle injury	0.0171	0.0253	0.0373	0.0324
Other code	0.0047	0.0145	0.0362	0.0088
Other mental disorder	0.0152	0.0282	0.0145	0.0476
Other musculoskeletal disease	0.0401	0.0457	0.0488	0.0457
Other musculoskeletal injury	0.1200	0.1333	0.2081	0.0900
Other neurological condition	0.1185	0.1541	0.1446	0.1541
Other respiratory condition	0.0167	0.0143	0.0106	0.0333
Other spinal injury	0.0276	0.0130	0.0180	0.0208
PTSD	0.1925	0.0678	0.1563	0.0623
Schizophrenia	0.0105	0.0262	0.0175	0.0163
Sense organ condition	0.0215	0.0238	0.0254	0.0215
Skin condition	0.0210	0.0147	0.0204	0.0132
Spinal injury 5237	0.0795	0.0743	0.0666	0.0281
Spinal injury 5241	0.0364	0.0410	0.0287	0.0343
Spinal injury 5242	0.0797	0.0154	0.0193	0.0377
Spinal injury 5243	0.0659	0.0308	0.0193	0.1244
Traumatic brain injury (TBI)	0.0582	0.0193	0.0895	0.0125

Table A.6. Disability Regression Coefficients, Standard Errors, and Marginal Effects: Multinomial Probit for Disability Disposition

Variable	PDRL			TDRL			Separation
	Estimate	Std. Error	Marg. Effect	Estimate	Std. Error	Marg. Effect	Marg. Effect
Army and Navy DES							
FY07	—	—	—	—	—	—	—
FY08	0.0683	0.1420	0.0061	0.0485	0.0732	0.0043	−0.0104
FY09	0.8989	0.1280	0.1179	0.0478	0.0761	−0.0490	−0.0689
FY10	0.9389	0.1418	0.1455	−0.2991	0.0927	−0.1136	−0.0319
Age	0.0703	0.0020	0.0070	0.0377	0.0019	0.0022	−0.0093
Female	−0.1213	0.0375	−0.0166	0.0043	0.0318	0.0085	0.0081
Reserve component	−0.4138	0.1646	−0.0560	0.0053	0.1075	0.0274	0.0286
Officer	−0.0581	0.1681	−0.0124	0.0719	0.1687	0.0166	−0.0042
Married	−0.0111	0.0281	0.0020	−0.0552	0.0246	−0.0092	0.0071
IDES	0.2793	0.0369	0.0436	−0.0946	0.0360	−0.0348	−0.0088
Not deployed since 2001	—	—	—	—	—	—	—
Deployed within 1 year of MEB	0.3274	0.0357	0.0271	0.2650	0.0321	0.0264	−0.0535
Deployed within 1-2 years of MEB	0.3323	0.0370	0.0329	0.1851	0.0337	0.0118	−0.0447
Deployed within 2-3 years of MEB	0.2630	0.0497	0.0284	0.1095	0.0452	0.0027	−0.0311
Deployed within 3-4 years of MEB	0.2844	0.0626	0.0305	0.1213	0.0578	0.0035	−0.0340
Deployed 4+ years before MEB	0.3540	0.0610	0.0394	0.1283	0.0576	0.0003	−0.0397
Infantry, gun crews, seamanship	0.0708	0.0442	0.0083	0.0200	0.0387	−0.0010	−0.0073
Electronic equipment repairers	−0.0412	0.0648	−0.0093	0.0587	0.0532	0.0131	−0.0038
Communications, intelligence	0.0289	0.0555	0.0039	−0.0005	0.0495	−0.0019	−0.0020
Healthcare specialists	−0.0234	0.0611	−0.0077	0.0713	0.0533	0.0142	−0.0065
Other technical & allied specialists	0.0306	0.0857	−0.0043	0.1316	0.0764	0.0216	−0.0173
Functional support & administration	0.1479	0.0513	0.0132	0.1045	0.0453	0.0092	−0.0224
Electrical/mechanical equipment repairers	—	—	—	—	—	—	—
Craftsworkers	−0.1546	0.0800	−0.0160	−0.0743	0.0689	−0.0034	0.0194
Service and supply handlers	−0.0404	0.0479	−0.0053	−0.0016	0.0423	0.0023	0.0030
Non-occupational	0.1024	0.0896	−0.0160	0.4656	0.0635	0.0767	−0.0607
Tactical operations officers	0.6649	0.1722	0.0581	0.4897	0.1721	0.0450	−0.1031
Intelligence officers	1.0529	0.2911	0.0876	0.8445	0.2868	0.0836	−0.1712
Engineering & maintenance officers	0.9753	0.2095	0.1081	0.3620	0.2103	0.0023	−0.1104
Scientists and professionals	0.5566	0.3275	0.0572	0.2766	0.3194	0.0138	−0.0710
Healthcare officers	0.3403	0.2395	0.0079	0.5923	0.2289	0.0842	−0.0920

Table A.6—Continued

Variable	PDRL			TDRL			Separation
	Estimate	Std. Error	Marg. Effect	Estimate	Std. Error	Marg. Effect	Marg. Effect
Administrators	0.7102	0.2443	0.0568	0.6049	0.2400	0.0627	–0.1196
Supply, procurement officers	0.7074	0.2371	0.0647	0.4768	0.2353	0.0400	–0.1046
Non-occupational	0.8721	0.2422	0.0919	0.3976	0.2399	0.0153	–0.1072
DoD-unique musculoskeletal diseases	0.5247	0.0369	0.0517	0.2951	0.0341	0.0192	–0.0709
DoD-unique musculoskeletal Injuries	0.7326	0.0418	0.0526	0.7178	0.0358	0.0815	–0.1341
D0D-unique musculoskeletal injuries	0.1740	0.1078	0.0198	0.0571	0.0969	–0.0009	–0.0188
Anxiety disorder	1.3648	0.0893	0.0122	2.6771	0.0720	0.3914	–0.4037
Arthritis	—	—	—	—	—–	—	—
Asthma	2.8947	0.0845	0.1857	3.1823	0.0745	0.3839	–0.5696
Bipolar disorder	2.4182	0.0887	0.1382	2.9240	0.0716	0.3682	–0.5063
Cardiovascular condition	2.2011	0.0819	0.1757	1.8808	0.0772	0.1955	–0.3712
Digestive condition	2.5723	0.0794	0.1810	2.5789	0.0701	0.2966	–0.4776
Endocrine condition	1.0544	0.0992	0.0796	0.9730	0.0844	0.1065	–0.1861
Epilepsy	2.2573	0.1044	0.1150	2.9471	0.0797	0.3826	–0.4976
Extremity amputation or loss	5.6417	0.2259	0.5497	3.2703	0.2342	0.2237	–0.7734
GYN condition	2.4881	0.2069	0.1801	2.4158	0.1849	0.2728	–0.4529
Genitourinary condition	2.6481	0.1212	0.1835	2.6991	0.1105	0.3132	–0.4967
Hemic condition	2.5981	0.2003	0.1435	3.2189	0.1699	0.4094	–0.5529
Infectious disease	2.9430	0.1978	0.2024	3.0233	0.1780	0.3523	–0.5547
Major depressive disorder	1.8315	0.0662	0.0774	2.6398	0.0561	0.3549	–0.4323
Muscle injury	2.2399	0.0846	0.2315	1.0922	0.0861	0.0519	–0.2834
Other code	1.2775	0.1465	0.1160	0.8731	0.1311	0.0744	–0.1904
Other mental disorder	1.8019	0.0938	0.0940	2.3190	0.0804	0.2994	–0.3934
Other musculoskeletal disease	1.0739	0.0610	0.0788	1.0257	0.0543	0.1147	–0.1935
Other musculoskeletal injury	1.4192	0.0391	0.1179	1.1416	0.0360	0.1133	–0.2312
Other neurological condition	2.1886	0.0400	0.1648	2.0253	0.0368	0.2221	–0.3869
Other respiratory condition	2.2453	0.0960	0.1586	2.2409	0.0900	0.2570	–0.4157
Other spinal injury	1.3627	0.0753	0.1299	0.8350	0.0766	0.0621	–0.1920
Schizophrenia	3.1759	0.1148	0.1845	3.7932	0.0972	0.4751	–0.6596
Sense organ condition	2.1298	0.0786	0.1927	1.4670	0.0791	0.1260	–0.3187
Skin condition	2.3524	0.0873	0.2072	1.7076	0.0880	0.1548	–0.3620
Spinal injury 5237	0.8638	0.0511	0.0807	0.5555	0.0473	0.0440	–0.1247
Spinal injury 5241	1.9266	0.0657	0.1602	1.5462	0.0630	0.1532	–0.3134
Spinal injury 5242	1.0261	0.0507	0.0923	0.7148	0.0540	0.0622	–0.1544

Table A.6—Continued

Variable	PDRL			TDRL			Separation
	Estimate	Std. Error	Marg. Effect	Estimate	Std. Error	Marg. Effect	Marg. Effect
Spinal injury 5243	1.1496	0.0545	0.0908	0.9983	0.0532	0.1049	–0.1957
Traumatic brain injury (TBI)	2.4958	0.0810	0.1677	2.6259	0.0761	0.3099	–0.4776
Army	0.2763	0.1109	0.1120	–1.1689	0.0609	–0.2268	0.1147
Marines	–0.0790	0.1538	–0.0083	–0.0371	0.0780	–0.0016	0.0098
Army_FY08	0.8038	0.1486	0.0831	0.3909	0.0821	0.0184	–0.1016
Army_FY09	0.4509	0.1342	0.0331	0.4310	0.0845	0.0482	–0.0813
Army_FY10	0.6117	0.1482	0.0476	0.5419	0.1024	0.0578	–0.1054
Marines_FY08	–0.1581	0.2087	–0.0108	–0.1636	0.1048	–0.0191	0.0299
Marines_FY09	–0.0315	0.1828	0.0099	–0.2202	0.1070	–0.0374	0.0275
Marines_FY10	0.0405	0.2012	0.0229	–0.2725	0.1304	–0.0513	0.0284
Army_Reserve	0.3354	0.1674	0.0446	0.0086	0.1121	–0.0199	–0.0246
Marine_Reserve	0.4467	0.2165	0.0529	0.1129	0.1410	–0.0084	–0.0445
Constant	–6.2734	0.1263		–2.9463	0.0802		
Air Force DES							
FY09	—	—	—	—	—	—	—
FY10	0.2359	0.0779	0.0341	0.0884	0.0716	–0.0021	–0.0321
Age	0.1496	0.0059	0.0235	0.0360	0.0057	–0.0058	–0.0177
Female	–0.1315	0.0831	–0.0123	–0.1225	0.0755	–0.0152	0.0275
Reserve component	–1.1459	0.1312	–0.1817	–0.2576	0.1279	0.0484	0.1334
IDES	0.2103	0.1331	0.0234	0.1554	0.1288	0.0152	–0.0386
Not deployed since 2001	—	—	—	—	—	—	—
Deployed within 1 year of MEB	–0.0446	0.1557	–0.0399	0.3448	0.1329	0.0811	–0.0412
Deployed within 1–2 years of MEB	0.1392	0.1165	0.0026	0.2417	0.1093	0.0411	–0.0437
Deployed within 2–3 years of MEB	0.1687	0.1375	–0.0005	0.3335	0.1299	0.0588	–0.0583
VASRD1	–0.2966	0.1582	–0.0118	–0.4475	0.1569	–0.0725	0.0843
VASRD2	0.3490	0.1120	0.0728	–0.1109	0.1125	–0.0570	–0.0158
VASRD3	0.2031	0.1069	0.0290	0.0808	0.1045	–0.0007	–0.0282
VASRD4	1.2268	0.0947	0.1280	0.9956	0.0910	0.1089	–0.2369
VASRD5	0.8792	0.1220	0.0348	1.3304	0.1112	0.2157	–0.2505
VASRD6	1.4983	0.1260	0.0567	2.2954	0.1133	0.3739	–0.4305
VASRD7	2.4214	0.4706	0.2029	2.5045	0.4603	0.3353	–0.5382
VASRD8	0.7265	0.6016	–0.1514	3.0496	0.3291	0.6135	–0.4621
Constant	–5.8845	0.2098	—	–2.3174	0.1875	—	—
	–5.9449	0.2113	—	–2.3405	0.1881	—	—

Table A.7. Disability Regression Coefficients, Standard Errors, and Marginal Effects: Ordinary Least Squares for Disability Rating (Army and Navy DES)

	Army/Navy/Marine Corps		Air Force	
Variable	Estimate	Std. Error	Estimate	Std. Error
Intercept	–0.6864	0.5621	–0.9094	1.6060
FY07	—	—	—	—
FY08	1.2034	0.5816	—	—
FY09	4.3560	0.5979	—	—
FY10	2.5439	0.7349	0.6192	0.6203
Age	0.3923	0.0120	0.5865	0.0485
Female	–0.6439	0.2165	–1.9090	0.7095
Reserve component	–2.2827	0.7818	–1.1972	1.0122
Officer	2.3172	1.0374	19.4089	6.7029
Married	–0.3250	0.1613	0.9286	0.6468
IDES	3.0440	0.2295	2.5311	1.0694
Not deployed since 2001	—	—	—	—
Deployed within 1 year of MEB	2.0712	0.2133	3.7478	1.1648
Deployed within 1–2 years of MEB	2.5057	0.2202	2.2132	0.9555
Deployed within 2–3 years of MEB	2.3477	0.2852	3.1761	1.1164
Deployed within 3–4 years of MEB	2.6965	0.3637	1.4780	1.3348
Deployed 4+ years before MEB	3.5691	0.3726	–0.0108	0.9589
Infantry, gun crews, seamanship	0.5119	0.2536	1.1228	1.2464
Electronic equipment repairers	–0.7140	0.3729	0.8790	1.4201
Communications, intelligence	–0.1143	0.3207	1.0110	1.2956
Healthcare specialists	–0.1526	0.3465	1.9585	1.2849
Other technical & allied specialists	0.1853	0.5077	1.5090	1.6246
Functional support & administration	0.7205	0.3062	0.3027	1.0159
Electrical/mechanical equipment repairers	—	—	—	—
Craftsworkers	–0.5402	0.4523	–1.0176	1.6575
Service and supply handlers	–0.3272	0.2789	1.2406	1.1407
Non-occupational	1.0223	0.4607	3.8829	1.4793
Tactical operations officers	3.8973	1.0717	–10.4897	7.0787
Intelligence officers	3.0416	1.7640	–22.8975	8.1521
Engineering & maintenance officers	3.4743	1.2990	–22.9164	7.7188
Scientists and professionals	3.9836	1.8883	–14.3323	7.6382
Healthcare officers	2.5643	1.4386	–23.2809	6.9915
Administrators	2.2599	1.5241	–22.4420	7.5264
Supply, procurement officers	3.1510	1.4274	–18.2877	7.4702
Non-occupational	1.9850	1.4960	0.0000	—
DoD-unique musculoskeletal diseases	2.7980	0.2026	–4.1228	1.6371
DoD-unique musculoskeletal Injuries	5.3376	0.2342	–0.7020	1.9297
D0D-unique muscle injuries	1.4937	0.6020	–4.6367	3.8802
Anxiety disorder	19.0332	0.5190	12.7093	2.2991

Table A.7—Continued

Variable	Army/Navy/Marine Corps		Air Force	
	Estimate	Std. Error	Estimate	Std. Error
Arthritis	—	—	—	—
Asthma	16.3448	0.5099	11.1941	1.1746
Bipolar disorder	20.4474	0.5525	18.7515	1.6896
Cardiovascular condition	19.3697	0.5454	9.8119	1.5524
Digestive condition	18.7556	0.4874	14.8842	1.4937
Endocrine condition	9.5724	0.5933	7.1299	1.9594
Epilepsy	24.0452	0.5731	12.6329	1.7617
Extremity amputation or loss	45.5512	0.6751	43.7874	5.0620
GYN condition	22.4843	1.3250	43.6531	3.9091
Genitourinary condition	28.8115	0.7005	22.5656	2.3431
Hemic condition	48.5816	1.1328	47.2783	3.2760
Infectious disease	29.7572	1.2076	23.1786	2.7889
Major depressive disorder	19.6434	0.3958	15.5913	1.2930
Muscle injury	12.6339	0.5321	6.4930	1.9058
Other code	8.0315	0.7737	30.4467	4.0169
Other mental disorder	16.5536	0.5810	10.9048	1.4863
Other musculoskeletal disease	8.1932	0.3753	11.5344	1.3853
Other musculoskeletal injury	8.4176	0.2310	3.1300	1.1259
Other neurological condition	15.5842	0.2293	15.9882	0.9187
Other respiratory condition	21.7527	0.5962	16.3657	1.7882
Other spinal injury	9.3991	0.4774	4.2638	2.0633
Schizophrenia	31.0517	0.6606	32.6511	2.5229
Sense organ condition	11.3477	0.5045	7.5000	2.1757
Skin condition	17.9723	0.5267	17.7950	2.5406
Spinal injury 5237	5.3354	0.2845	3.4256	1.8740
Spinal injury 5241	10.4828	0.4081	6.3168	2.0189
Spinal injury 5242	5.8141	0.3144	2.5863	1.3507
Spinal injury 5243	6.8913	0.3292	4.2260	1.0943
Traumatic brain injury (TBI)	21.5484	0.3329	23.1047	2.1922
PTSD	28.9561	0.2224	30.8155	1.2382
Army	−6.7098	0.4660	—	—
Marine Corps	−3.2132	0.6043	—	—
Army x FY08	6.5755	0.6272	—	—
Army x FY09	6.7694	0.6391	—	—
Army x FY10	8.9994	0.7790	—	—
Marine Corps x FY08	1.1986	0.8038	—	—
Marine Corps x FY09	1.4839	0.8161	—	—
Marine Corps x FY10	1.9238	0.9969	—	—
Army x Reserve	2.6248	0.8030	—	—
Marine Corps x Reserve	2.5707	1.0146	—	—

Table A.8. Disability Regression Coefficients, Standard Errors, and Marginal Effects: OLS for (Log) DES Processing Time

Variable	Army		Navy/Marine Corps	
	Estimate	Std. Error	Estimate	Std.Error
Army and Navy MEB Processing Time				
Intercept	4.2091	0.0232	3.7147	0.0415
FY07	—	—	—	—
FY08	0.1347	0.0103	0.1151	0.0167
FY09	0.0209	0.0107	0.1302	0.0192
FY10	0.0169	0.0132	0.0731	0.0236
Age	0.0052	0.0006	–0.0020	0.0013
Female	–0.0058	0.0109	–0.0156	0.0183
Reserve component	–0.0461	0.0117	0.0536	0.0234
Officer	0.0279	0.0509	–0.0155	0.1482
Married	0.0467	0.0080	0.0328	0.0137
IDES	0.3656	0.0143	–0.0227	0.0266
Deployed within 1 year of MEB	0.0684	0.0106	0.0420	0.0215
Deployed within 1–2 years of MEB	0.0487	0.0112	0.0258	0.0197
Deployed within 2–3 years of MEB	0.0109	0.0145	0.0153	0.0237
Deployed within 3–4 years of MEB	0.0333	0.0185	0.0477	0.0305
Deployed 4+ years before MEB	0.0305	0.0204	–0.0069	0.0278
Infantry, gun crews, seamanship	0.0045	0.0129	–0.0037	0.0206
Electronic equipment repairers	0.0160	0.0202	0.0209	0.0257
Communications, intelligence	–0.0215	0.0157	0.0332	0.0301
Healthcare specialists	–0.0384	0.0174	0.0352	0.0349
Other technical & allied specialists	–0.0640	0.0245	0.0026	0.0551
Functional support & administration	0.0360	0.0156	0.0496	0.0246
Electrical/mechanical equipment repairers	—	—	—	—
Craftsworkers	0.0276	0.0233	0.0324	0.0349
Service and supply handlers	–0.0035	0.0139	0.0611	0.0254
Non-occupational	–0.0672	0.0312	–0.1697	0.0281
Tactical operations officers	–0.1723	0.0515	–0.0259	0.1617
Intelligence officers	–0.0755	0.0875	–0.3905	0.2138
Engineering & maintenance officers	–0.0609	0.0672	–0.0354	0.1608
Scientists and professionals	0.0431	0.1034	0.2239	0.2009
Healthcare officers	–0.1186	0.0719	0.0801	0.1740
Administrators	–0.0230	0.0789	–0.2679	0.1931
Supply, procurement officers	0.0939	0.0709	–0.1255	0.1744
Non-occupational	–0.0478	0.0763	–0.0876	0.1769

Table A.8—Continued

Variable	Army		Navy/Marine Corps	
	Estimate	Std. Error	Estimate	Std.Error
DoD-unique musculoskeletal diseases	0.0518	0.0096	0.0856	0.0225
DoD-unique musculoskeletal Injuries	0.0555	0.0116	0.0515	0.0210
D0D-unique muscle injuries	0.0012	0.0292	–0.0124	0.0670
Anxiety disorder	0.2903	0.0244	0.1106	0.0618
Arthritis	0.1595	0.0236	0.0926	0.0535
Asthma	—	—	—	—
Bipolar disorder	0.2236	0.0304	0.0566	0.0373
Cardiovascular condition	0.1354	0.0287	0.0643	0.0471
Digestive condition	0.1410	0.0268	0.0856	0.0337
Endocrine condition	0.1718	0.0314	0.0467	0.0492
Epilepsy	0.2415	0.0329	0.1170	0.0383
Extremity amputation or loss	0.1483	0.0337	0.0623	0.0652
GYN condition	0.0560	0.0717	0.0509	0.0952
Genitourinary condition	0.0520	0.0369	0.0551	0.0512
Hemic condition	0.1541	0.0694	0.0879	0.0677
Infectious disease	0.1889	0.0658	0.0059	0.0916
Major depressive disorder	0.2849	0.0204	0.1226	0.0326
Muscle injury	0.0641	0.0281	0.0473	0.0501
Other code	0.2754	0.0540	0.0225	0.0466
Other mental disorder	0.2873	0.0303	0.1244	0.0458
Other musculoskeletal disease	0.1020	0.0190	0.1883	0.0367
Other musculoskeletal injury	0.0936	0.0118	0.0012	0.0202
Other neurological condition	0.1314	0.0118	0.0961	0.0196
Other respiratory condition	0.1664	0.0295	0.1493	0.0629
Other spinal injury	0.1422	0.0225	0.2184	0.0551
Schizophrenia	0.1689	0.0359	0.1095	0.0452
Sense organ condition	0.1355	0.0256	0.0856	0.0420
Skin condition	0.1192	0.0260	0.0148	0.0530
Spinal injury 5237	0.1512	0.0142	0.0801	0.0264
Spinal injury 5241	0.1272	0.0211	0.0034	0.0352
Spinal injury 5242	0.1780	0.0144	0.0055	0.0666
Spinal injury 5243	0.1363	0.0155	0.1209	0.0435
Traumatic brain injury (TBI)	0.2637	0.0159	0.3215	0.0352
PTSD	0.3061	0.0107	0.1458	0.0242

Table A.8—Continued

Variable	Army		Navy/Marine Corps	
	Estimate	Std. Error	Estimate	Std.Error
Army and Navy PEB Processing Time				
Intercept	3.6215	0.0171	2.9419	0.0312
FY07	—	—	—	—
FY08	0.2307	0.0085	0.2690	0.0134
FY09	0.2465	0.0087	0.5002	0.0150
FY10	0.2218	0.0105	0.5289	0.0182
Age	0.0102	0.0005	0.0103	0.0010
Female	0.0085	0.0090	0.0010	0.0150
Reserve component	–0.1691	0.0091	0.1212	0.0186
Officer	0.0074	0.0430	0.0970	0.1226
Married	0.0966	0.0067	0.0059	0.0113
IDES	0.2096	0.0103	0.0043	0.0177
Not deployed since 2001	0.1717	0.0086	0.0325	0.0175
Deployed within 1 year of MEB	—	—	—	—
Deployed within 1–2 years of MEB	0.2060	0.0092	0.0401	0.0161
Deployed within 2–3 years of MEB	0.1963	0.0121	0.0493	0.0196
Deployed within 3–4 years of MEB	0.1843	0.0155	0.0876	0.0252
Deployed 4+ years before MEB	0.1584	0.0172	0.0005	0.0229
Infantry, gun crews, Seamanship	–0.0237	0.0107	–0.0393	0.0165
Electronic equipment repairers	–0.0602	0.0167	0.0092	0.0212
Communications, intelligence	–0.0311	0.0131	–0.0128	0.0247
Healthcare specialists	–0.1398	0.0141	0.0016	0.0287
Other technical & allied specialists	–0.0511	0.0204	0.0512	0.0454
Functional support & administration	0.0700	0.0130	0.0148	0.0201
Electrical/mechanical equipment repairers	—	—	—	—
Craftsworkers	–0.0219	0.0195	–0.0140	0.0285
Service and supply handlers	–0.0264	0.0115	0.0089	0.0208
Non-occupational	–0.1522	0.0258	–0.2384	0.0207
Tactical operations officers	0.0409	0.0435	–0.0145	0.1338
Intelligence officers	0.0550	0.0746	0.3209	0.1769
Engineering & maintenance officers	0.0394	0.0560	0.0548	0.1332
Scientists and professionals	0.1098	0.0889	–0.1227	0.1659
Health care officers	0.1401	0.0607	0.0964	0.1439
Administrators	0.1693	0.0672	–0.1410	0.1598
Supply, procurement officers	0.1256	0.0594	0.0314	0.1443
Non-occupational	0.0478	0.0643	0.0505	0.1440
DoD-unique musculoskeletal diseases	–0.0176	0.0079	0.0553	0.0185
DoD-unique musculoskeletal injuries	–0.0361	0.0095	0.0417	0.0174

Table A.8—Continued

Variable	Army		Navy/Marine Corps	
	Estimate	Std. Error	Estimate	Std.Error
D0D-unique muscle injuries	0.0379	0.0242	–0.0364	0.0554
Anxiety disorder	0.1577	0.0203	0.0636	0.0511
Arthritis	0.1673	0.0196	0.0734	0.0442
Asthma	—	—	—	—
Bipolar disorder	0.2411	0.0256	0.0819	0.0308
Cardiovascular condition	0.1603	0.0241	0.1629	0.0390
Digestive condition	0.1229	0.0224	0.0079	0.0279
Endocrine condition	0.1272	0.0264	0.0709	0.0406
Epilepsy	0.2486	0.0277	0.0811	0.0315
Extremity amputation or loss	0.0905	0.0272	0.2061	0.0527
GYN condition	0.1823	0.0612	–0.1268	0.0788
Genitourinary condition	0.1300	0.0310	0.0581	0.0423
Hemic condition	0.1958	0.0582	0.0292	0.0559
Infectious disease	0.1867	0.0551	0.1127	0.0758
Major depressive disorder	0.1545	0.0172	0.1078	0.0269
Muscle injury	0.1793	0.0234	0.0523	0.0415
Other code	0.2401	0.0454	–0.0875	0.0384
Other mental disorder	0.1653	0.0253	0.1622	0.0379
Other musculoskeletal disease	–0.0055	0.0158	0.1347	0.0303
Other musculoskeletal injury	0.0386	0.0099	–0.0184	0.0166
Other neurological condition	0.1369	0.0099	0.0768	0.0162
Other respiratory condition	0.1356	0.0248	0.0131	0.0520
Other spinal injury	0.0868	0.0190	0.0972	0.0455
Schizophrenia	0.1932	0.0299	0.1196	0.0372
Sense organ condition	0.1432	0.0215	0.1212	0.0347
Skin condition	0.1633	0.0216	0.1761	0.0433
Spinal injury 5237	0.1296	0.0117	0.0897	0.0218
Spinal injury 5241	0.0910	0.0176	0.0540	0.0290
Spinal injury 5242	0.0505	0.0121	0.1363	0.0551
Spinal injury 5243	0.0302	0.0129	0.1531	0.0360
Traumatic brain injury (TBI)	0.0948	0.0133	0.2201	0.0289
PTSD	0.1117	0.0089	0.1159	0.0199

Bibliography

Abraham, J. M., and R. Feldman, "Taking Up or Turning Down: New Estimates of Household Demand for Employer-Sponsored Health Insurance," *Inquiry,* Vol. 47, Spring 2010, pp. 17–32.

Adamson, David M., M. Audrey Burnam, Rachel M. Burns, Leah B. Caldarone, Robert A. Cox, Elizabeth D'Amico, Claudia Diaz, Christine Eibner, Gail Fisher, Todd C. Helmus, Terri Tanielian, Benjamin R. Karney, Beau Kilmer, Grant N. Marshall, Laurie T. Martin, Lisa S. Meredith, Karen N. Metscher, Karen Chan Osilla, Rosalie Liccardo Pacula, Rajeev Ramchand, Jeanne S. Ringel, Terry L. Schell, Jerry M. Sollinger, Lisa H. Jaycox, Mary E. Vaiana, Kayla M. Williams, and Michael R. Yochelson, *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery*, Santa Monica, Calif.: RAND Corporation, 2008. As of July 23, 2011: http://www.rand.org/pubs/monographs/MG720.html

Bansak, Cynthia, and Steven Raphael, "The State Children's Health Insurance Program and Job Mobility: Identifying Job Lock among Working Parents in Near-Poor Households," *Industrial and Labor Relations Review,* Vol. 61, No. 4, 2008, pp. 564–579.

Brauner, Marygail K., Timothy Jackson, and Elizabeth K. Gayton, *Medical Readiness of the Reserve Component*, Santa Monica, Calif.: RAND Corporation, 2012. As of April 16, 2012: http://www.rand.org/pubs/monographs/MG1105.html

Brook, R. H., J. E. Ware, Jr., W. H. Rogers, E. B. Keeler, A. R. Davies, C. A. Donald, G. A. Goldberg, K. N. Lohr, P. C. Masthay, and J. P. Newhouse, "Does Free Care Improve Adults' Health?—Results from a Randomized Controlled Trial," *The New England Journal of Medicine*, Vol. 309, No. 23, 1983, pp. 1426–1434.

Chandra, Amitabh, Jonathan Gruber, and Robin McKnight, "The Importance of the Individual Mandate—Evidence from Massachusetts," *New England Journal of Medicine,* Vol. 36, No. 44, January 27, 2011, pp. 293–295.

Christensen, Eric, Joyce McMahon, Elizabeth Schaefer, Ted Jaditz, and Dan Harris, *Final Report for the Veterans' Disability Benefits Commission: Compensation, Survey Results,and Selected Topics*: Alexandria, Va.: Center for Naval Analysis, 2007.

The Commonwealth Fund, "Health Reform Resource Center: What's in the Affordable Care Act?" 2011. As of May 23, 2011: http://www.commonwealthfund.org/Health-Reform/Health-Reform-Resource.aspx

Defense Manpower Data Center, *November 2008 Status of Forces Survey of Reserve Component Members: Administration, Datasets, and Codebook*, DMDC Report No. 2009-024, 2009.

Department of Defense, *Comprehensive Review of the Future Role of the Reserve Component:* Volume I*, Executive Summary & Main Report*, 2011.

Ellis, Randall P., and Ching-To Albert Ma, "Health Insurance, Cost Expectations, and Adverse Job Turnover," *Health Economics,* Vol. 20, No. 1, 2011, pp. 27–44.

Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, and Katherine Baicker, "The Oregon Health Insurance Experiment: Evidence from the First Year," Cambridge, Mass.: National Bureau of Economic Research, NBER Working Paper, 2011.

Freeman, Joseph D., Srikanth Kadiyala, Janice F. Bell, and Diane P. Martin, "The Causal Effect of Health Insurance on Utilization and Outcomes in Adults: A Systematic Review of US Studies," *Medical Care*, Vol. 46, No. 10, 2008, pp. 1023–1032.

Girosi, Federico, Amado Cordova, Christine Eibner, Carole Roan Gresenz, Emmett B. Keeler, Jeanne S. Ringel, Jeffrey Sullivan, John Bertko, Melinda Beeuwkes Buntin, and Raffaele Vardavas, *Overview of the Compare Microsimulation Model*, Santa Monica, Calif.: RAND Corporation, WR-650, 2009. As of June 7, 2011: http://www.rand.org/pubs/working_papers/WR650.html

Government Accountability Office, *Military and Veterans Disability System: Pilot Has Achieved Some Goals, but Further Planning and Monitoring Needed*, GAO 11-633T, 2010.

———, *Military and Veterans Disability System: Worldwide Deployment of Integrated System Warrants Careful Monitoring*, GAO-11-633T, 2011.

———, *Military Disability Retirement: Closer Monitoring Would Improve the Temporary Retirement Process*, GAO 09-239, 2009.

———, *Military Disability System: Improved Oversight Needed to Ensure Consistent and Timely Outcomes for Reserve and Active Duty Service Members*, GAO 06-362, 2006.

———, *Military Health Care: Cost Data Indicate That Tricare Reserve Select Premiums Exceeded the Costs of Providing Program Benefits*, GAO-08-104, 2007.

Gruber, J., and K. Simon, "Crowd-Out 10 Years Later: Have Recent Public Insurance Expansions Crowded Out Private Health Insurance?" *Journal of Health Economics,* Vol. 27, February 2008, pp. 201–211.

Gruber, Jonathan, "Covering the Uninsured in the United States," *Journal of Economic Literature,* Vol. 46, No. 3, September 2008, pp. 571–606.

Gruber, Jonathan, and Brigitte C. Madrian, "Health Insurance, Labor Supply, and Job Mobility: A Critical Review of the Literature," Cambridge, Mass.: National Bureau of Economic Research, NBER Working Paper, 2002.

Hosek, Susan, "Tricare Reserve Select: Would Extending Eligibility to All Reservists Be Cost Effective?" in *The New Guard and Reserve*, John D. Winkler and Barbara A. Bicksler (eds.), San Ramon, Calif.: Falcon Books, 2010.

Institute of Medicine, *America's Uninsured Crisis: Consequences for Health and Health Care*, 2009.

Kaiser Family Foundation and Health Research and Educational Trust, *Employer Health Benefits: 2010 Annual Survey*, 2010.

Levy, Helen, and David Meltzer, "The Impact of Health Insurance on Health," *Annual Review of Public Health*, Vol. 29, 2008, pp. 399–409.

Mariano, Louis T., Sheila N. Kirby, Christine Eibner, and Scott Naftel, *Civilian Health Insurance Options of Military Retirees: Findings from a Pilot Survey*, Santa Monica, Calif.: RAND Corporation, MG-583-OSD, 2007. As of August 25, 2011: http://www.rand.org/pubs/monographs/MG583.html

Office of the Under Secretary of Defense (Personnel and Readiness), *Report to Congress on the Temporary Disability Retired List (TDRL): An Assessment of Its Continuing Utility and Future Role*, 2008.

President's Commission on Care for America's Returning Wounded Warriors, *Serve, Support, Simplify*, 2007.

SoF-R—*See* Defense Manpower Data Center.

TRICARE Management Activity, *Evaluation of the TRICARE Program: Fiscal Year 2010 Report to Congress*, 2011.

U.S. Census Bureau, "Health Insurance Coverage Status and Type of Coverage—All Persons by Age and Sex: 1999 to 2009," undated. As of May 16, 2011: http://www.census.gov/hhes/www/hlthins/data/historical/index.html

Veterans' Disability Benefits Commission, *Honoring the Call to Duty: Veterans' Disability Benefits in the 21st Century*, 2007.

CHAPTER 16

Reserve Participation and Cost Under a New Approach to Reserve Compensation

Michael G. Mattock
James Hosek
Beth J. Asch

Summary

Every four years, the Department of Defense (DoD) conducts a Quadrennial Review of Military Compensation (QRMC). One issue considered in the 11th QRMC, which began in 2010, is ensuring that the pay and benefits of Reserve Component (RC) members are consistent with the current and planned use of RC personnel in an operational capacity. The 11th QRMC proposes a new approach to compensating RC members, a total-force approach, in which RC compensation is more closely aligned with the approach used to compensate Active Component (AC) members.

The total-force compensation approach has four elements:

- **Regular military compensation (RMC) based on days of reserve service, regardless of duty status.** RMC includes basic pay, allowances for housing and subsistence, and a tax advantage (allowances are not subject to taxation). Currently, RC members receive different pay levels depending on duty status. Under the total-force approach, they would receive a day of RMC for each day of duty, computed in the same way that active RMC is computed.
- **53 RC retirement points, one for each day of service, regardless of duty status.** In the existing system, RC members accumulate 75 points per year of participation under the model used in this assessment, while under the proposed system RC members accumulate 53 points for 53 days of service.

The views expressed in this paper represent those of the authors and are not necessarily those of the Department of Defense.

- **Retirement eligibility after 30 years of service (YOS)**, RC members who have attained 20 qualifying years for retirement benefits can begin receiving benefits on accumulating 10 additional years in the selected, individual ready, or retired reserve, or at age 60, whichever occurs first. Thus an individual could collect reserve retirement benefits within 30 years of starting service. Currently, RC retirement benefits begin at age 60; under the total-force approach, benefits might begin up to 13 years earlier for some individuals.
- **Supplemental pay.** Forms of supplemental pay include incentive pay, pay for RC travel in excess of 50 miles (or 100 miles round trip), and pay for currently unpaid reserve work.

The total-force approach would reduce RC pay but would compensate for the reduction by allowing RC members who qualify to claim retirement benefits earlier than age 60 and by providing supplemental pay, such as incentive pay. The study reported here assesses the force-management and cost effects of this new pay approach on RC participation, AC retention, and cost.

Approach of This Study

To assess these effects, we used a stochastic dynamic programming model of AC retention and RC participation developed at RAND for the 10th QRMC. Individuals in the model begin their military career in the AC and are assumed to make annual retention decisions to stay or leave. If they leave the AC, they may join the RC and flow in and out of the RC over the remainder of their career. Because individuals start out as AC members, our analysis of RC participation focuses on members who previously served on active duty. The majority of RC participants in the senior years of service have prior AC service and are therefore likely to qualify for RC retirement benefits. The majority of junior-level RC participants do not have prior AC service and are more likely to have fewer years of RC participation. We estimate that RC participants with prior AC service comprise 35 percent to 40 percent of total RC participants. While our model can be extended to non-prior-service RC members, the results reported here are only for those with prior AC service.

In the model, individuals are forward-looking in their decisions, accounting, for example, for the possibility of qualifying for future retirement benefits, and their decisions are affected by uncertainty (which we model with random shocks at every decision point), by compensation, and by their preferences for active and reserve military service relative to the civilian sector. We do not directly observe

these preferences or the random shocks, but we can infer the parameters underlying their distributions using Defense Manpower Data Center (DMDC) data on actual active retention and reserve participation decisions through 2010 of members who began service in 1990–1991. The estimated model parameters permit us to conduct policy simulations to project how AC participation, affiliation with the RC, RC participation, and personnel costs would change under alternative compensation policies. This modeling approach permits evaluation of policies that do not yet exist or that have no direct historical analog. Thus, it is well suited to the purposes of the 11th QRMC.

We used the model estimates to simulate the effects of 11 variants of the total-force compensation approach on AC retention, RC participation, and cost relative to the current baseline approach to RC compensation for officer and enlisted personnel for all four service branches.

The first three variants represent the core QRMC proposal and include all four elements—RMC, 53 points, 30-YOS retirement, and supplemental pay. The form of the supplemental pay is varied. One case considers incentive pay in the form of an annual bonus that is a percentage of basic pay, the amount of which would hold RC prior-service force size constant. In another case, incentive pay is structured as a flat dollar amount, regardless of years of service, also set to hold RC force size constant. In the third case, targeted incentive pay is structured as a flat dollar amount in each year of service between 8 and 15 years. The next three variants are the same as the first three but without the earlier retirement element—RC retirement benefits begin at age 60, as they do under the current retirement system. The seventh alternative includes all four elements, but the supplemental pay consists of travel reimbursement rather than incentive pay. In the remaining alternatives, we remove different elements and revert to the status quo for the purpose of comparison. In one of these variants, we remove supplemental pay, while in another, we remove both 30-YOS retirement and supplemental pay. None of these alternatives includes supplemental pay.

The simulations compute the current costs, retirement costs, and total costs of each variant and the change in cost relative to the baseline case. Current cost is the cost of current compensation and includes RMC (or baseline RC pay in the base case) and any additions to current compensation in the variant under consideration. AC retirement costs are based on the accrual charge sufficient to cover the retirement liability of AC members who retire from the AC plus the part of the retirement liability of AC members who retire from the RC. RC retirement costs are based on the RC retirement liability for the RC force minus the funds credited to the RC retirement account for the accrual charges made during AC service. The total cost for each component is the sum of current and retirement costs.

Findings

All of the variants we considered have little effect on the AC—effects on force size and cost are within a percentage point or two of the baseline. Thus, we focus on the effects on the RC.

A key finding of our analysis is that the total-force compensation approach with incentive pay set as a flat dollar amount rather than a percentage of basic pay is less costly than the baseline. By design, we chose the dollar amount of the incentive pay to hold RC prior force size constant, and the resulting total RC enlisted and officer cost decreases by about 2.7 percent across all services, a savings of $80 million annually in 2007 dollars. Total RC costs fall despite an increase in retirement costs because current costs fall. Retirement at 30 YOS increases retirement benefits and therefore retirement costs, but this increase is more than offset by a decrease in pay (relative to baseline pay) after YOS 5 and the reduction in retirement costs due to a reduction in retirement points. The simulations indicate that RC participation falls slightly before YOS 20 and increases slightly after YOS 20, although the effects are small and overall RC force size is constant.

In addition, a flat-dollar-amount incentive that targets personnel in YOS 8 to 15 can yield additional savings. The total dollar amount needed to keep prior service RC force size constant when pay is targeted is less than the total needed under the nontargeted arrangements, resulting in a 6.6 percent cost savings ($190 million annually in 2007 dollars) when combined with retirement at 30 YOS, and a 7.3 percent cost savings ($220 million annually in 2007 dollars) when combined with retirement at age 60. It may be difficult for this kind of incentive to gain acceptance, as service members outside the targeted range would earn considerably less than their more senior or junior peers; however, this could be addressed by judicious allocation of some portion of the cost savings toward special or incentive pays for those service members. This point extends to non-prior-service reservists as well. That is, like prior-service reservists, they would not receive targeted incentive pay until YOS 8 to 15, but special or incentive pays such as reserve enlistment or affiliation bonuses could be used in earlier years to sustain non-prior-service participation.

We also considered the total-force compensation approach without the opportunity to retire early. Because the value of retirement benefits is lower under the current retirement-at-60 system, incentive pay would have to be higher to maintain prior-service RC force size. The net result is that this variant results in a more front-loaded RC compensation structure with higher current pay for many personnel and lower retirement benefits. As past research has found, a front-loaded system is more

efficient, although the amount of cost savings depends on the structure of incentive pay. When incentive pay varies with YOS and is a percentage of basic pay, the cost saving is about $20 million, a 0.6 percent change in total prior-service RC cost across the services. When incentive pay is a flat dollar amount, the cost saving is $100 million, about a 3.5 percent change in RC total cost. Finally, when incentive pay is a flat amount but targeted to YOS 8 to 15, the cost saving is $220 million, a 7.3 percent decrease in RC costs. But as in the previous case, part of the cost savings might need to be allocated to special and incentive pays in earlier years to sustain non–prior-service participation. The structure of incentive pay affects the amount of cost savings because it affects the degree to which baseline pay is restored under the total-force pay approach. Interestingly, though not surprisingly, RC retirement costs are lower when RC members retire at age 60 than when they retire earlier at 30 YOS because the value of retirement benefits is lower and post-20-YOS RC participation is a bit lower, even though pre-20-YOS participation is higher. Our overall conclusion is that the total-force compensation approach is viable in either case in terms of maintaining RC force size, whether RC members retire earlier or not.

We also assessed the total-force approach with travel reimbursement as the supplemental pay and found that the RC force size increases by 3 to 4 percent relative to the baseline for enlisted personnel but decreases by 5 to 10 percent for officers. Total RC cost falls for officers, but it stays roughly constant for enlisted personnel. Other considerations may also affect the use of travel reimbursement as supplementary pay. Reimbursing travel expenses may be inefficient if members are willing to travel more than 50 miles one way even in the absence of reimbursement. Our model was not designed to detect this effect. Nonetheless, in this case, the services would be paying an economic rent—i.e., more than required to induce the desired level of participation—which would be inefficient. Furthermore, reimbursing travel expenses may create unintended consequences by inducing RC members to travel longer distances in order to increase their compensation. Reimbursing travel may also be unfair to the extent that those who travel less than 50 miles one way would not receive this benefit. Finally, travel might be considered a work-related expense, not compensation for work performed. Thus, travel reimbursement should probably be used highly selectively for critical personnel or market areas.

We also considered variants in which incentive pay was omitted and the terms of retirement varied and found that supplemental pay is a critical element for maintaining RC force size. Under a policy that includes RMC, 53 retirement points, and retirement at 30 YOS but no supplemental pay, enlisted RC force size falls by 10 to 16 percent for officers and 10 to 19 percent for enlisted personnel.

Finally, we assessed a variant in which the terms of retirement are changed, but not RC pay. In this case, baseline RC compensation is unchanged, but RC members can retire at 30 YOS and they earn 53 points annually. We find that RC participation increases, and enlisted RC force size increases by from 2 to 5 percent, depending on service, but total cost rises because of an increase in retirement costs. Thus, changing the terms of retirement without changing RC pay based on the concept of a day of RMC for a day of duty increases total cost.

Concluding Thoughts

Our analysis finds that the total-force compensation approach is cost-effective when supplemental pay takes the form of either a flat-amount incentive or targeted incentive pay. The approach moves RC compensation closer in structure to that in the AC by paying RMC for each day of duty, using the same formula as the AC uses, and it allows RC members the opportunity to begin receiving retirement benefits sooner, at 30 YOS. Thus, we conclude that the approach is not only cost-effective but also fairer vis-à-vis the compensation for AC members, and it improves the transparency and simplicity of the overall military compensation system. The approach is viable in terms of meeting RC force requirements, even in the absence of a change in retirement age, but the supplemental pay feature, especially in the form of incentive pay, is critical to ensuring that the RC meets its desired force size. The addition of incentive pay also offers the opportunity for enhanced force-management flexibility, because the amount could vary by occupation, unit type, YOS, and over time depending on force growth targets and economic conditions. Further, the cost savings from the total-force compensation approach could be programmed for other uses to manage the force, such as other special and incentive (S&I) pays or RC family support programs. Thus, the approach enhances force management.

The focus of the 11th QRMC on RC compensation continues a long tradition of policy debate and analysis of the structure of military compensation in general. It remains of utmost importance that the structure of compensation enables the AC and RC to meet their manpower requirements. The present analysis finds that the proposals under consideration by the current QRMC would do so, and the simulations indicate that certain variants would do so more cost-effectively than the baseline system. The 10th QRMC, the Defense Advisory Committee on Military Compensation, and earlier groups also considered proposals that affected the AC retirement benefit, and similar proposals seem likely to be put forth again. Our analysis assumed that AC compensation did not change, but such changes could affect our results. Because our model incorporates AC retention along with (prior-service) RC participation, it can analyze the effects of such changes on both the AC and the RC in conjunction with the 11th QRMC proposals.

Finally, because our analysis focuses on the steady state, it does not address the myriad of questions that may arise in implementing changes. Ensuring successful implementation will require input from many stakeholders and may require further analysis.

1. Introduction

The 11th Quadrennial Review of Military Compensation (QRMC) in 2010 examined four aspects of military compensation, one of which was whether the compensation system for members of the Reserve Component (RC) is consistent with the current and planned use of RC personnel.

The RC now plays a more prominent and active role in national security than it did in the past, but the current RC compensation system is not well integrated with that of the Active Component (AC). First, different types of RC duty status result in different levels of compensation. Reservists who are not activated typically participate in inactive-duty training one weekend a month (called *drilling*) and annual training for two weeks, usually in the summer. The two-week annual training is performed on active duty. Daily pay differs depending on whether a reservist is drilling or performing the annual training. Specifically, one weekend day of inactive duty for training yields two days of basic pay, whereas one day of active duty results in one day of basic pay plus allowances. This is inconsistent with the AC approach, in which basic pay for one day of service is the same from day to day.

The RC and AC housing allowance systems also differ. RC members do not receive a housing allowance for inactive duty, and, unlike the AC allowance, the RC allowance is not based on location and in general is lower for RC members who are on active duty for fewer than 31 days.

Finally, the RC retirement system differs from the AC system. Like their AC counterparts, RC members vest at 20 years of service (YOS), but they cannot begin receiving benefits until they are 60 years of age,[1] whereas vested AC members can claim benefits immediately. The RC retirement system is based on a point system in which members accumulate points based on participation, including time served in the AC, if any. However, unlike the AC, RC members receive annual participation points (15 per year), and RC retirement point accumulations are converted into years on the basis of 360 days per year rather than 365 days.[2]

1. As a result of recent legislation, the age at which an RC member who has been deployed in the period beginning January 28, 2008, can begin drawing retirement is decreased by three months for every 90 consecutive days of deployment.
2. The AC and RC retirement systems differ in other important ways not discussed here, and the compensation systems also differ in ways that are not discussed. Differences in the retirement systems are discussed in greater detail in Asch, Hosek, and Loughran (2006).

Consistent with the objectives of military compensation articulated in the Department of Defense's (DoD's) *Military Compensation Background Papers* (Department of Defense, 2005), the RC compensation system should provide incentives for members to serve at the required levels of participation and should be clearly integrated with the AC compensation system to facilitate transitions between the AC and RC and to ensure equitable pay for similar service. More broadly, any reform of RC compensation should be consistent with the broader objectives of military compensation stated in the Military Compensation Background Papers. Any change to the system should simplify and facilitate force management, specifically, the transition between duty statuses, and the new system should be at least as good as the current system with respect to effectiveness, efficiency, and equity. Finally, the new system should align with force-management objectives by ensuring that the services meet their RC manpower requirements given that RC members are anticipated to be used more intensively in an operational capacity than they were in the Cold War era.

The 11th QRMC has proposed a new approach for compensating RC members, "total-force" compensation. The Office of the Secretary of Defense (OSD) asked RAND to assess the force-management and cost effects of changing to this approach, and specifically, the effects of the change on AC retention, the flow of prior AC members to the RC, RC participation, and AC and RC personnel costs. This report describes the results of that assessment.

Under the total-force pay approach, RC members would receive one day's basic pay plus allowances for housing and subsistence for each day of RC duty, regardless of RC duty status, paid according to the same schedules as those for AC duty. Accumulation of RC retirement points would be based on one point per day of duty and would be prorated based on a 365-day year rather than the currently used 360-day year. Further, the total-force approach could include other features. For example, the 11th QRMC recommends allowing RC members to begin claiming retirement benefits when they have accumulated 10 years in the reserves beyond the required 20 qualifying years needed for vesting, or at age 60, whichever occurs first. Thus, RC members who joined the military before age 20 could begin receiving benefits before age 50. Other features that could be included are compensation for unreimbursed travel by RC members, compensation for time spent on RC matters that is currently unpaid, an annual bonus for participation in the Reserve, and additional annual participation points.

To assess the force-management and cost implications of the total-force pay approach, we used a model of the career decisions of military personnel developed at RAND for the 10th QRMC, the dynamic retention model (DRM). The DRM models the decisions of individual members to stay or leave the military as a stochastic

dynamic program, using Defense Manpower Data Center (DMDC) data on the military careers of AC and RC members. The analysis described in this report focuses on prior-service personnel, i.e., individuals who began military service in the AC and then left it, perhaps choosing to participate in the RC and possibly choosing to move back and forth between RC and civilian status. For each AC component, we drew a sample from the DMDC data of 25,000 individuals who entered the component in fiscal year (FY) 1990–1991, and we tracked them through the end of FY 2009. Our data and methods are described in greater detail in Appendix A. As shown there, our estimated models fit the data very well.

We used the model parameter estimates to simulate the effects of compensation alternatives on force-management outcomes such as RC participation. We simulated AC retention by year of service, RC affiliation among those with prior AC service, and RC participation by year of service, and we computed AC force size, AC current and retirement costs, RC prior-service force size, and RC prior-service current and retirement costs. These computations, including our methods for calculating cost, are described in Appendix A.

Focusing on prior-service reservists has three advantages. As discussed in Chapter Two, prior-service reservists are the primary source of trained, experienced personnel for the RC, so it is important to understand whether changes in RC compensation would affect not only RC participation but also AC retention and the willingness of outgoing AC members to join the RC. Also, by including AC service, we can analyze incentives intended to increase the RC join rate of AC members at a reenlistment decision point, as well as changes in AC compensation that might be proposed along with changes in RC compensation. Although AC compensation changes are not part of the total-force pay approach proposed by the 11th QRMC, such changes might affect RC participation and interact with RC compensation changes, so this modeling capability is potentially useful. The RC compensation alternatives that RAND was asked to analyze include changes to the RC retirement system, and we capture the behavioral changes for prior-service reservists, the group most likely to be affected by RC retirement changes. We believe that this group should also be included in future analyses. Chapter Two shows overall RC strength in selected years for prior-service and non–prior-service RC participants and compares our simulated prior-service strength with actual overall strength.

The DRM assumes that service members consider how future opportunities affect current decisions; accounts for past career decisions; allows members to differ in their taste for AC and RC service; incorporates the AC and RC compensation systems, including pay and retirement benefits; recognizes that the future is uncertain; and assumes that individuals respond rationally to that uncertainty in evaluating their

options. A particular advantage of the dynamic approach is that it permits assessment of compensation proposals that have never been tried. Thus, it is well suited for assessing the total-force compensation proposal.

Our implementation of the model has limitations that we return to in Chapter Five. We focus on the AC, the flow of prior AC members to the RC, and the participation in the RC by prior-AC service members. Thus, the analysis omits the participation of non–prior-service RC members. The analysis is a steady-state analysis and assumes that real military and civilian pay and benefits and military promotion policies are stable over time. We do not analyze the transition from the current policy to the steady state under a new policy. We assume a constant personal discount rate over time and across members given their branch and whether they are enlisted personnel or officers. The model omits deployment and deployment-related pays and demographic variables such as education and gender as explanatory variables. Finally, the costing analysis omits the changes in cost associated with training and recruitment. However, these costs are minor relative to the cost of current compensation and retirement. Even with these limitations, the policy simulations provide a fairly accurate measure of the change in retention, participation, and cost under policy alternatives relative to the baseline.

The remainder of this report describes our model and analytical results. Chapter Two presents contextual background. Chapter Three describes the total-force pay approach in greater detail and the RC compensation alternatives we considered. Chapter Four summarizes our key results, with greater details provided in Appendix B. We discuss the findings and present our conclusions in Chapter Five.

2. Contextual Background

Reservists can be divided into those with and those without prior AC service. Most junior reserve members are non–prior-service members, and the majority of more experienced members are prior-service members. We focus on prior-service reservists, but to place our analysis in context, we compare total RC strength with our simulated prior-service RC strength by year of service.[3]

We present AC and RC force size in FY 1990, FY 2000, and FY 2009 (the most recent years for which data are available) and show overall and prior-service RC force strength by year of service for those years. The overall RC force data are from official statistics, and the prior-service RC force data are derived from our simulations. Such comparisons are imperfect because the overall RC force data are cross-sectional and not in a steady state, while our simulations are longitudinal and assume a steady state.

3. Our data, estimation approach, and simulation methodology are discussed in Appendix A.

Nevertheless, the comparisons provide some general context for our results, specifically in verifying that junior reservists are mainly non–prior-service and experienced reservists are mainly prior-service.

Significant changes in AC and RC force size occurred in FY 1990, FY 2000, and FY 2009 (Table 2.1). The AC and RC were at their Cold War strength in 1990, but by 2000 they were about one-third smaller. The Army National Guard, Army Reserve, and Navy Reserve felt the brunt of the RC force drawdown, with a combined decrease of 260,000 between FY 1990 and FY 2000. The decreases in the Marine Corps Reserve, Air National Guard, and Air Force Reserve were smaller, at 5,000 to 10,000 each. In the years after 2000, Operation Enduring Freedom (Afghanistan, 2001–present) and Operation Iraqi Freedom (2003–2010) required the AC to add 67,000 soldiers and 23,000 Marines, though the AC Navy and Air Force decreased further, losing 39,000 and 24,000 personnel, respectively. During these years, there was little change in RC strength apart from decreases of 20,000 in the Navy Reserve and 4,400 in the Air Force Reserve.

Table 2.1. AC and RC Strength, by Fiscal Year

Component	FY 1990	FY 2000	FY 2009
Active			
Army	728,017	467,552	532,400
Navy	574,894	365,640	326,323
Marine Corps	196,652	171,008	194,000
Air Force	530,863	351,322	317,050
Total	2,030,426	1,355,522	1,369,773
Selected Reserve			
Army National Guard (ARNG)	444,224	353,045	358,391
Army Reserve (USAR)	310,071	206,892	205,297
Navy Reserve (USNR)	152,789	86,933	66,508
Marine Corps Reserve (USMCR)	44,530	39,667	38,510
Air National Guard (ANG)	117,786	106,365	109,196
Air Force Reserve (USAFR)	83,813	72,340	67,968
Total	1,153,213	865,242	845,870

Figure 2.1 presents our comparisons for these fiscal years. In each panel, the blue line shows total reserve enlisted strength by YOS, and the red line shows prior-service enlisted strength. Year of service is defined by pay entry base date (PEBD).[4] Total reserve enlisted strength by YOS is the actual count of reserve participants as of

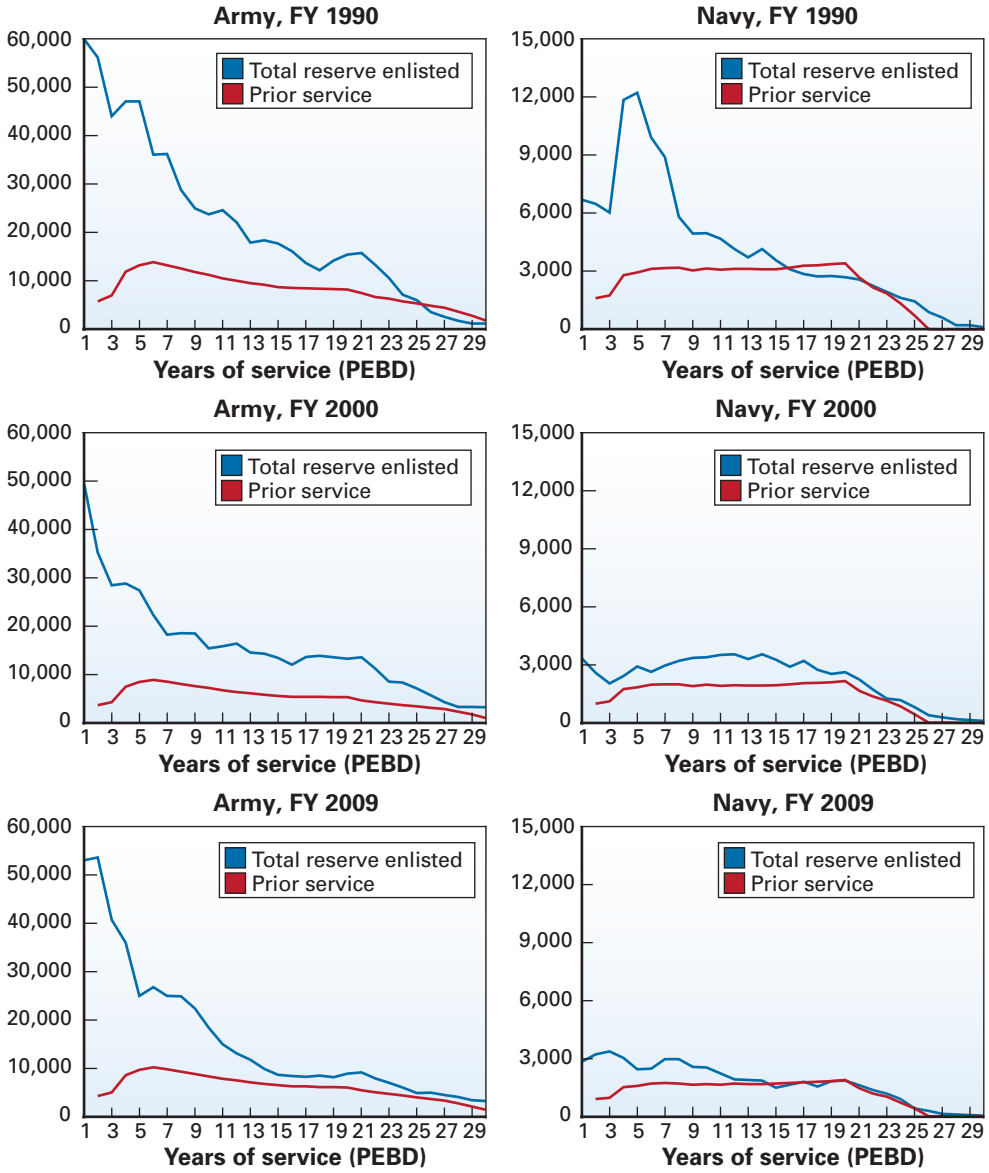


Figure 2.1. Reserve Enlisted Strength and Predicted Prior-Service Strength, FY 1990, 2000, and 2009

4. This is customary for the RC. PEBD is a convenient means of including years of AC service as well as years of RC participation. For example, 10 years of PEBD service includes any combination of AC and RC years adding to 10.

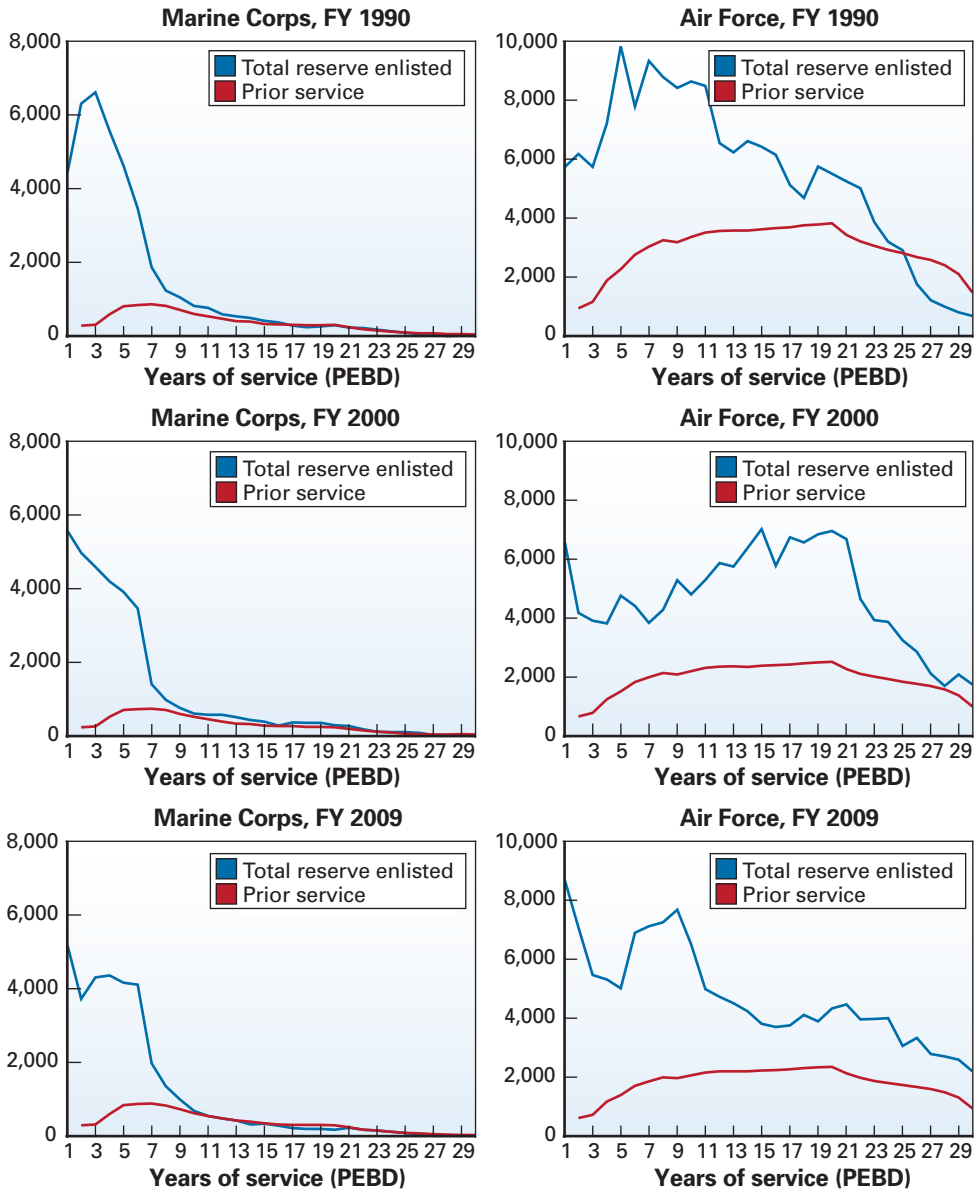


Figure 2.1—Continued

September 30, the end of the fiscal year.[5] Prior-service enlisted strength is based on our simulation of RC participation and a scale factor, which changes with changes in AC force size. Changes in AC force size affect the number of individuals leaving the AC, which affects the number of prior-service individuals available to participate in the RC and so affects our estimates of RC force size.[6]

The calculations in Figure 2.1 suggest the following:[7]

- Non–prior-service reservists are prevalent at lower YOS. This is partly a mechanical consequence of the fact that prior-service reservists already have some AC service and so would first appear at higher years of service, say four or more, whereas non–prior-service reservists have no prior years of service when they start in the RC. It is also a consequence of keeping the RC at full strength.
- The majority of RC personnel at higher years of service are usually prior-service personnel who have more years of military experience, higher rank, and more leadership and supervisory responsibility. Because those with more years of service are older and closer to qualifying for RC retirement benefits, they are more likely to be responsive to changes in RC compensation that affect RC retirement benefits. Non–prior-service reservists with higher years of reserve participation may have a taste for reserve service similar to that of prior-service reservists in higher years.

Figure 2.1 also suggests that RC force-size adjustments differ by service. In the Army RC, non–prior-service accessions (reservists in the first year of service) numbered 50,000 to 60,000 in FY 1990, FY 2000, and FY 2009, but the total number of reservists with more than 10 YOS was lower in FY 2009 than in FY 1990 or FY 2000. In FY 2009, most of the reservists with 15 or more YOS appeared to be prior-service reservists.

5. Office of the Assistant Secretary of Defense (Reserve Affairs), undated, 2000, 2009.
6. Our simulation assumes 10,000 AC entrants for each branch of service. These individuals stay on active duty until they choose to leave, and their AC retention generates an AC force. For instance, 10,000 AC Army enlisted entrants might generate a force of 60,000. AC Army enlisted strength was about 620,000 in FY 1990, so we scaled up our results by a factor of 10.33 (620,000/60,000) for FY 1990. AC Army enlisted strength was about 400,000 in FY 2000, for a scale factor of 6.67 (400,000/60,000), and about 460,000 in FY 2009, for a scale factor of 7.67. Precise numbers vary. Other approaches to scaling could be taken; for example, because many individuals serve a term or two before leaving the AC, scaling could be based on AC force size lagged 4 to 8 years. We explored alternative scaling approaches, and the differences with respect to our objective of illustrating the prevalence of prior-service personnel in the RC were minor.
7. Because RC total strengths in Figure 2.1 are based on cross-sectional data and not a steady state, while the RC prior-service strengths are simulated steady-state results, there may be "crossovers" where the simulated steady-state prior-service strength exceeds the actual strength observed at a point in time. For example, we observe a crossover for Air Force enlisted personnel with more than 25 YOS in FY 1990 but not in later years. As noted earlier, comparison of steady-state modeling results with actual cross-sectional data is imperfect but adequate for providing contextual background.

As the Navy RC downsized, it greatly reduced non–prior-service accessions. Table 2.2 confirms this decrease, based on official statistics on prior-service and non–prior-service accessions by the RC for FY 1990, FY 2000, and FY 2009. Navy RC non–prior-service accessions fell from 14,356 in FY 1990 to 3,073 in FY 2000 and 1,034 in FY 2009; prior-service accessions were 59 percent in FY 1990, 83 percent in FY 2000, and 93 percent in FY 2009. The decrease in Navy RC strength from 153,000 in FY 1990 to 87,000 in FY 2000 to 67,000 in FY 2009 evidently left little need for non–prior-service accessions.

In Figure 2.1, the calculations for the Marine Corps RC are similar across the fiscal years, which is consistent with the fact that there has been little change in force size (Table 2.1). At nine or more YOS, nearly all Marines are prior-service, while in the first five YOS, nearly all RC Marines are non–prior-service.

Table 2.2. RC Enlisted Accessions, by Fiscal Year

	FY 1990		FY 2000		FY 2009	
	Non–Prior Service	Prior Service	Non–Prior Service	Prior Service	Non–Prior Service	Prior Service
Total Accessions						
ARNG	36,163	40,442	33,243	29,567	39,430	18,567
USAR	29,081	38,466	22,183	29,019	18,764	17,909
USNR	14,356	20,954	3,073	14,645	1,034	11,066
USMCR	7,818	3,992	6,141	3,692	5,700	3,658
ANG	4,173	8,150	5,100	5,583	4,748	5,258
USAFR	2,338	9,514	1,730	5,924	3,210	5,817
All	93,929	121,518	71,470	88,430	72,886	62,275
Prior-Service Accessions (percentage of total accessions)						
ARNG	—	53	—	47	—	32
USAR	—	57	—	57	—	49
USNR	—	59	—	83	—	91
USMCR	—	34	—	38	—	39
ANG	—	66	—	52	—	53
USAFR	—	80	—	77	—	64
All	—	56	—	55	—	46

The Air Force RC had a large number of non–prior-service personnel in FY 1990, and during the downsizing in the 1990s, Air Force non–prior-service accessions decreased but non–prior-service reservists continued to participate. By FY 2009, many of the non–prior-service airmen were no longer serving, and the Air Force RC had more or less returned to its FY 1990 shape, although scaled down as consistent with the overall decrease in strength from 202,000 in FY 1990 to 177,000 in FY 2009.

In conclusion, because prior-service reservists make up the majority of experienced reservists and so comprise the majority of those likely to qualify for retirement, our policy analysis of changes to the reserve retirement system is likely to be fairly accurate for the total reserve force. We speculate that non–prior-service reservists who reach mid-career years will also be responsive to changes in reserve retirement benefits and thus will be similar to prior-service reservists. We do not know whether the response to current pay will be similar for the two groups, however.

3. Compensation Alternatives

The approach to RC compensation proposed by the 11th QRMC is based on a day of pay for each day of RC duty and a change in RC retirement benefits, with additional components to be determined by DoD and the services, and for those requiring legislative changes, also by Congress. This chapter describes the elements of the proposed modifications in more detail and presents some comparisons of baseline reserve pay versus regular military compensation (RMC). It then describes the alternative packages assessed in this study, which consist of various combinations of these elements.

Total-Force Pay Approach: Regular Military Compensation and Retired Pay

The total-force pay approach would change the computation of annual basic pay for RC members and would provide a basic allowance for subsistence (BAS) and a basic allowance for housing (BAH) for each day of duty, regardless of duty status, using the AC schedule of rates. In this report, RMC is RC pay based on the AC schedules for basic pay, BAS, BAH, and the tax advantage of the allowances, and baseline pay refers to the current approach for computing RMC for RC members. This section describes the computation and presents comparisons of RMC and baseline pay.

Under the baseline RC compensation system, RC members receive up to 48 "days" of drill pay for 24 days of inactive-duty training with two drills per day and

14 days of pay for annual training, for which a housing allowance is paid, based on the schedule that applies to RC members. Baseline pay for inactive-duty training and annual training comprises 62 days of basic pay (48 + 14) plus the 14 days of tax-free BAH plus the tax advantage associated with it.

Under the total-force approach, each day of duty, regardless of duty status, would result in the payment of one day's worth of basic pay, BAS, and BAH, computed using the schedule for AC members. Thus, over the course of a year, RMC for inactive-duty training and annual training would equal 38 days (24 drill days plus 14 days) of basic pay, BAS, BAH, and the tax advantage associated with getting BAS and BAH tax-free.

We used several sources of information to estimate baseline pay and RMC for the DRM. Because our model uses data for the 1990–1991 entering active-duty cohort and our analysis is a steady-state analysis, the decision of which pay table to use is somewhat arbitrary. For our computations, we used basic pay, BAS, and BAH rates for 2007, as these have been fairly stable over time.

Computing the AC BAH amounts for RC members requires an estimate of the geographic location of RC members, since AC BAH rates are location-specific. Using information provided by DMDC on the current geographic distribution of RC members, the 11th QRMC computed BAH rates for RC members using the AC BAH schedule, and we used these rates to compute RMC for our analysis. Because BAH rates also vary by marital status, we assumed the 2007 marital rates, by grade, for AC members, obtained from the 2007 Green Book,[8] and took a weighted average of single and married BAH rates by grade. The AC marital rates are likely to be lower than those for RC members with prior active service, who tend to be older and have had more time to marry. However, any effect of this factor on our behavioral or cost results is likely to be slight. As described in Appendix A, we roughly estimated the tax advantage by computing the percentage of AC RMC attributable to it, based on information from the 2007 Green Book; we applied the roughly 6 percent that we computed to the RMC of RC members.

Figure 3.1 shows our computation of RC annual baseline pay and RMC for enlisted personnel, by years of service. Figure 3.2 shows the computation for RC officers. The shift from baseline pay to RMC would decrease the pay of both groups substantially. For enlisted personnel, the decrease is 1 percent at 1 YOS, 14 percent at 10 YOS, 17 percent at 20 YOS, and 20 percent at 30 YOS. For officers, the decrease is 27 percent at 1 YOS, 33 percent at 10 YOS, 37 percent at 20 YOS, and

8. Office of the Under Secretary of Defense (Comptroller), 2006.

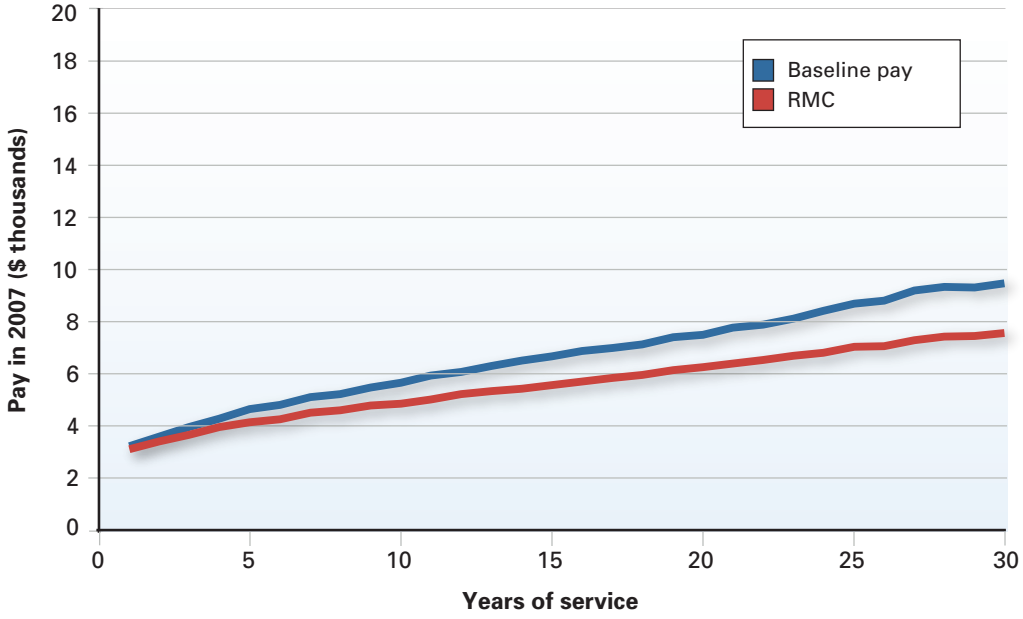


Figure 3.1. Enlisted RC Baseline Pay and RMC Under the Proposed Total-Force Compensation System

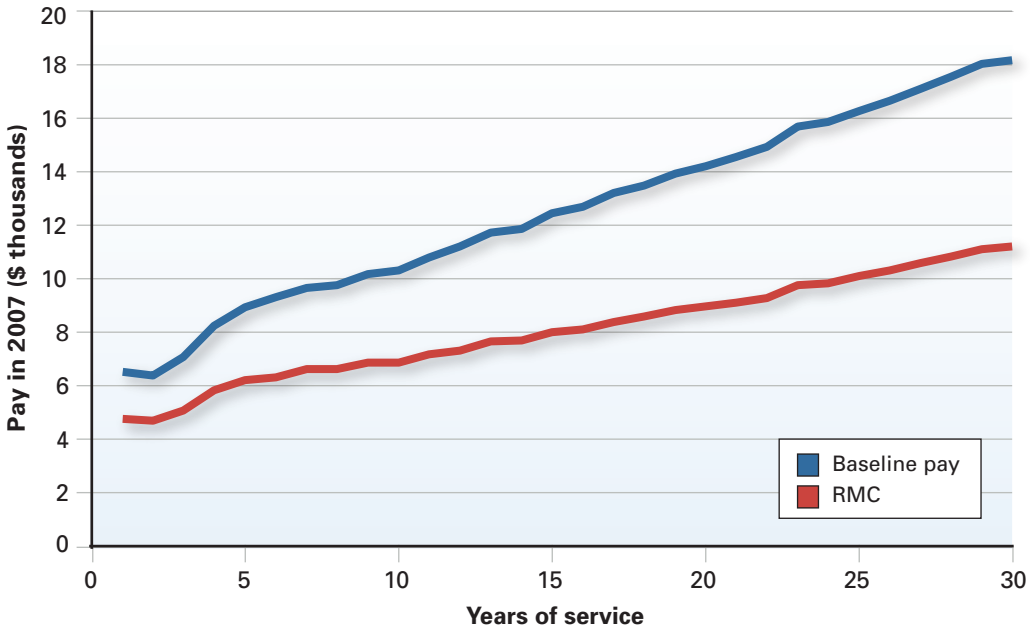


Figure 3.2. Officer RC Baseline Pay and RMC Under the Proposed Total-Force Compensation System

38 percent at 30 YOS. These figures are consistent with the changes estimated by the 11th QRMC, which estimates a drop of 3 percent for individuals in pay grade E2 and a 20-percent drop for those in pay grade E8. It is important to note that the compensation packages considered by the 11th QRMC include other elements that operate to offset this decrease.

Additional Components of the Total-Force Pay Package

In addition to reducing current pay by the move to RMC, the total-force approach would decrease reserve retirement benefits by reducing retirement points. In the baseline case, RC members receive 75 points per year, but under RMC they receive 53 points per year (24 drill days and 14 summer training days, plus 15 annual participation points), a 30-percent decrease.

To offset the reduction in current pay and retirement benefits, the total-force approach would include other elements of pay. These additional elements would enable the RC to maintain current force strength and shape and thus are an essential part of the total-force pay approach. At the same time, such supplemental pay could be used to modify the shape of the force if desired, while sustaining the strength. In the following, we describe other components that could be included in the package. These components can be combined and should not be considered mutually exclusive.

Eligibility for Retirement Pay at 30 YOS

The 11th QRMC recommends aligning AC and RC retirement more closely by allowing RC members who have attained 20 qualifying years to begin receiving benefits on accumulating 10 additional years in the selected, individual ready, or retired reserve, or at age 60, whichever occurs first. Those who are discharged and have 20 YOS would begin drawing retired pay at age 60, unless they had at least 30 years of service at the time of discharge. For brevity, we refer to this as *retirement at 30 YOS*. Currently, RC members begin receiving benefits at age 60, after 20 qualifying years. Under the total-force approach, a reservist who joined the military at age 20 could begin receiving benefits as early as age 50. This change, without any other change, could increase the discounted present value (DPV) of retirement benefits relative to the current system. Specifically, for members whose 20 years of service are continuous and who entered the military before age 30, the payout will start before age 60, implying that retirement benefits would be paid over more years, so the expected DPV of benefits would be higher. However, many RC members have breaks in service, i.e., they leave the military, then later return. Some members have multiple breaks, and some have breaks for extended periods of time. The more gaps in service, the less likely benefits would begin before age 60.

The total-force pay approach also involves reduced retirement-point accumulation—in our model, the number of points for each year of RC participation is reduced from 75 to 53. This reduction will reduce the retirement annuity and thus the present value of retirement benefits after age 60; hence it will reduce retirement cost. However, under the 30-YOS option, some RC members would receive the annuity for more years, resulting in an increase in cost over those years. The net effect will depend on a number of factors, including the number of AC years of service prior-service members accumulated before entering the reserves and any change in length of RC service in response to the policy change.

Changing the RC retirement eligibility to 30 YOS will change incentives to participate. Members will have a greater incentive to reduce breaks in service and the length of those breaks, and those nearing 30 YOS will have an incentive to increase participation because of the draw produced by the 30-YOS rule, other things being equal.

Incentive Pay

The military makes considerable use of special and incentive (S&I) pays to manage personnel flexibly and to address recruiting and retention shortfalls—for example, the RC compensation system currently includes affiliation and enlistment bonuses—and incentive pay would be included in the total-force pay approach. For the purposes of our model, incentive pay would be an annual cash payment to selected reservists. It could be paid at the end of the year, after the reservist has satisfied a minimum amount of service, or at the beginning of the year; or part of it could be paid at the beginning of the year, with the remainder spread over the rest of the year.

In our policy simulations, all members would receive incentive pay if the RC offers it. The pay could be targeted to specific personnel, such as those with critical skills or in critical units, and could vary to induce greater participation among certain personnel. One possibility would be to have all RC members receive some incentive pay if they satisfactorily complete the required minimum service each year, with additional incentive pay targeted as needed. The idea is to have enough incentive pay to sustain the current force size and shape, at least as a starting point, and to permit flexibility that would support the possibility of changing the force shape and would help to ensure that manning requirements were met in all occupational areas. Chapter Four presents an assessment of the force-management and cost effects of incentive pay as part of the total-force pay approach. As shown there, incentive pay is necessary to support the current force size.

In our analysis, incentive pay is structured in three ways: as a percentage of annualized basic pay, as a flat dollar amount paid to all RC participants, and as a targeted flat dollar amount paid only to RC members in YOS 8 to 15. The percentage and dollar amounts vary depending on the other components in the total-force pay package (discussed below). The percentage and dollar amounts are determined through an optimization routine that sets them just high enough to hold force size constant.

Figures 3.3 and 3.4 and Tables 3.1 and 3.2 give a more precise idea of how the incentive pay as a percentage of annualized basic pay is calculated. Figure 3.3 shows baseline reserve pay, the new pay line (RMC), and RMC plus incentive pay of 2.3 percent and, alternatively, 3.1 percent of *annualized* basic pay. The RMC plus incentive pay of 2.3 percent of annualized basic pay is higher than baseline pay in YOS 1 to 6 and below baseline pay in later YOS. RMC plus incentive pay of 3.1 percent of annualized basic pay is higher than baseline pay in YOS 1 to 14 and lower in later years. For officers, incentive pay of 7 percent is higher than baseline pay up to 18 YOS, though incentive pay of 6 percent is higher only up to five YOS.

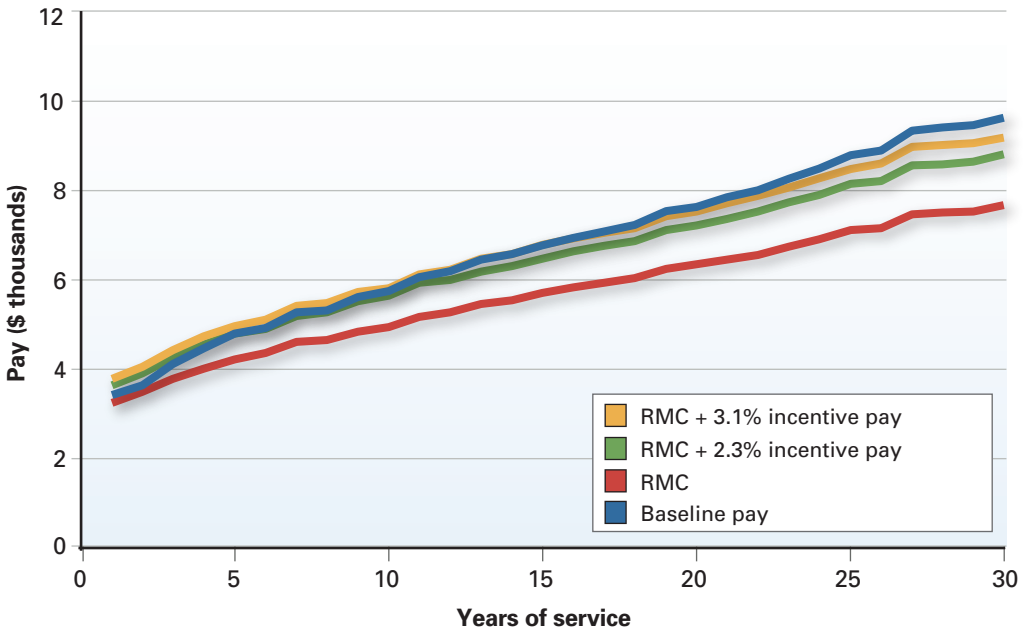


Figure 3.3. Enlisted RMC plus Percentage Incentive Pay

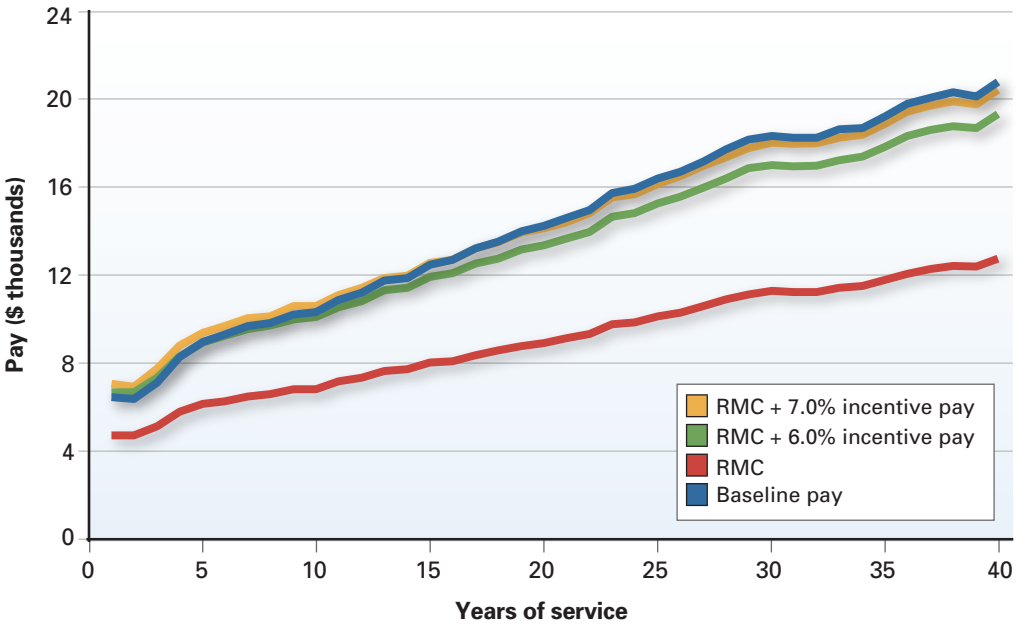


Figure 3.4. Officer RMC plus Percentage Incentive Pay

Figures 3.5 and 3.6 and Tables 3.3 and 3.4 show how RMC with flat dollar amounts of incentive pay compares with baseline pay. The specific dollar amounts are those required to hold Army RC force size constant, as discussed in Chapter Four, and the dollar amounts for the other services differ. The flat-dollar incentive increases pay by the same amount above RMC, regardless of YOS. Pay increases relative to the baseline for junior personnel but decreases for senior personnel.

Figures 3.7 and 3.8 and the rightmost columns of Tables 3.3 and 3.4 show how RMC with targeted dollar amounts of incentive pay compares with baseline pay. As with the other two forms of incentive pay, the specific dollar amounts vary with service and status (officer versus enlisted) and are chosen to hold RC force size constant. The specific dollar amounts in the figures and tables in this chapter are illustrative only. Targeted incentive pay increases pay by the same amount, but only during the targeted years, 8 to 15 YOS.

Tables 3.1 and 3.2 provide illustrative calculations of incentive pay. The Monthly Basic Pay column presents average monthly basic pay by YOS. A reservist drilling for two days per month would receive 2/30 of monthly basic pay. In the Annual Basic Pay column, monthly basic pay is multiplied by 12 to annualize it. The next columns show the incentive pay amounts at the given percentages, and the following columns show

Table 3.1. Illustrative Calculation of Percentage Incentive Pay and RMC: Enlisted Personnel

YOS	Monthly Basic Pay ($)	Annual Basic Pay ($)	2.3% Incentive Pay ($)	3.1% Incentive Pay ($)	Baseline Pay ($)	RMC ($)	RMC + 2.3% Incentive Pay ($)	RMC + 3.1% Incentive Pay ($)
1	1,415	16,976	390	526	3,400	3,224	3,615	3,750
2	1,531	18,373	423	570	3,633	3,488	3,910	4,058
3	1,713	20,556	473	637	4,086	3,782	4,255	4,419
4	1,858	22,298	513	691	4,441	4,004	4,517	4,695
5	1,998	23,972	551	743	4,776	4,232	4,783	4,975
6	2,045	24,541	564	761	4,897	4,334	4,899	5,095
7	2,200	26,402	607	818	5,251	4,582	5,190	5,400
8	2,227	26,729	615	829	5,317	4,644	5,259	5,473
9	2,354	28,247	650	876	5,599	4,832	5,482	5,708
10	2,410	28,916	665	896	5,732	4,941	5,606	5,837
11	2,554	30,643	705	950	6,059	5,170	5,875	6,120
12	2,605	31,262	719	969	6,180	5,271	5,990	6,240
13	2,721	32,647	751	1,012	6,440	5,449	6,199	6,461
14	2,770	33,241	765	1,030	6,555	5,539	6,304	6,569
15	2,865	34,376	791	1,066	6,770	5,694	6,485	6,760
16	2,927	35,126	808	1,089	6,914	5,806	6,614	6,895
17	3,003	36,031	829	1,117	7,084	5,923	6,752	7,040
18	3,061	36,728	845	1,139	7,218	6,025	6,869	7,164
19	3,185	38,226	879	1,185	7,500	6,218	7,097	7,403
20	3,245	38,938	896	1,207	7,636	6,318	7,214	7,525
21	3,334	40,007	920	1,240	7,837	6,458	7,378	7,698
22	3,401	40,807	939	1,265	7,989	6,568	7,507	7,833
23	3,526	42,309	973	1,312	8,268	6,749	7,722	8,061
24	3,619	43,427	999	1,346	8,480	6,899	7,898	8,245
25	3,754	45,052	1,036	1,397	8,783	7,099	8,135	8,496
26	3,796	45,556	1,048	1,412	8,878	7,165	8,213	8,577
27	4,006	48,071	1,106	1,490	9,341	7,453	8,559	8,943
28	4,029	48,344	1,112	1,499	9,392	7,487	8,598	8,986
29	4,053	48,632	1,119	1,508	9,447	7,526	8,644	9,034
30	4,138	49,653	1,142	1,539	9,639	7,657	8,799	9,196

Table 3.2. Illustrative Calculation of Percentage Incentive Pay and RMC: Officers

YOS	Monthly Basic Pay ($)	Annual Basic Pay ($)	6% Incentive Pay ($)	7% Incentive Pay ($)	Baseline Pay ($)	RMC ($)	RMC + 6% Incentive Pay ($)	RMC + 7% Incentive Pay ($)
1	2,744	32,926	1,976	2,305	6,490	4,750	6,725	7,055
2	2,715	32,576	1,955	2,280	6,420	4,722	6,676	7,002
3	3,053	36,638	2,198	2,565	7,177	5,169	7,367	7,734
4	3,576	42,917	2,575	3,004	8,337	5,868	8,443	8,872
5	3,854	46,248	2,775	3,237	8,971	6,194	8,969	9,431
6	4,003	48,039	2,882	3,363	9,319	6,353	9,236	9,716
7	4,175	50,104	3,006	3,507	9,704	6,571	9,577	10,079
8	4,228	50,741	3,044	3,552	9,828	6,627	9,671	10,179
9	4,414	52,967	3,178	3,708	10,242	6,866	10,044	10,574
10	4,439	53,262	3,196	3,728	10,302	6,884	10,080	10,613
11	4,708	56,496	3,390	3,955	10,915	7,203	10,593	11,158
12	4,842	58,102	3,486	4,067	11,227	7,346	10,832	11,413
13	5,104	61,243	3,675	4,287	11,813	7,678	11,353	11,965
14	5,148	61,778	3,707	4,324	11,916	7,728	11,435	12,052
15	5,399	64,788	3,887	4,535	12,481	8,038	11,925	12,573
16	5,489	65,867	3,952	4,611	12,691	8,137	12,089	12,747
17	5,739	68,864	4,132	4,820	13,259	8,440	12,572	13,261
18	5,869	70,428	4,226	4,930	13,560	8,589	12,815	13,519
19	6,062	72,747	4,365	5,092	13,998	8,830	13,194	13,922
20	6,160	73,918	4,435	5,174	14,223	8,942	13,377	14,117
21	6,322	75,860	4,552	5,310	14,589	9,146	13,697	14,456
22	6,482	77,786	4,667	5,445	14,956	9,341	14,008	14,786
23	6,813	81,753	4,905	5,723	15,701	9,765	14,670	15,487
24	6,889	82,668	4,960	5,787	15,873	9,864	14,824	15,651
25	7,115	85,386	5,123	5,977	16,384	10,152	15,275	16,129
26	7,263	87,158	5,229	6,101	16,717	10,343	15,573	16,444
27	7,474	89,688	5,381	6,278	17,187	10,622	16,004	16,901
28	7,675	92,106	5,526	6,447	17,640	10,886	16,412	17,333
29	7,884	94,612	5,677	6,623	18,105	11,168	16,844	17,790
30	7,963	95,561	5,734	6,689	18,283	11,269	17,003	17,959
31	7,934	95,212	5,713	6,665	18,217	11,230	16,943	17,895
32	7,928	95,135	5,708	6,659	18,205	11,217	16,925	17,876

Table 3.2—Continued

YOS	Monthly Basic Pay ($)	Annual Basic Pay ($)	6% Incentive Pay ($)	7% Incentive Pay ($)	Baseline Pay ($)	RMC ($)	RMC + 6% Incentive Pay ($)	RMC + 7% Incentive Pay ($)
33	8,089	97,074	5,824	6,795	18,567	11,432	17,257	18,227
34	8,136	97,632	5,858	6,834	18,671	11,495	17,352	18,329
35	8,375	100,497	6,030	7,035	19,202	11,812	17,842	18,847
36	8,625	103,497	6,210	7,245	19,763	12,141	18,351	19,386
37	8,739	104,871	6,292	7,341	20,016	12,297	18,589	19,637
38	8,826	105,909	6,355	7,414	20,210	12,413	18,767	19,827
39	8,767	105,207	6,312	7,364	20,081	12,331	18,643	19,695
40	9,115	109,384	6,563	7,657	20,854	12,800	19,363	20,457

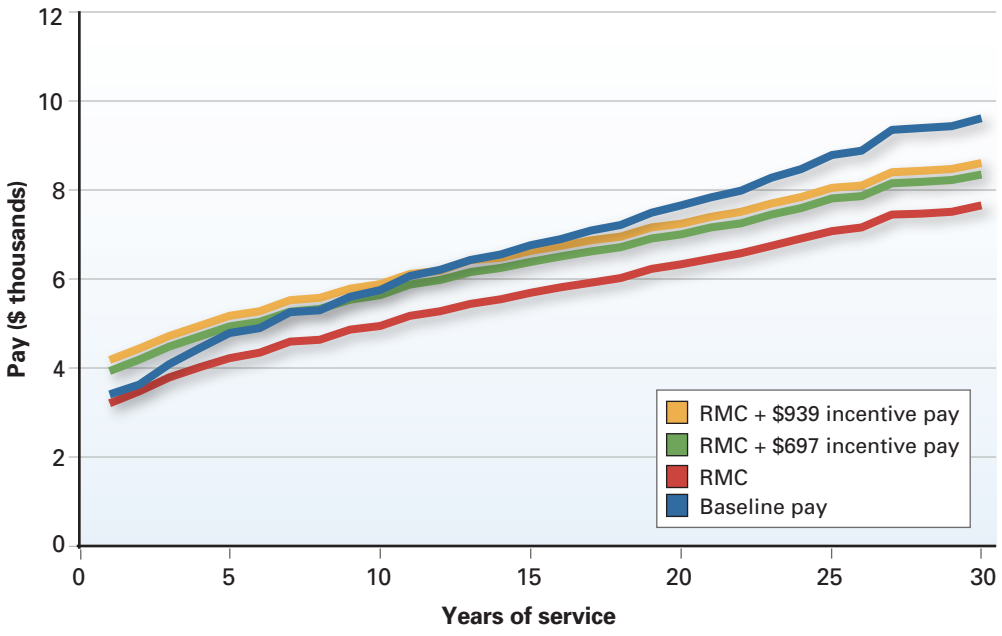


Figure 3.5. Enlisted RMC plus Dollar Incentive Pay

baseline pay, RMC, and RMC plus the incentive pays. As discussed earlier, baseline pay and RMC include BAH and BAS and the tax advantage associated with tax-free allowances, as well as pay for both inactive-duty training (drill weekends) and 14 days of active-duty training.

Incentive pay of 2.3 percent ranges from 12 percent of enlisted RMC at low years of service to 15 percent at high years of service. In other words, incentive pay is, on average, equivalent to an annual bonus of 12 to 15 percent of the enlisted reservist's annual RMC. The variation between 12 and 15 percent is due in part to basic pay rising with YOS and in part to higher allowances among those in more senior grades. Similarly, incentive pay of 3.1 percent ranges from 15 to 20 percent of annual RMC as YOS increases. For officers, the incentive payment of 6 percent of annual basic pay is equivalent to a 40- to 50-percent increase over RMC, and the incentive payment of 7 percent is equivalent to a 50- to 60-percent increase over RMC.

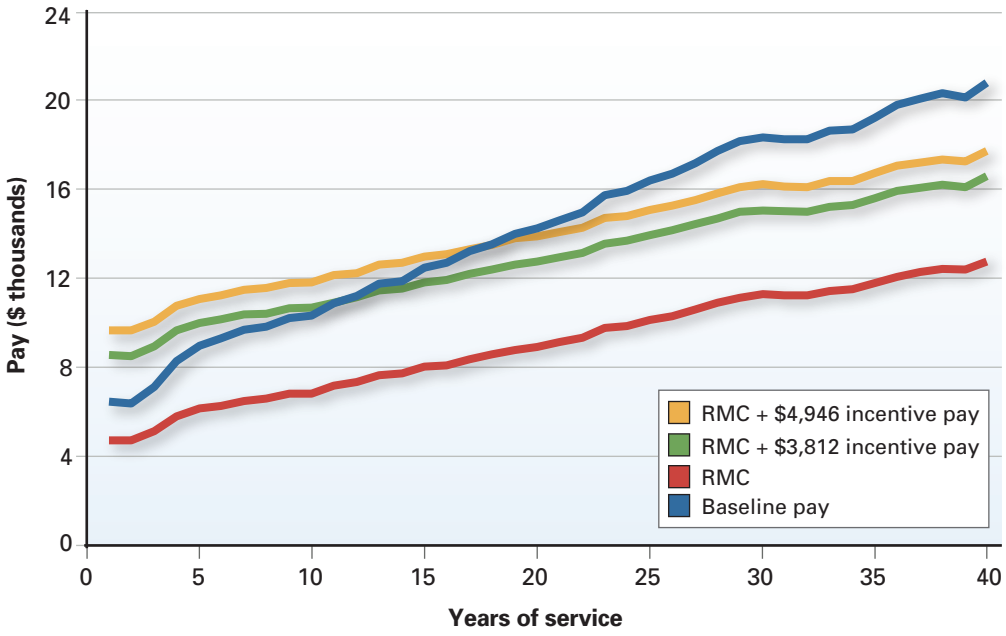


Figure 3.6. Officer RMC plus Dollar Incentive Pay

Table 3.3. Illustrative Calculation of Dollar Incentive Pay and RMC: Enlisted Personnel

YOS	Baseline Pay ($)	RMC ($)	RMC + $697 Incentive Pay ($)	RMC + $939 Incentive Pay ($)	RMC + $1,440 Targeted Incentive Pay at 8–15 YOS ($)	RMC + $2,075 Targeted Incentive Pay at 8–15 YOS ($)
1	3,400	3,224	3,921	4,163	3,224	3,921
2	3,633	3,488	4,185	4,427	3,488	4,185
3	4,086	3,782	4,479	4,721	3,782	4,479
4	4,441	4,004	4,701	4,943	4,004	4,701
5	4,776	4,232	4,929	5,171	4,232	4,929
6	4,897	4,334	5,031	5,273	4,334	5,031
7	5,251	4,582	5,279	5,521	4,582	5,279
8	5,317	4,644	5,341	5,583	6,084	7,416
9	5,599	4,832	5,529	5,771	6,272	7,604
10	5,732	4,941	5,638	5,880	6,381	7,713
11	6,059	5,170	5,867	6,109	6,610	7,942
12	6,180	5,271	5,968	6,210	6,711	8,043
13	6,440	5,449	6,146	6,388	6,889	8,221
14	6,555	5,539	6,236	6,478	6,979	8,311
15	6,770	5,694	6,391	6,633	7,134	8,466
16	6,914	5,806	6,503	6,745	5,806	6,503
17	7,084	5,923	6,620	6,862	5,923	6,620
18	7,218	6,025	6,722	6,964	6,025	6,722
19	7,500	6,218	6,915	7,157	6,218	6,915
20	7,636	6,318	7,015	7,257	6,318	7,015
21	7,837	6,458	7,155	7,397	6,458	7,155
22	7,989	6,568	7,265	7,507	6,568	7,265
23	8,268	6,749	7,446	7,688	6,749	7,446
24	8,480	6,899	7,596	7,838	6,899	7,596
25	8,783	7,099	7,796	8,038	7,099	7,796
26	8,878	7,165	7,862	8,104	7,165	7,862
27	9,341	7,453	8,150	8,392	7,453	8,150
28	9,392	7,487	8,184	8,426	7,487	8,184
29	9,447	7,526	8,223	8,465	7,526	8,223
30	9,639	7,657	8,354	8,596	7,657	8,354

Table 3.4. Illustrative Calculation of Dollar Incentive Pay and RMC: Officers

YOS	Baseline Pay ($)	RMC ($)	RMC + $3,812 Incentive Pay ($)	RMC + $4,946 Incentive Pay ($)	RMC + $8,100 Targeted Incentive Pay at 8–15 YOS ($)	RMC + $11,054 Targeted Incentive Pay at 8–15 YOS ($)
1	6,490	4,750	8,562	9,696	4,750	4,750
2	6,420	4,722	8,534	9,668	4,722	4,722
3	7,177	5,169	8,981	10,115	5,169	5,169
4	8,337	5,868	9,680	10,814	5,868	5,868
5	8,971	6,194	10,006	11,140	6,194	6,194
6	9,319	6,353	10,165	11,299	6,353	6,353
7	9,704	6,571	10,383	11,517	6,571	6,571
8	9,828	6,627	10,439	11,573	14,727	17,681
9	10,242	6,866	10,678	11,812	14,966	17,920
10	10,302	6,884	10,696	11,830	14,984	17,938
11	10,915	7,203	11,015	12,149	15,303	18,257
12	11,227	7,346	11,158	12,292	15,446	18,400
13	11,813	7,678	11,490	12,624	15,778	18,732
14	11,916	7,728	11,540	12,674	15,828	18,782
15	12,481	8,038	11,850	12,984	16,138	19,092
16	12,691	8,137	11,949	13,083	8,137	8,137
17	13,259	8,440	12,252	13,386	8,440	8,440
18	13,560	8,589	12,401	13,535	8,589	8,589
19	13,998	8,830	12,642	13,776	8,830	8,830
20	14,223	8,942	12,754	13,888	8,942	8,942
21	14,589	9,146	12,958	14,092	9,146	9,146
22	14,956	9,341	13,153	14,287	9,341	9,341
23	15,701	9,765	13,577	14,711	9,765	9,765
24	15,873	9,864	13,676	14,810	9,864	9,864
25	16,384	10,152	13,964	15,098	10,152	10,152
26	16,717	10,343	14,155	15,289	10,343	10,343
27	17,187	10,622	14,434	15,568	10,622	10,622
28	17,640	10,886	14,698	15,832	10,886	10,886
29	18,105	11,168	14,980	16,114	11,168	11,168
30	18,283	11,269	15,081	16,215	11,269	11,269
31	18,217	11,230	15,042	16,176	11,230	11,230

Table 3.4—Continued

YOS	Baseline Pay ($)	RMC ($)	RMC + $3,812 Incentive Pay ($)	RMC + $4,946 Incentive Pay ($)	RMC + $8,100 Targeted Incentive Pay at 8–15 YOS ($)	RMC + $11,054 Targeted Incentive Pay at 8–15 YOS ($)
32	18,205	11,217	15,029	16,163	11,217	11,217
33	18,567	11,432	15,244	16,378	11,432	11,432
34	18,671	11,495	15,307	16,441	11,495	11,495
35	19,202	11,812	15,624	16,758	11,812	11,812
36	19,763	12,141	15,953	17,087	12,141	12,141
37	20,016	12,297	16,109	17,243	12,297	12,297
38	20,210	12,413	16,225	17,359	12,413	12,413
39	20,081	12,331	16,143	17,277	12,331	12,331
40	20,854	12,800	16,612	17,746	12,800	12,800

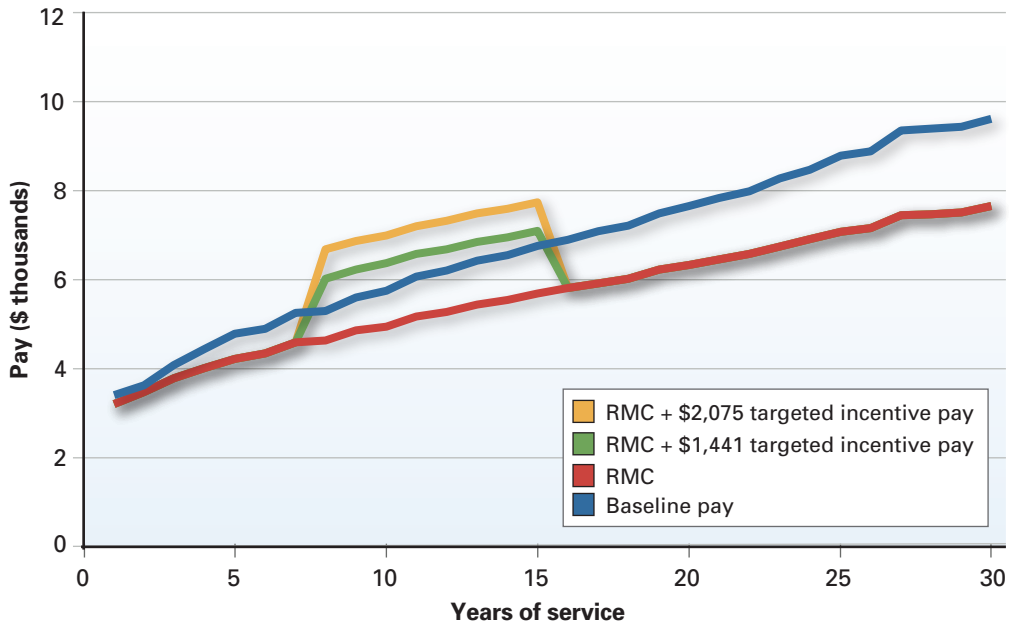


Figure 3.7. Enlisted RMC plus Targeted Dollar Incentive Pay at 8 to 15 YOS

The flat incentive pay ranges from $700 to $1,000 for enlisted members and from $3,800 to $5,000 for officers, with the specific amount varying by policy alternative and service, depending on the amount required to hold RC force size constant. Enlisted personnel with fewer than 9 YOS receive higher pay than the baseline when the dollar incentive amount is low ($697 in Table 3.3), and those with fewer than 13 YOS receive higher pay when the incentive amount is high. Officers with fewer than 12 YOS receive higher pay than baseline when the incentive amount is $3,812, and those with fewer than 18 YOS receive higher pay when the incentive amount is $4,946.

As seen in Figures 3.7 and 3.8, the targeted incentive pay raises pay above baseline during the targeted YOS, 8 to 15. For other participants, pay equals RMC, falling short of baseline pay.

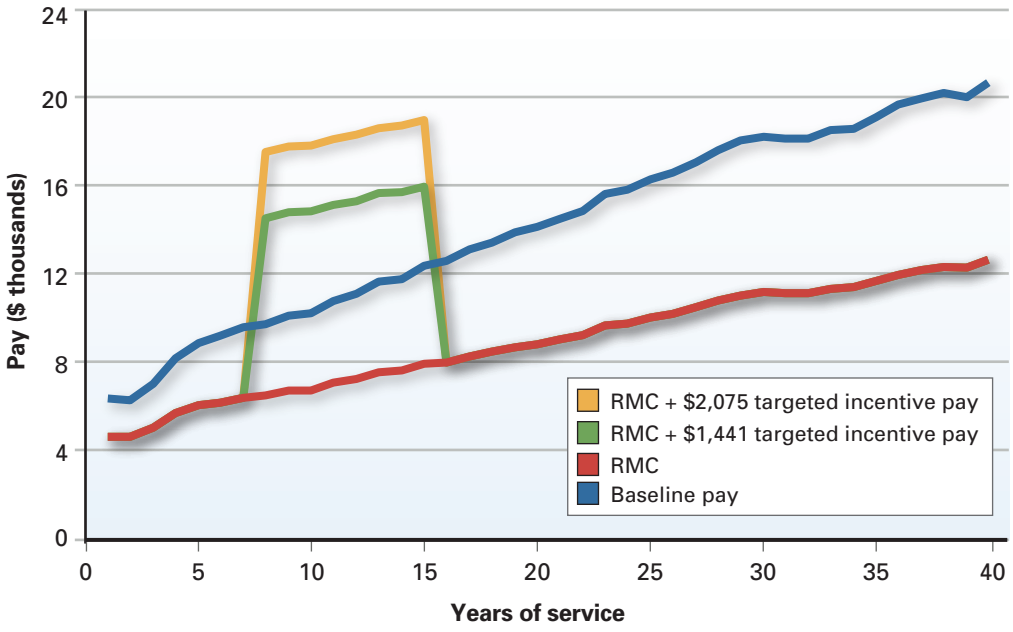


Figure 3.8. Officer RMC Plus Targeted Dollar Incentive Pay at 8 to 15 YOS

Additional Annual Participation Points

Another potential component of the total-force pay package is additional annual participation points. These points would be in addition to the annual 15 given to RC members and would help make up for the decrease in retirement points. Additional points would increase the value of RC retirement pay and would hence improve RC compensation. Like incentive pay, additional points could be targeted or provided across the board to all members. However, because they increase retired pay rather than current compensation, their effect would differ depending on the amount and timing of participation over the RC member's career.

Exploratory analyses we conducted suggested that additional participation points would not be a realistic standalone policy. In some cases, it would take more than a year's worth of additional points (more than 365 additional points) to restore RC participation under a total-force pay approach that included RMC but not other features. However, our presentation of results in Chapter Four includes a variant in which we consider 75 rather than 53 retirement points, a bonus of 22 points. This variant is described later in this chapter.

Reduced RC Retirement Age

Another option would allow RC retirement benefits to begin before age 60 for qualifying reservists. Lowering the RC retirement age would increase the expected DPV of RC retirement benefits, since they would be received over a longer period. Consequently, we would expect RC participation to increase among those nearing the lower retirement age and to fall among those who had reached it. An exploratory analysis yielded results consistent with this expectation. However, the 11th QRMC did not include this option but instead included the option of allowing retirement pay eligibility at 30 YOS (rather than explicitly at a younger age).

Unreimbursed Travel

Currently, RC members whose commute for their weekend inactive-duty training exceeds normal commuting distances are not automatically reimbursed for travel expenses. Reimbursement occurs only if they are eligible and if their service secretary authorizes it, according to Section 408a of title 37 of the U.S. code. To be eligible, the RC member must have a critical skill or be in a critical unit or be previously assigned to a unit affected by base realignment or closure. The service can specify the local commuting distance, but the Defense Travel Management Office defines a minimum distance for reimbursement of 150 miles one way. In contrast,

RC members who travel for the two weeks of annual training receive reimbursement based on the round-trip mileage from their home of record to their duty location.

The total-force pay package could include reimbursement of travel expenses for RC travel greater than 50 miles one way, regardless of duty status. At the request of the 11th QRMC, DMDC computed the average distance traveled and the number of RC travelers in different mileage categories (e.g., less than 50 miles one way, 50 to 100 miles, and so forth) for selected enlisted and officer personnel, by grade. This input was used to compute the weighted-average miles traveled by RC officers and enlisted personnel, by grade, conditional on traveling more than 50 miles one way. Using these data together with the 2007 permanent-change-of-station mileage rate, we computed the weighted-average annual travel cost, by YOS. Reimbursing for travel would increase RC compensation for enlisted personnel and officers, as shown in Figures 3.9 and 3.10, respectively. Depending on YOS, compensation would increase by up to 17 percent over RMC for enlisted personnel, and by up to 21 percent over RMC for officers. However, even with reimbursed travel, reserve cash pay would fall short of baseline pay except at the lowest YOS. Chapter Four presents results for this option, and Chapter Five discusses some advantages and disadvantages of reimbursing travel expenses.

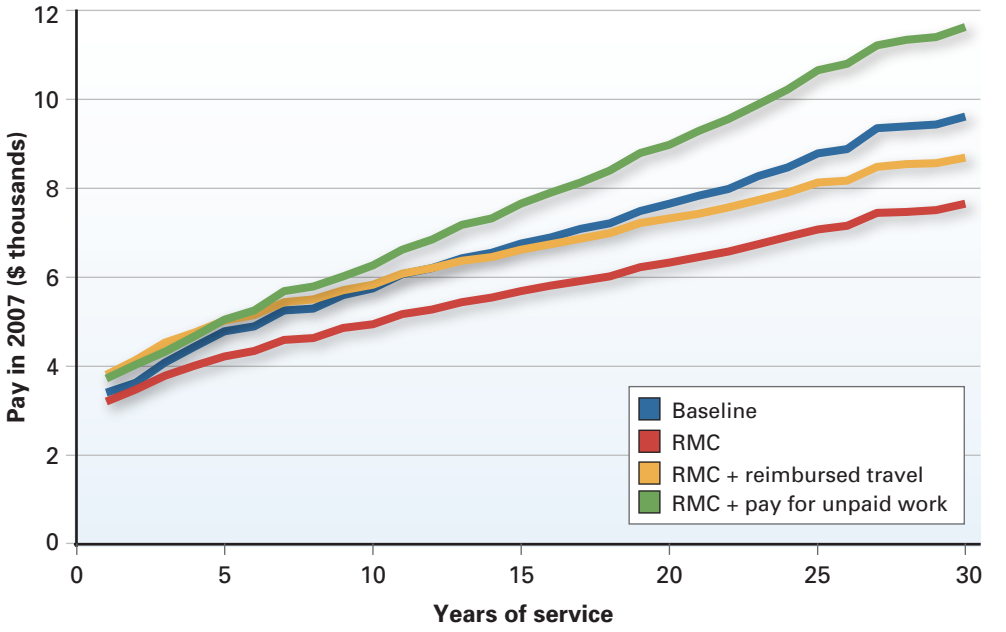


Figure 3.9. Enlisted Annual RMC: Current RC Compensation System and Proposed Total-Force System

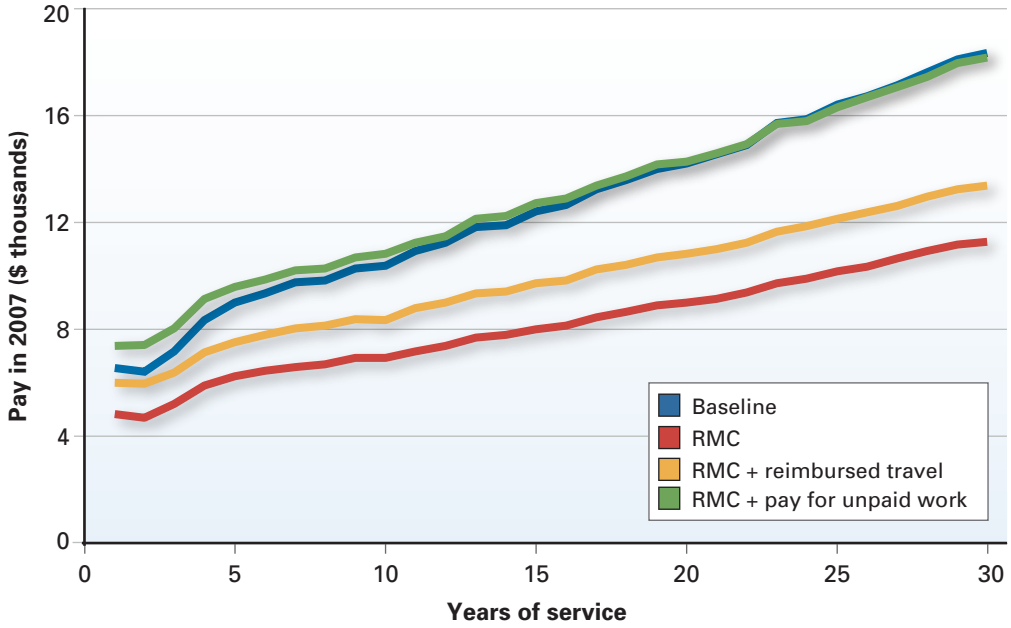


Figure 3.10. Officer Annual RMC: Current RC Compensation System and Proposed Total-Force System

Unpaid Work on RC Business

Respondents in DoD surveys of RC personnel report that they regularly perform RC-related work that is uncompensated. For example, in the December 2009 Status of Reserve Forces survey, RC members who are not full-time reservists spent an average of 8.5 unpaid hours per month performing unit business off duty, when not activated. The 11th QRMC asked DMDC to compute the average number of unpaid hours, by grade, over a several-year period. We used the resulting five-year average of unpaid hours of work on unit business, by grade, during the period June 2005 to June 2009 and converted it to days per year. We then added these days to recompute annual RMC under the total-force approach, assuming unpaid work would now be compensated.

Figures 3.9 and 3.10 show the results for enlisted personnel and officers, respectively. Compensating for unpaid hours substantially increases RMC, exceeding baseline pay for enlisted personnel and equaling baseline pay for officers with more than 10 YOS. In exploratory analysis, we incorporated pay for unpaid work, and not surprisingly, given the large increment in RC compensation, RC participation increased dramatically. In our view, this option is not realistic as an across-the-board policy for all RC members, because it raises issues about the possibility of abuse

without an accountability mechanism in place, the cost of tracking irregular hours, and the greater incentive for RC members to increase hours but not necessarily performance (Lazear, 1986).

Alternative Compensation Packages

The four elements in the total-force compensation approach are (1) RMC for each day of RC service, regardless of duty status; (2) one retirement point per day of RC service, regardless of duty status; (3) retirement benefits beginning on completion of the 30 YOS (or reaching age 60, whichever occurs sooner) for those who qualify; and (4) supplemental pay in any of several possible forms, including incentive pay, pay for travel in excess of 50 miles (100 miles round trip), and pay for currently unpaid RC unit work. The effects of implementing this approach on AC and RC force size and cost are discussed below. We also explore the importance of separate elements such as the retirement and supplemental pay features of the approach by removing them and reverting to status quo compensation, e.g., the current retirement system and no supplemental pay. The specific alternatives we assessed with our model are summarized in Table 3.5.

Table 3.5. Summary of Alternative Compensation Packages

Alternative	RMC Based on a Day's Pay for Each Day of RC Duty	53 Retirement Points, Based on a Day's Pay for Each Day of RC Duty	Retirement Benefits Begin on Completion of 30 YOS or Reaching Age 60	Supplemental Pay
1	X	X	X	Percentage incentive pay
2	X	X	X	Flat dollar incentive pay
3	X	X	X	Targeted incentive pay
4	X	X		Percentage incentive pay
5	X	X		Flat dollar incentive pay
6	X	X		Targeted incentive pay
7	X	X	X	Travel pay
8	X	X	X	None
9	X	X		None
10	X			None
11		X	X	None

We analyzed 11 different compensation policies and compared them to the current (baseline) compensation policy for enlisted personnel and officers and for each service. The first three represent the core QRMC proposal and include all four elements. They differ in the form of supplemental pay included, as shown in the rightmost column of Table 3.5. The next three alternatives use RMC and 53 points but adhere to the current retirement benefit age of 60, and incentive pay is included. The seventh alternative uses travel reimbursement as supplemental pay. The remaining alternatives show the effects of removing different elements and reverting to the status quo baseline. The eleven policies are described below:

1. RMC is based on one day's pay for each day of RC duty. The expected number of points per year for retirement for a non-deployed reservist is decreased from 75 to 53. Retirement can begin at 30 YOS, which allows reservists to retire sooner than they can under the current system, e.g., as early as age 50 for those with an AC career beginning at age 20. Incentive pay is calculated as a percentage of annualized basic pay determined by an algorithm in our analysis that selects the smallest percentage consistent with holding RC prior-service force size constant at its level under the current system.
2. Same as alternative 1, except that incentive pay is a flat dollar amount.
3. Same as alternative 2, except that incentive pay is a flat dollar amount targeted to members with between 8 and 15 YOS.
4. Same as alternative 1, except that retirement starts at age 60, as it does under current policy. This makes the retirement benefit somewhat less generous than that in alternative 1, but the incentive pay percentage is higher, which, in effect, compensates for the less generous retirement benefit.
5. Same as alternative 4, except that incentive pay is a flat dollar amount.
6. Same as alternative 5, except that incentive pay is a flat dollar amount targeted to members with between 8 and 15 YOS.
7. RMC, number of retirement points, and retirement eligibility are the same as in the core QRMC package, and supplemental pay is included in the form of reimbursement for travel in excess of 50 miles one way (100 miles round trip). Only some reservists would receive travel reimbursement. Chapter Four pre-sents estimates of the overall effects for the RC and includes reservists who do not qualify for travel reimbursement.

8. RMC is based on a day's pay for each day of RC duty; 53 retirement points per year are available; and retirement can start at 30 YOS. The total-force approach affects the calculation of RMC and the number of retirement points, and there is no incentive or other supplemental pay. The shift from baseline pay to RMC results in a decrease in current pay and retirement points. Allowing retirement at 30 YOS tends to increase the value of these benefits relative to the current system, while decreasing retirement points decreases the value of the benefits. The results of the model calculations will show whether the decrease in current pay overwhelms the possible increase in retirement benefits, leading to decreased force size.
9. Same as alternative 8, but without the earlier retirement benefit. This alternative changes to the total-force compensation approach without changing the age at which retirement benefits can begin.
10. This alternative shifts to a day of RMC for each day of reserve service but holds retirement points at the current level, i.e., 75 points per year. This produces a "bonus" of 22 retirement points (over the 53 per year in the total-force approach). The policy also holds the starting retirement age at 60.

The final alternative considers the effects of not using the day's-pay total-force approach in computing RMC but changing retirement points and age of benefit receipt.

11. Retirement points and the move to earlier retirement are the same as those in alternative 1, but pay is kept at its baseline level and there is no incentive pay. This alternative is analyzed to determine whether RC force size will be sustained with these conditions and at what RC cost.

The next chapter presents the results for these alternatives.

4. Results

This chapter presents an overview of the results of our policy simulations for each of the four armed service branches, for officers and enlisted personnel. We begin with a discussion of the results for Army enlisted personnel, followed by a discussion of those for enlisted personnel in all the services. We then present a parallel discussion of our results for officers. Tables of detailed results are given in Appendix B.

Results for Army Enlisted Personnel

Table 4.1 presents the results of the policy simulations for AC and RC Army enlisted personnel, including force size, current cost, retirement cost, and total cost. Total cost is the sum of current and retirement cost, as described in Appendix A. The table shows the baseline value, the new value under the policy being simulated, and the percentage change from the baseline. The first six columns hold prior-service RC force size constant, and the last five do not. The percentage changes in cost shown in all 11 columns are calculated per AC member for AC costs and per RC member for RC costs, so the changes shown adjust for changes in force size in the cases where force size is not held constant or where there are minor differences in force size (in columns 1–6). This is the case for the remainder of the tables in this chapter, which have the same structure as Table 4.1.

None of the policies has much effect on the Army AC—the changes in force size, current cost, and total cost are all within 1 percent of the baseline. This means that the total-force pay approach of the 11th QRMC is not likely to affect the size or cost of the active force. This finding also holds for the other services, as shown in the tables in Appendix B. By implication, then, our discussion of policy alternatives can focus on the RC.

Alternative 1 is the combination of RMC, 53 retirement points per year, retirement at 30 YOS, and incentive pay of 2.27 percent of annualized basic pay. Current cost decreases by 4 percent, but retirement cost increases by 7 percent, because retirement at 30 YOS increases the expected number of years over which retirement benefits will be received. This more than offsets the decrease in retirement benefits resulting from fewer retirement points.[9]

9. Our active and reserve retirement costing follows the practice of the DoD Actuary, except that we compute retirement costs separately for enlisted and officers for each service and component rather than pooling across the AC and across the RC.

Table 4.1. Results for Army Enlisted Personnel

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	2.27%	Flat $697	Targeted $1,611	3.09%	Flat $939	Targeted $2,202
			Active			
Force size, baseline	458,220	458,220	458,220	458,220	458,220	458,220
Force size, new	457,441	456,370	459,456	456,513	456,071	458,879
% change	0	0	0	0	0	0
Current cost, baseline	22.038	22.038	22.038	22.038	22.038	22.038
Current cost, new	21.979	21.919	22.098	21.940	21.921	22.072
% change	0	0	0	0	0	0
Retirement cost, baseline	3.360	3.360	3.360	3.360	3.360	3.360
Retirement cost, new	3.320	3.304	3.346	3.327	3.323	3.362
% change	–1%	–1%	–1%	–1%	–1%	0%
Total cost, baseline	25.398	25.398	25.398	25.398	25.398	25.398
Total cost, new	25.299	25.222	25.444	25.267	25.244	25.434
% change	0	0	0	0	0	0
			Reserve			
Force size, baseline	171,783	171,783	171,783	171,783	171,783	171,783
Force size, new	171,783	171,775	171,783	171,813	171,745	171,850
% change	0	0	0	0	0	0
Current cost, baseline	1.098	1.098	1.098	1.098	1.098	1.098
Current cost, new	1.058	1.047	1.031	1.095	1.081	1.066
% change	–4	–5	–6	0	–2	–3
Retirement cost, baseline	0.105	0.105	0.105	0.105	0.105	0.105
Retire cost, new	0.113	0.107	0.108	0.086	0.083	0.083
% change	7	2	2	–18	–21	–21
Total cost, baseline	1.203	1.203	1.203	1.203	1.203	1.203
Total cost, new	1.171	1.155	1.139	1.182	1.164	1.150
% change	–3	–4	–5	–2	–3	–5

Table 4.1—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
		Active			
Force size, baseline	458,220	458,220	458,220	458,220	458,220
Force size, new	456,123	460,878	461,096	460,916	457,471
% change	0	1	1	1	0
Current cost, baseline	22.038	22.038	22.038	22.038	22.038
Current cost, new	21.901	22.197	22.228	22.213	21.969
% change	0	0	0	0	0
Retire cost, baseline	3.360	3.360	3.360	3.360	3.360
Retire cost, new	3.295	3.392	3.431	3.425	3.302
% change	–1	0	1	1	–2
Total cost, baseline	25.398	25.398	25.398	25.398	25.398
Total cost, new	25.197	25.588	25.659	25.638	25.271
% change	0	0	0	0	0
		Reserve			
Force size, baseline	171,783	171,783	171,783	171,783	171,783
Force size, new	177,107	154,290	147,611	150,231	176,456
% change	3	–10	–14	–13	3
Current cost, baseline	1.098	1.098	1.098	1.098	1.098
Current cost, new	1.123	0.829	0.783	0.800	1.140
% change	–1	–16	–17	–17	1
Retire cost, baseline	0.105	0.105	0.105	0.105	0.105
Retire cost, new	0.114	0.098	0.073	0.087	0.120
% change	4	4	–19	–6	11
Total cost, baseline	1.203	1.203	1.203	1.203	1.203
Total cost, new	1.237	0.927	0.856	0.887	1.260
% change	0	–14	–17	–16	2

NOTES: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

In many cases, percentage changes in retirement cost are larger than those in current cost because of changes in retirement benefit size and years of receipt. Figure 4.1 shows the change in the number of reservists who qualify for retirement benefits by having 20 or more years of creditable service and the year "bin" they fall into. Retirement costs change by more than the change in the number qualifying for retirement, however, because more years of benefits are anticipated under the 30-YOS

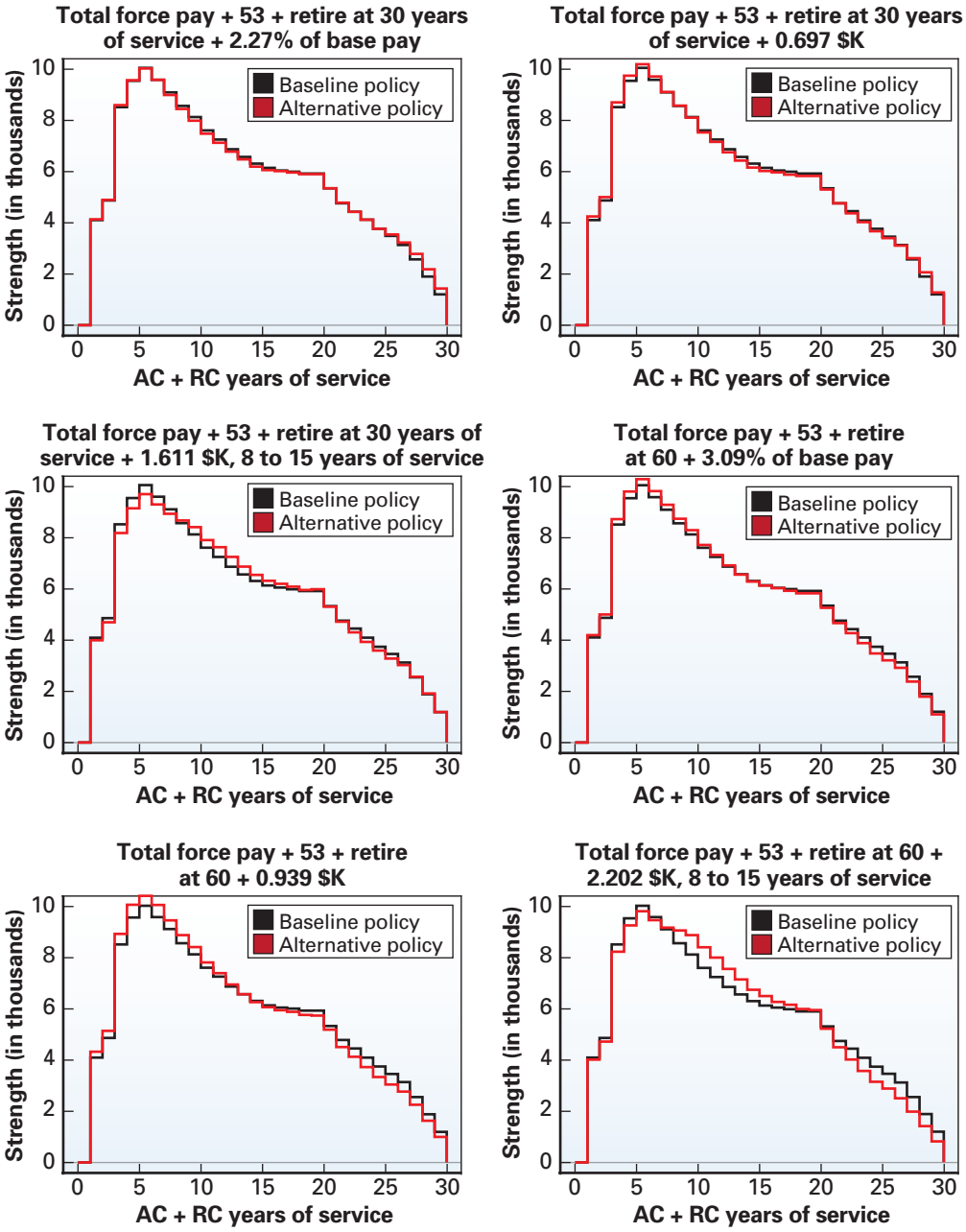


Figure 4.1. Reserve Force Size Policy Simulations: Army Enlisted Personnel

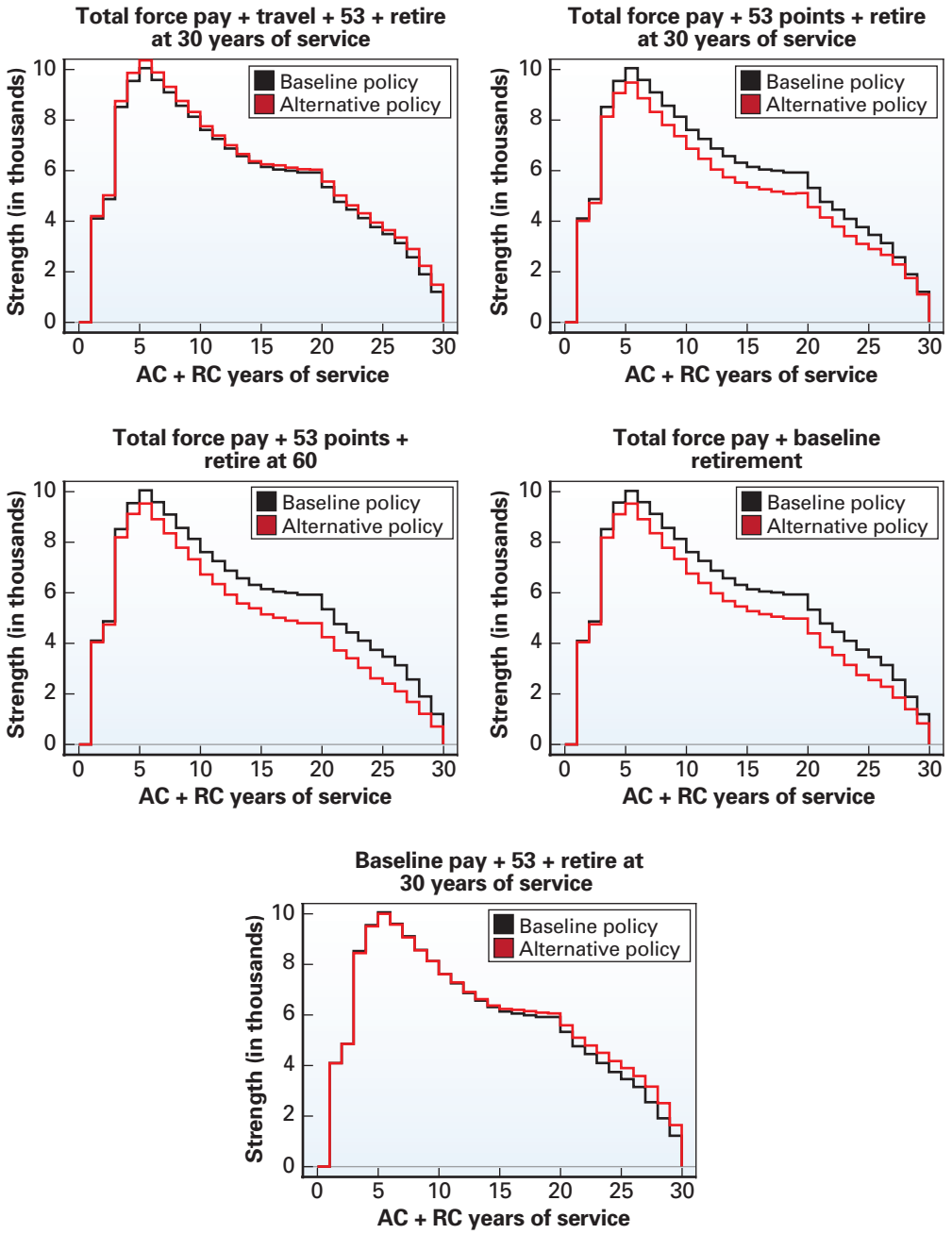


Figure 4.1—Continued

retirement plan than under the age-60 retirement plan. Under the 30-YOS plan, the increase in retirement cost from more years of benefits typically dominates the decrease in cost from fewer retirement points, so retirement costs increase. Under the age-60 plan, there is no change in years paid, but there is a decrease in cost resulting from fewer retirement points. These changes in the retirement system tend to amplify the percentage change (plus or minus) in retirement cost, making it larger than the participation response.

Figure 4.1 has a panel for each policy alternative for the Army. (Results for the other services are shown in Figures B.2–B.4 in Appendix B and are discussed in the next subsection). The upper left panel shows reserve participation by YOS under alternative 1. Participation increases at 20 or more YOS, which implies that more of the participating reservists qualify for retirement benefits. Even with the increase in participation and the higher retirement cost, total cost falls by 3 percent because the move from baseline pay to RMC decreases pay, and the decrease becomes greater with years of service. Adding incentive pay to RMC increases pay, and RMC plus incentive pay is higher than baseline pay at low years of service, but lower at high years of service. The opportunity to retire at 30 YOS neutralizes the lower pay at higher years of service. There is a slight decrease in pre–20-YOS participation and a slight increase in post–20-YOS participation (and no change in force size overall).

In alternative 1, cost decreases, while force size remains constant because current compensation for senior reservists decreases. The pay decrease from baseline is roughly $125 at 10 YOS and $400 at 20 YOS, and it is expected to decrease participation. However, the relatively high taste for reserve service at these YOS and the opportunity to retire at 30 YOS keep the decrease in pre–20-YOS participation small. From YOS 20 to 30, the pay decrease ranges from $400 to $800, but the option to retire at 30 YOS more than offsets this decrease, so participation increases. The fact that current pay is lower than baseline pay from YOS 7 to 30 but participation is affected little helps to explain why current cost is lower than at baseline.

Alternative 2 is the same as alternative 1, except that incentive pay is paid as a flat amount, $697. This policy is more cost-effective in terms of achieving a given RC prior-service force size, though the mix of junior and senior personnel changes a bit. Force size is held constant, but total cost per member is 4 percent lower rather than 3 percent lower.

Alternative 3 is even more cost-effective in terms of holding RC force constant. This policy is the same as Alternative 2, but the incentive pay is higher and is paid only to those in YOS 8 to 15. Alternative 3 results in even more RC current cost savings than alternative 2, the same RC retirement savings, and a RC total cost savings of 5 percent. While force size is held constant in the policies considered in alternatives

1 to 3, the effect on RC experience mix is somewhat different. The changes are generally slight, but the untargeted-incentive-pay policy options (1 and 2) result in greater participation among those with more than 20 YOS and a slight decrease in participation prior to 20 YOS. In contrast, the targeted-incentive-pay option increases participation in mid-career prior to 20 YOS but reduces participation of junior personnel and those with more than 20 YOS. Thus, this option produces a force more heavily weighted toward mid-career personnel. Although our measures of merit focus on cost, holding force size constant, the appeal of the three options may also depend on the desired force shape. Nevertheless, any of the force shapes could be changed further by the use of S&I pays.

Alternatives 4 to 6 are like alternatives 1 to 3 except that eligibility for retirement is kept at age 60. However, the number of retirement points decreases, as does the pay upon which retirement benefits are computed, so the value of retirement benefits is lower. Therefore, incentive pay in alternative 4 will have to be higher than in alternative 1 to keep force size constant. Incentive pay in alternative 4 is 3.09 percent of annualized basic pay. As was shown in Figure 3.3, RMC plus incentive pay of 3.09 percent (3.1 percent with rounding) results in pay higher than baseline pay for the first 14 YOS. With early current compensation higher and retirement benefits lower, this policy decreases the back-loading of military compensation. It results in an increase in participation in YOS 1 to 10, little change in YOS 11 to 20, and a decrease in YOS 21 to 30, again holding force size constant. The greater front-loading results in no savings in current cost (0 percent change), but retirement cost per member decreases by 18 percent, and total cost decreases by 2 percent. The issue of back-loading versus front-loading is discussed later in this subsection.

In alternative 5, incentive pay is $939, current cost is 2 percent lower, retirement cost is 21 percent lower, and total cost is 3 percent lower. As in alternative 4, RC force size is held constant, but participation among junior reservists increases, while participation decreases among those with more than 20 YOS. Total RC cost savings are greater when the incentive pay is a flat amount rather than a percentage of annualized basic pay. In alternative 6, the targeted incentive pay is $2,202 for participation during YOS 8 to 15. The cost savings are greater than those in alternative 5 or the percentage incentive pay in alternative 4. The RC force shape also differs. Targeted incentive pay increases participation among mid-career RC personnel and decreases it among the post–20-YOS and junior personnel.

Because service members discount future dollars at a higher rate than the government discounts future costs, as discussed in Appendix A, benefits that are paid in the future are worth less to military members than the government's cost of providing them. For this reason, we expect more-front-loaded options (alternatives 4, 5, and 6) to result in more cost savings than alternatives 1, 2, and 3. However,

cost savings for Army enlisted personnel are not larger under alternatives 4, 5, and 6, but smaller, partly because the force shape changes a bit, even though force size is held constant. Under alternatives 4 to 6, the participation of mid-career reservists (YOS 8 to 20) increases. While the increase is not large, it is sufficient to result in smaller cost savings under alternatives 4 and 5 than under alternatives 1 and 2, and about the same cost savings under alternatives 6 and 3. However, this finding does not hold for all the services, as we show in the next subsection.

Alternatives 7 to 11 do not hold force size constant, although we compute percentage changes in cost as changes in cost per member (as we also do for alternatives 1 to 6). Alternative 7 offers RMC, 53 points, retirement at 30 YOS, and reimbursement for travel in excess of 50 miles one way (100 miles round trip). We use the average reimbursement by YOS in the simulation, and when it is added to RMC, the pay is $400 above baseline pay at YOS 2, tapering down to zero at YOS 12 and below baseline pay beyond YOS 12. The RMC-plus-travel-reimbursement pay is in a sense more generous than needed. Force size increases by 3 percent, and current cost per member is only 1 percent lower, which compares with the 4 percent lower current cost under alternative 1. Retirement cost per member increases by 4 percent, and total cost does not change—the lower current cost only offsets the higher retirement cost.

Alternatives 8 to 10 offer RMC plus either 53 or 75 retirement points, plus retirement at 30 YOS or at age 60, but no incentive pay. As a result, current pay is less than baseline pay, and the decrease in pay is greater at higher YOS. The resulting decrease in force size is substantial, 10 to 14 percent, which underscores the necessity of supplemental pay to preserve force strength. This is the main point of including these alternatives in our calculations. Allowing retirement to begin at 30 YOS is not nearly sufficient to preserve force strength.

A comparison of alternatives 8 and 9 shows how force size and cost change when retirement eligibility begins at 30 YOS rather than at age 60. As seen, force size is greater under alternative 8—a 10 percent drop rather than a 14 percent drop—but retirement cost per member is also higher—a 4 percent increase versus a 19 percent decrease. Total cost per reservist is $6,000 under alternative 8 and $5,800 under alternative 9 (cost per reservist is not shown in Table 4.1, although the percentage changes are calculated as the change in cost per reservist).

A comparison of alternatives 9 and 10 shows the effect of shifting from 75 retirement points (alternative 10) to 53 retirement points (alternative 9). Both alternatives have current pay equal to RMC and retirement at age 60. Not surprisingly, retirement cost is lower when points are reduced from 75 to 53, but so is force size and current cost. Total cost per reservist is $5,800 under a 53-point policy and $5,900 under a 75-point policy.

Finally, alternative 11 assumes baseline pay, 53 points, and retirement at 30 YOS. It results in a 3 percent larger force and a 2 percent higher total cost per reservist. The cost per reservist under alternatives 1, 2, and 3 is $6,817, $6,723, and $6,878, respectively, and it is $7,141 under alternative 11. Thus, the total cost per reservist is higher under the option with baseline pay than under the alternatives that include RMC, decrease points from 75 to 53, make enlisted personnel eligible for retirement at 30 YOS, and provide any of the incentive pays. For the age-60 retirement options, alternatives 4, 5, and 6, the cost per reservist is $6,881, $6,776, and $6,694, respectively, and these costs, too, are lower than that under alternative 11.

Results for Enlisted Personnel: All Services

Table 4.2 summarizes the results of our simulations for enlisted personnel in all services. It shows the percentage change from baseline for force size, current cost, retirement cost, and total cost per AC or RC member. The percentage changes are highly consistent across the services. Even though we estimated models for each service, and the parameter estimates differ, the relative impact of the policies—i.e., the percentage changes from baseline—is similar across the services. More complete results for the Navy, Air Force, and Marine Corps are given in Appendix B.

Columns 1–6 of Table 4.2 show results for the first six alternative options. The percentage decrease in current cost is largest under alternative 3. The percentage change in retirement cost differs by service and policy, though offering retirement at 30 YOS consistently increases retirement cost per reservist (alternatives 1, 2, and 3), while keeping retirement at age 60 decreases retirement cost (alternatives 4, 5, and 6). The decrease occurs because retirement points are limited to 53 per year instead of 75 and because reserve participation is somewhat higher before 20 YOS and somewhat lower after 20 YOS under the age-60 policy. When current cost and retirement cost are combined, the total cost is lower under the flat-amount incentive policy than under the percentage-of-basic-pay incentive policy, and still lower with targeted incentive pay. The decrease in total cost tends to be larger with retirement at age 60 than with retirement at 30 YOS.

The results for alternatives 1 to 6, where RC force size is held constant, imply that the total-force pay approach is viable, producing a cost savings or no change in cost under either the 30-YOS or age-60 retirement system, provided incentive pay is set at a sufficient level. The more generous retirement policy in terms of the DPV of RC retirement benefits, retirement at 30 YOS, allows incentive pay to be lower than the less generous age-60 policy. The incentive pay percentages and flat amounts are very similar across the services. Under alternative 1, the percentages are 2.27 (Army), 2.49 (Navy), 2.37 (Air Force), and 2.50 (Marine Corps). The percentages for alternative 4 are 3.09 (Army), 3.14 (Navy), 3.05 (Air Force), and 3.39 (Marine Corps). The flat

dollar amounts of incentive pay for retirement at 30 YOS (alternative 2) are $697 (Army), $747 (Navy), $717 (Air Force), and $788 (Marine Corps). The amounts for retirement at age 60 (alternative 4) are $939 (Army), $938 (Navy), $967 (Air Force), and $1,029 (Marine Corps). Finally, the targeted flat amounts of incentive pay for retirement at 30 YOS (alternative 3) are $1,611 (Army), $1,671 (Navy), $1,642 (Air Force), and $1,441 (Marine Corps). The amounts for retirement at age 60 (alternative 6) are $2,202 (Army), $2,075 (Navy), $2,107 (Air Force), and $1,925 (Marine Corps). The similarity in incentive pay across the services under each type of incentive pay implies that a common policy for enlisted personnel—that is, a common schedule or common parameters for setting incentive pay, rather than a single common amount or percentage—is feasible, whichever policy is pursued. A common policy would allow the services to have flexibility in setting incentive pay to meet their manning requirements.

Table 4.2. Percentage Change from Baseline for All Services: Enlisted Personnel

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	Percentage	Flat dollar	Targeted dollar	Percentage	Flat dollar	Targeted dollar
Force size						
Army	0	0	0	0	0	0
Navy	0	0	0	0	0	0
Air Force	0	0	0	0	0	0
Marine	0	0	0	0	0	0
Current cost						
Army	–4	–5	–6	0	–2	–3
Navy	–2	–3	–5	0	–1	–2
Air Force	–4	–6	–9	–2	–4	–7
Marine	–1	–1	–4	2	2	–1
Retirement cost						
Army	7	2	2	–18	–21	–21
Navy	8	6	6	–18	–21	–20
Air Force	16	14	17	–24	–27	–22
Marine	12	4	9	–16	–21	–24
Total cost						
Army	–3	–4	–5	–2	–3	–5
Navy	–1	–2	–3	–3	–4	–5
Air Force	–2	–4	–6	–4	–6	–8
Marine	0	–1	–3	1	0	–3

Table 4.2—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Force size					
Army	3	–10	–14	–13	3
Navy	4	–19	–24	–20	2
Air Force	4	–19	–24	–23	5
Marine	4	–15	–18	–15	3
Current cost					
Army	–1	–16	–17	–17	1
Navy	–1	–16	–17	–17	1
Air Force	–3	–17	–18	–18	1
Marine	1	–16	–16	–16	1
Retirement cost					
Army	4	4	–19	–6	11
Navy	4	13	–11	–1	10
Air Force	14	20	–23	–1	23
Marine	4	14	–17	2	16
Total cost					
Army	0	–14	–17	–16	2
Navy	0	–12	–16	–14	2
Air Force	–1	–13	–19	–16	3
Marine	1	–13	–16	–14	3

NOTES: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior-service RC force size is held constant.

Figure 4.2 compares the force structures under alternatives 3 and 6. (Results for all alternatives for the Navy, Air Force, and Marine Corps are shown in Appendix B.) The left-hand panels show results for alternative 3, and the right-hand panels show results for alternative 6. Generalizing across the services, alternative 3 has a modest effect on force shape, and alternative 6 typically decreases post–20-YOS participation and participation between YOS 3 and 7 but increases mid-career participation between YOS 8 and 20.

Under alternative 7, the average amount of travel reimbursement, when added to RMC, is higher than RMC plus incentive pay. Force size increases by 3 to 4 percent, and total cost per reservist is unchanged or nearly so. Recall that the simulations include all RC prior-service personnel, and only alternatives 1 to 6 hold RC force size constant. The results for alternative 7 suggest that if travel reimbursement were scaled down such that force size remained constant, total cost per reservist would decrease by several percentage points, similar to the decrease under alternatives 2, 4, and 6.

Alternatives 8, 9, and 10 omit incentive pay and vary the terms of retirement. These policies all result in a decrease in force size, ranging from 10 percent to 24 percent, implying that a shift to RMC plus 53 points must be accompanied by some form of pay supplement to maintain force size.

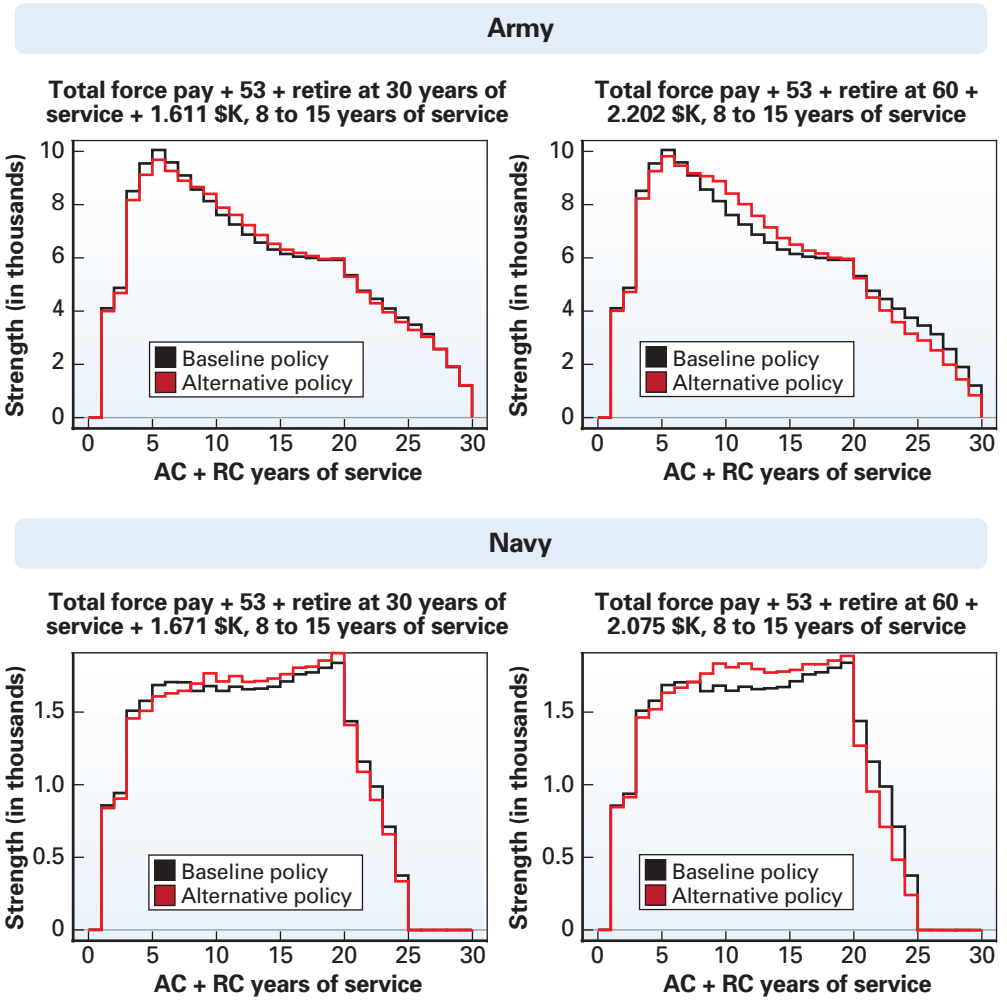


Figure 4.2. Reserve Force Size Policy Simulations: Enlisted Personnel

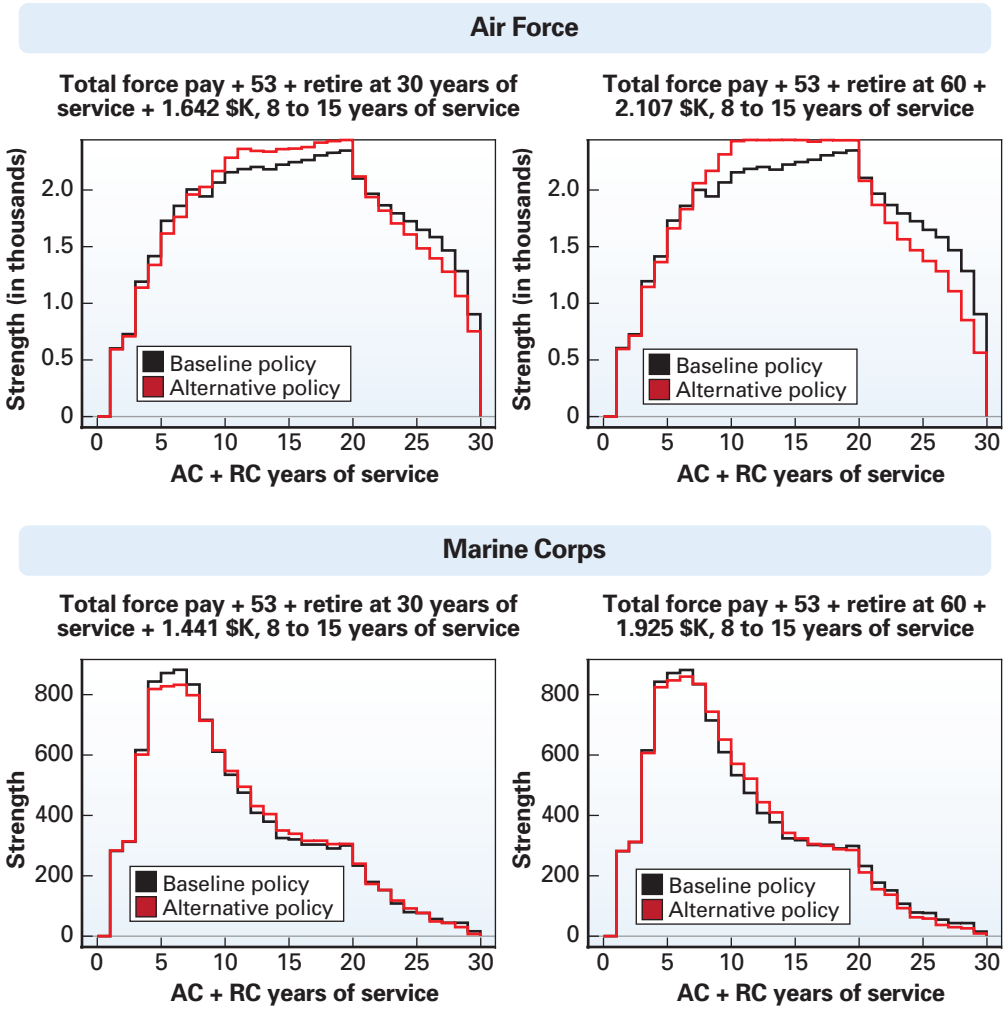


Figure 4.2—Coninued

Under alternative 11, force size increases by 2 to 5 percent and total cost per reservist increases 2 to 3 percent. Both current cost and retirement cost increase. The percentage increase in force size is matched with a somewhat smaller increase in total cost per member. In contrast, under alternatives 1 to 6, where force size is constant, total cost decreases in most cases.

Results for Army Officers

Results for Army officers are shown in Table 4.3 and Figure 4.3. The results are similar to those for Army enlisted reservists, but there are some specific differences.

The policies that offer incentive pay as a percentage of annualized basic pay (alternatives 1 and 4) increase total cost by 1 percent and 3 percent, respectively. Those that offer a flat amount of incentive pay (alternatives 2 and 5) decrease total cost by 3 percent in both cases. The cost decrease is even greater under alternatives 3 and 6, where incentive pay is a flat amount targeted to YOS 8 to 15. These options decrease total cost by 10 percent and 11 percent, respectively. Thus, alternatives 3 and 6 are the most cost-effective in terms of holding RC prior-service force size constant.

However, the sources of the total cost savings under alternatives 3 and 6 differ. Under alternative 3, current cost falls by 15 percent and retirement cost rises by 8 percent. Under alternative 6, current cost falls by 8 percent and retirement cost falls by 17 percent. The right-hand panel in the third row of Figure 4.3 shows that under alternative 6, post–20-YOS participation and participation in YOS 3 to 7 would decrease, and mid-career participation between YOS 8 and 19 would increase. Alternative 3 produces a similar pattern, although the changes are smaller. This suggests that the attractiveness of alternative 6 versus alternative 3 depends in part on whether the reserve organization would accept lower participation among more-junior and post–20-YOS officers and greater participation among mid-career officers. The same pattern appeared in the results for Army enlisted personnel (Figure 4.1).

Under alternative 1, incentive pay is set at 6.18 percent of annualized basic pay. This is higher than the value for enlisted personnel, 2.27 percent. The higher percentage results from the larger absolute decrease in officer pay under the shift from baseline pay to RMC (see Figures 3.1 and 3.2). The flat incentive pay under alternative 2 is $3,812, while the targeted incentive amount is $8,404 (alternative 3). Under alternatives 4, 5, and 6, the incentives are 7.96 percent of annualized basic pay, $4,946, and $11,054, respectively. The difference in incentive pays between enlisted and officer personnel implies that an incentive pay policy should have different tables or parameters for officers and enlisted personnel.

Alternative 7 offers travel reimbursement instead of incentive pay but is otherwise the same as alternative 1. Travel reimbursement is not enough to hold officer prior-service force size constant; it decreases by 6 percent. (Recall that travel reimbursement increased enlisted RC force size by 3 percent.) This implies that travel reimbursement for Army officers is not sufficient to overcome the effect of a decrease in pay under the shift to RMC. However, it might be used in addition to a pay supplement such

Table 4.3. Results for Army Officers

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	6.2%	Flat $3,812	Targeted $8,604	8.0%	Flat $4,946	Targeted $11,054
			Active			
Force size, baseline	90,795	90,795	90795	90,795	90,795	90,795
Force size, new	90,624	90,486	90612	90,646	90,558	90,502
% change	0	0	0	0	0	0
Current cost, baseline	8.659	8.659	8.659	8.659	8.659	8.659
Current cost, new	8.629	8.619	8.634	8.640	8.639	8.628
% change	0	0	0	0	0	0
Retirement cost, baseline	2.177	2.177	2.177	2.177	2.177	2.177
Retirement cost, new	2.150	2.145	2.143	2.174	2.172	2.158
% change	–1	–1	–1	0	0	–1
Total cost, baseline	10.836	10.836	10.836	10.836	10.836	10.836
Total cost, new	10.779	10.764	10.778	10.814	10.811	10.787
% change	0	0	0	0	0	0
			Reserve			
Force size, baseline	23,343	23,343	23343	23,343	23,343	23,343
Force size, new	23,357	23,345	23329	23,344	23,344	23,346
% change	0	0	0	0	0	0
Current cost, baseline	0.312	0.312	0.312	0.312	0.312	0.312
Current cost, new	0.299	0.288	0.264	0.328	0.314	0.286
% change	–4	–8	–15	5	0	–8
Retirement cost, baseline	0.097	0.097	0.097	0.097	0.097	0.097
Retirement cost, new	0.115	0.110	0.104	0.088	0.084	0.080
% change	19	14	8	–9	–13	–17
Total cost, baseline	0.409	0.409	0.409	0.409	0.409	0.409
Total cost, new	0.414	0.398	0.369	0.416	0.397	0.366
% change	1	–3	–10	2	–3	–11

Table 4.3—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points	53	53	53	75	53
Start benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
			Active		
Force size, baseline	90,795	90,795	90,795	90,795	90,795
Force size, new	91,405	92,055	92,414	92,254	90,497
% change	1	1	2	2	0
Current cost, baseline	8.659	8.659	8.659	8.659	8.659
Current cost, new	8.728	8.806	8.860	8.841	8.611
% change	0	0	1	0	0
Retirement cost, baseline	2.177	2.177	2.177	2.177	2.177
Retirement cost, new	2.181	2.208	2.246	2.238	2.141
% change	–1	0	1	1	–1
Total cost, baseline	10.836	10.836	10.836	10.836	10.836
Total cost, new	10.908	11.014	11.106	11.079	10.752
% change	0	0	1	1	0
			Reserve		
Force size, baseline	23,343	23,343	23,343	23,343	23,343
Force size, new	22,029	20,961	20,328	20,714	23,655
% change	–6	–10	–13	–11	1
Current cost, baseline	0.312	0.312	0.312	0.312	0.312
Current cost, new	0.227	0.179	0.173	0.176	0.318
% change	–23	–36	–36	–36	1
Retirement cost, baseline	0.097	0.097	0.097	0.097	0.097
Retirement cost, new	91,405	0.110	0.082	0.090	0.117
% change	1	27	–2	5	20
Total cost, baseline	8.659	0.409	0.409	0.409	0.409
Total cost, new	8.728	0.289	0.255	0.266	0.435
% change	0	–21	–28	–27	5

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior-service RC force size is held constant.

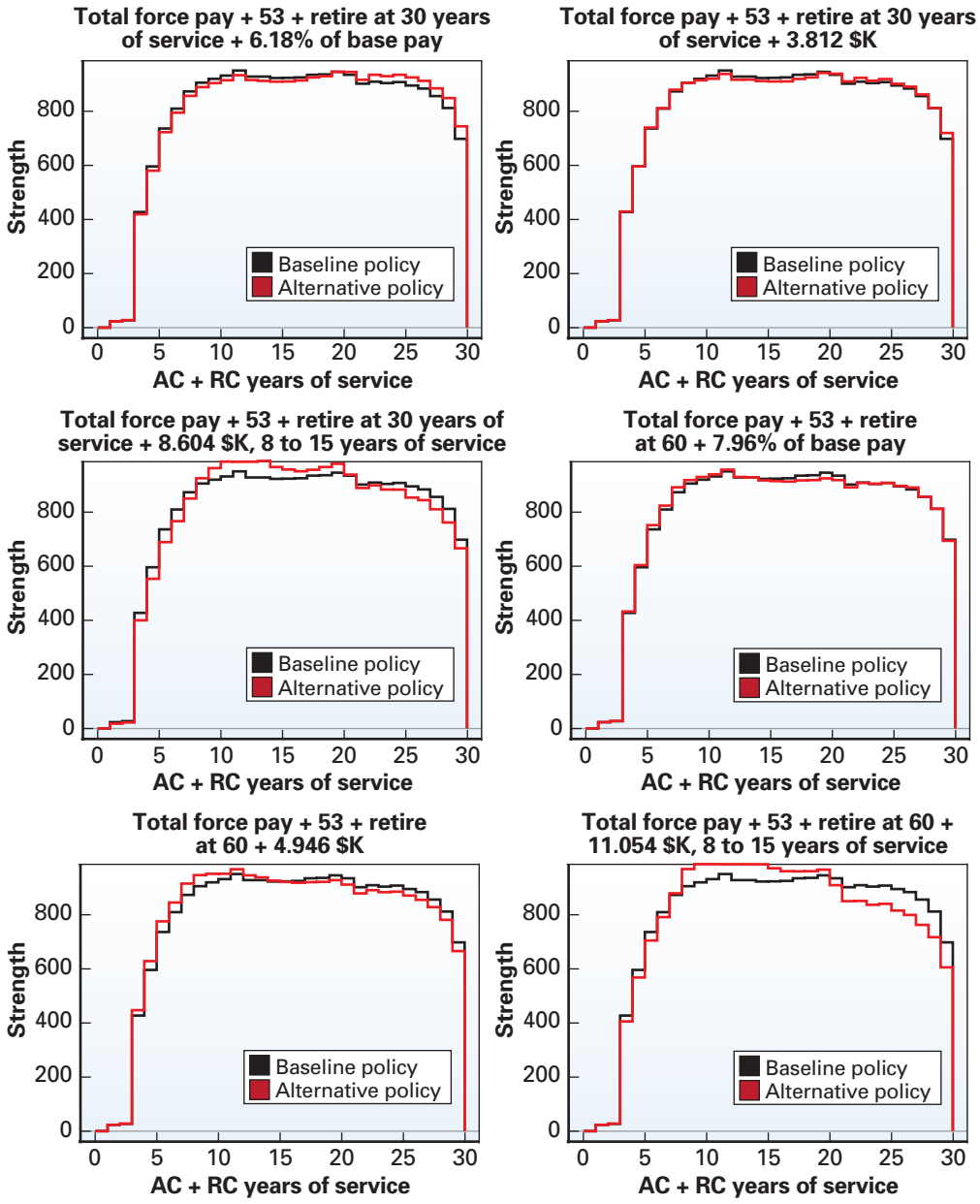


Figure 4.3. Reserve Force Size Simulations: Army Officers

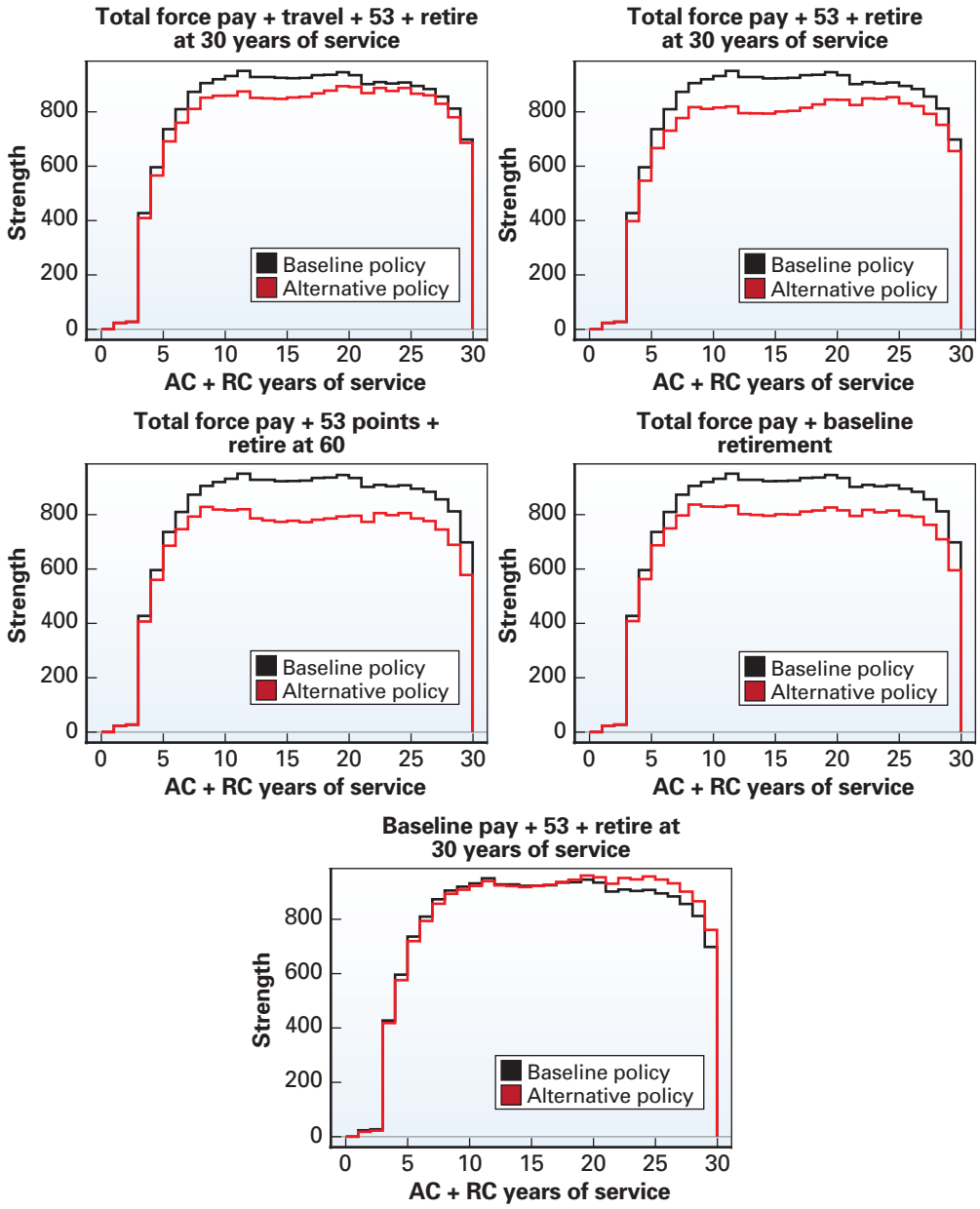


Figure 4.3—Continued

as incentive pay designed to hold force size constant. The incentive pay would ensure high enough participation to meet force-size requirements, and travel pay might be used to expand the market area of reserve units as needed.

Under alternatives 8, 9, and 10, the shift to RMC from baseline pay decreases officer force size by 10 to 13 percent. The use of incentive pay could prevent this decrease, as alternatives 1 to 4 demonstrate.

Under alternative 11, officer force size increases by 1 percent and total cost per reservist increases by 5 percent. The larger increase in total cost comes from retirement cost, which is 20 percent higher for officers, as compared with 11 percent higher for enlisted personnel. The difference reflects the fact that more of the officer force structure qualifies for retirement benefits.

Results for Officers: All Services

Table 4.4 summarizes the results for officers in all services. Like the results for enlisted personnel, the results for officers are consistent across the services. (The complete results for officers in the Navy, Air Force, and Marine Corps are presented in Appendix B.)

Among the alternatives that hold RC force size constant (alternatives 1 to 6), alternative 6 is the most cost-effective. The targeted incentive amount varies by service, ranging from $9,603 for the Marine Corps to $12,756 for the Air Force, and total RC cost is decreased by 8 to 13 percent, depending on service. Current cost decreases by 5 to 11 percent, and retirement costs also decline. Like the result for Army officers, this alternative increases RC participation in YOS 8 to 20 but reduces it in YOS 4 to 7 and beyond 20 YOS.

There is also a savings in total cost if retirement benefits begin at 30 YOS (or age 60, whichever occurs first) and the package includes targeted flat dollar incentive pay (alternative 3). However, except in the Marine Corps, the cost savings are not as great as those under alternative 6, where retirement pay begins at age 60. Allowing reservists to draw retirement benefits at 30 YOS means a longer payout of benefits, although the annuity is smaller, since it is based on 53 points. Furthermore, as seen in Figure 4.4, a higher percentage of reservists qualify for retirement by reaching 20 YOS, relative to the base case. Thus, RC retirement costs increase, offsetting the decrease in current costs.

If RC members begin retirement benefits at 30 YOS but the supplemental pay is an untargeted flat dollar amount (alternative 2), there is little or no change in total cost, except in the Army, where total cost drops by 3 percent. If retirement remains at age 60 (alternative 5), current cost changes little—and even increases slightly for the Navy and Air Force—but retirement costs fall. This suggests that for officers, the total-force pay package with an untargeted flat dollar incentive generally has no effect on RC total cost or results in a drop of 3 percent, depending on retirement eligibility.

Setting incentive pay as a percentage of basic pay so that it varies by grade results in a modest cost increase, regardless of whether retirement begins at 30 YOS

(alternative 1) or at age 60 (alternative 4). The effects on RC participation and on current and retirement costs are similar to those under the alternatives that offer a flat dollar amount of incentive pay (alternatives 2 and 5), but the magnitudes differ. The increase in retirement cost is larger under alternative 1 than under alternative 2, and the decrease in current cost is smaller. The net effect is an increase in total RC cost

Table 4.4. Percentage Change from Baseline for All Services: Officers

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	Percentage	Flat dollar	Targeted dollar	Percentage	Flat dollar	Targeted dollar
Force size						
Army	0	0	0	0	0	0
Navy	0	0	0	0	0	0
Air Force	0	0	0	0	0	0
Marine	0	0	0	0	0	0
Current cost						
Army	–4	–8	–15	5	0	–8
Navy	–5	–9	–18	8	1	–9
Air Force	–10	–14	–22	7	1	–11
Marine	1	–2	–9	5	0	–5
Retirement cost						
Army	19	14	8	–9	–13	–17
Navy	36	30	17	–8	–13	–21
Air Force	28	26	17	–7	–10	–18
Marine	14	8	–2	–12	–16	–20
Total cost						
Army	1	–3	–10	2	–3	–11
Navy	6	1	–9	4	–3	–12
Air Force	3	0	–9	0	–3	–13
Marine	4	0	–8	2	–3	–8

Table 4.4—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Force size					
Army	–6	–10	–13	–11	1
Navy	–9	–15	–21	–17	2
Air Force	–5	–10	–15	–13	4
Marine	–10	–16	–18	–15	–1
Current cost					
Army	–23	–36	–36	–36	1
Navy	–23	–36	–36	–36	1
Air Force	–24	–37	–37	–37	1
Marine	–22	–36	–36	–36	1
Retirement cost					
Army	22	27	–2	5	20
Navy	42	47	4	9	37
Air Force	30	35	1	6	27
Marine	18	23	0	9	17
Total cost					
Army	–12	–21	–28	–27	5
Navy	–7	–15	–26	–25	10
Air Force	–5	–13	–24	–22	10
Marine	–14	–24	–29	–27	4

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

for officers. Under alternative 4, the increase in current cost is greater than that under alternative 5, and the decrease in retirement cost is smaller. Here, the effect is a net increase in cost, relative to alternative 5.

As shown in Table 4.4, under alternative 7, RC force size decreases by 5 to 10 percent, depending on service, and total cost decreases, despite the increase in retirement costs. The decrease in force size and current cost is not surprising. Adding travel reimbursement for officers results in pay lower than baseline, even for junior officers.

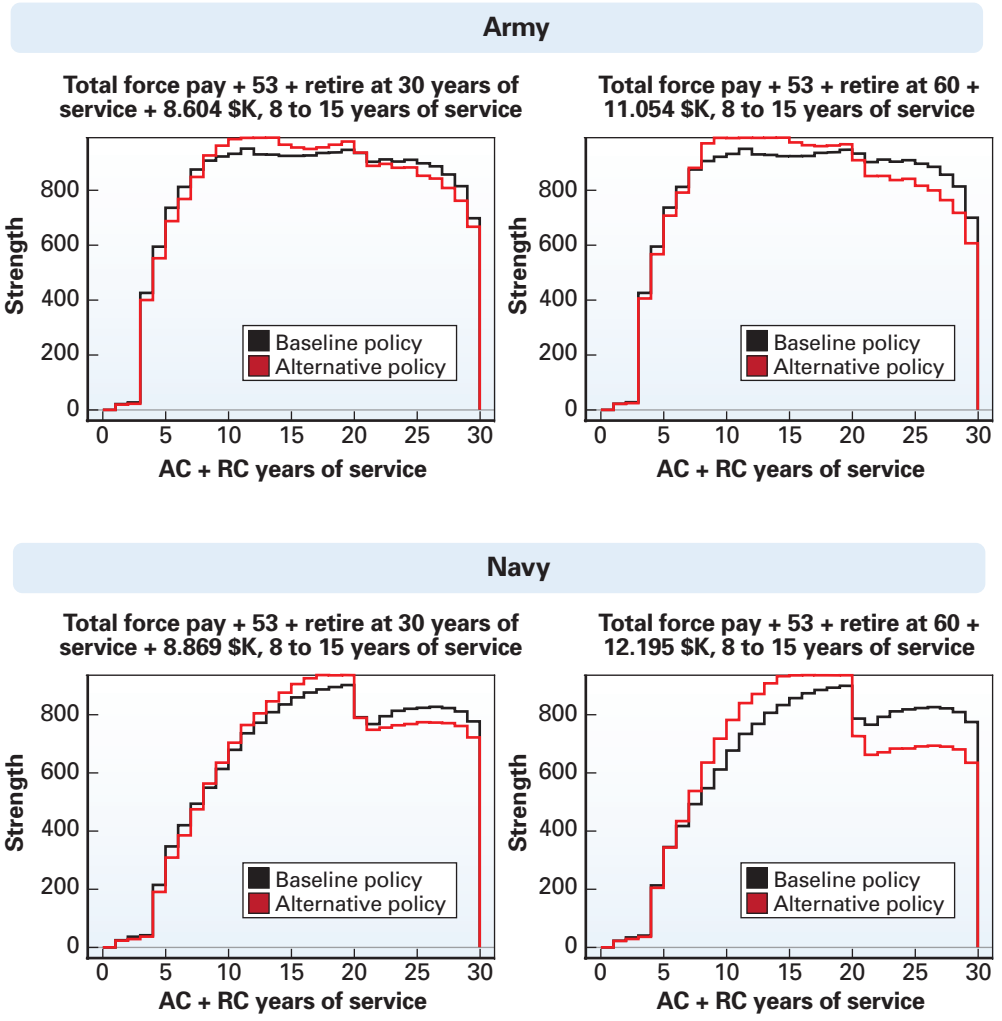


Figure 4.4. Reserve Force Size Policy Simulations: Officers

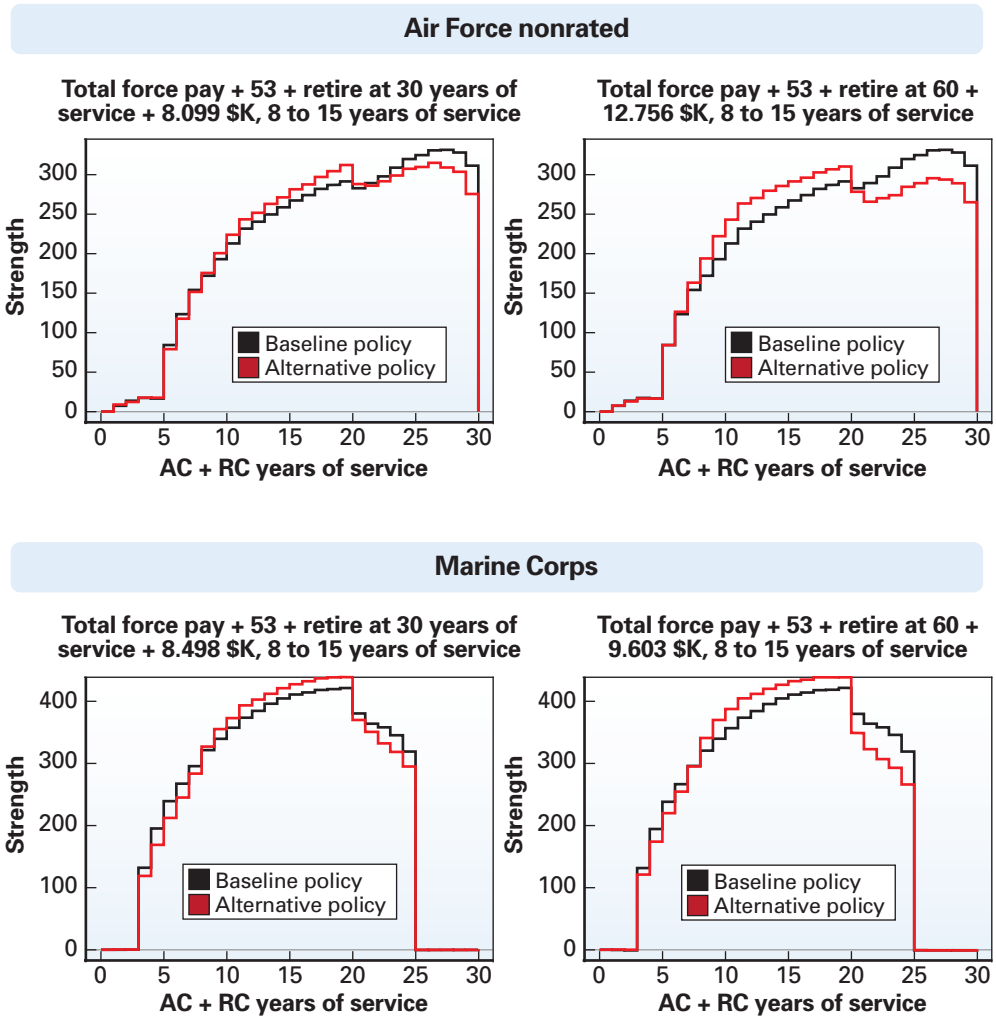


Figure 4.4—Continued

Results of the remaining alternatives, 8 to 11, are similar to those for enlisted personnel. Without supplemental incentive pay, the total-force package results in a decrease in RC officer force size, regardless of whether retirement begins at 30 YOS or at age 60. Under alternative 11, maintaining baseline pay for officers while changing retirement to YOS 30 and 53 points increases total cost per prior-service reservist. The cost increase under this option exceeds the change in cost under alternatives 1 and 2, where current pay includes RMC and incentive pay and the retirement provisions are the same.

5. Discussion and Conclusions

The 11th QRMC proposal to change RC compensation is an element of a larger movement aiming to transform the policies and practices that support the nation's reserve forces. Reasons for this transformation were given in the report of the Commission on the National Guard and Reserves (CNGR) (CNGR, 2008). They include the diverse and sporadic nature of the security threats now foreseen, which differ from those faced during the Cold War when the basis of today's active and reserve policies was established, and the need for capable homeland defense. They also include having the capability to tap into skills learned in the civilian sector, the need for policies that allow for the flexible use of forces yet recognize the increased job mobility of today's labor force, the need for pay and personnel systems that are competitive with the private sector in amount of compensation and attractiveness of career opportunity, and the need to control costs while meeting force requirements. The impetus for change is summed up in the commission's letter transmitting the report to the Senate and House Armed Services Committees on January 31, 2008:

> The Commission concludes that there is no reasonable alternative to the nation's continued increased reliance on reserve components as part of its operational force for missions at home and abroad. However, the Commission also concludes that this change from their Cold War posture necessitates fundamental reforms to reserve components' homeland roles and missions, personnel management systems, equipping and training policies, policies affecting families and employers, and the organizations and structures used to manage the reserves. These reforms are essential to ensure that this operational reserve is feasible in the short term while sustainable over the long term. In fact, the future of the all-volunteer force depends for its success on policymakers' undertaking needed reforms to ensure that the reserve components are ready, capable, and available for both operational and strategic purposes. (CNGR, 2008, p. 2.)

Among its recommendations, the CNGR stresses the importance of policies that enable the reserves to be strategic—a reserve of manpower including personnel with critical skills—and operational, with units and personnel that are equipped and ready to deploy.

The CNGR report states, "Two critical enablers of an enhanced continuum of service are a reduction in the number of reserve duty status categories and the implementation of an integrated pay and personnel system" (CNGR, 2008, p. 25), The 11th QRMC is addressing the first enabler by recommending a simplified approach to reserve duty status with many fewer statuses than now exist, and by sponsoring studies on compensation, including this one. Broadly, these studies address the following CNGR recommendation:

> In the case of compensation-related proposals, serve specific force management purposes; increase flexibility; provide greater simplification; have a demonstrated systemic benefit; expand choice, volunteerism, and market-based compensation; maximize efficiency; improve the transparency of the costs of compensation over time; draw on the strengths of the private sector; and be fair to service members and their families. (CNGR, 2008, pp. 25–26)

More recently, the *Comprehensive Review of the Future Role of the Reserve Components* recommended:

> Refining the current Reserve pay system so that it more closely mirrors that of the Active Component so as to enhance the further development of DoD and Service-specific continuum of service policies. In particular, consider compensating reservists with a day's pay for a day's work, including entitlements. To enable reservists to maintain current levels of compensation and improve unit readiness, consider use of end-of-year financial incentives based on satisfactory participation. (*Comprehensive Review*, 2011, p. 76)

DoD asked RAND to evaluate a number of possible changes to reserve compensation. Foremost was the shift from the current approach to reserve pay, which is based on pay for four drills per month plus pay for two weeks of training, usually in the summer, to a total-force pay approach based on paying RMC for a day of reserve service in the same way AC personnel are paid and offering earlier retirement benefits, specifically, the opportunity to receive retirement benefits on completing 30 YOS or reaching age 60, whichever occurs first. In addition, RAND was asked to consider supplemental pay, such as incentive pay, reimbursement for travel, pay for currently unpaid reserve work, participation bonuses or incentive pay, and participation points.

Among the proposals we analyzed, the effective and cost-effective proposals contained RMC, 30-YOS or age-60 retirement, and incentive pay. Other pays, e.g., travel reimbursement and pay for currently unpaid work, may have a role but are probably best viewed as pays for specific purposes that would not be expected to reach all, or even the majority, of reservists.

How do the leading QRMC proposals measure up on force management, flexibility, simplification, systemic benefit, expanded choice, market-based compensation, efficiency, transparency, ability to draw on the private sector, and fairness to service members and their families? Before answering this question, it is helpful to review our key findings. First, the policy options can maintain the current prior-service reserve force size and can do so at the same cost or lower cost than the current policy, depending on how the incentive pay is structured. When incentive

pay is a flat dollar amount, regardless of year of service, though differing by service and by officer versus enlisted status, the total cost of RC enlisted personnel and officers across all services drops relative to the baseline by between $80 million and $100 million, as shown in Table 5.1. There is also a cost saving when incentive pay is structured as a percentage of annual basic pay, but the saving is smaller, between $10 to $20 million. The largest cost savings are provided by a targeted, flat dollar incentive paid between YOS 8 and 15: $190 million with retirement after 30 YOS and $220 million with age-60 retirement. Second, the option that is selected must include supplemental pay such as the incentive pay we have analyzed. The move to RMC decreases current pay, and supplemental pay can maintain reserve participation at its current levels. By comparison, a move to earlier retirement alone with RMC is not sufficient to maintain participation, even though it increases the total value of retirement benefits. However, RMC plus incentive pay is sufficient to maintain force size under either retirement system. That is, a shift to RMC will be a viable policy option in terms of maintaining force size only if it is accompanied by supplemental pay such as incentive pay. Third, the policy options that hold RC force size constant have different effects on force shape, but the effects, though noteworthy, are small and unlikely to be disruptive. A policy that includes earlier retirement increases participation of those with 21 to 30 YOS and decreases it in early years of service; a policy that includes retirement at age 60 does the opposite, i.e., increases participation in early years and decreases it in senior years. Overall, both retirement options can provide the current force size, with only marginal change to its shape, at about the same or lower cost than the current system.

Cost Savings

Table 5.1, based on our detailed results, summarizes the baseline cost, cost savings, and cost savings as a percentage of baseline cost for enlisted and officer personnel. We estimate that current cost totaled $2.51 billion in 2007. Retirement cost totaled $0.45 billion, and total cost was $2.96 billion. A 1-percent decrease in total cost therefore translates to a savings of $30 million. The percentage changes shown in Table 5.1 are not percentage changes in cost per reservist, as in the tables in Chapter Four.

The analysis in Chapter Four found that much of the cost savings under some of the alternatives result from changes in the total cost of enlisted RC personnel, which is to be expected, since they comprise the majority of reservists. For example, RMC with retirement at 30 YOS and a flat dollar incentive pay results in cost savings for enlisted personnel (see Table 4.2) in each service, but not necessarily cost savings for officers. Again, our analysis considers only prior-service personnel and does not include non–prior-service personnel.

Table 5.1. Baseline Cost and Cost Changes: Enlisted Personnel and Officers (2007 $ billions)

	Current Cost	Retirement Cost	Total Cost
Baseline cost			
Army	1.41	0.20	1.61
Navy	0.49	0.13	0.62
Air Force	0.46	0.09	0.55
Marine Corps	0.16	0.03	0.19
Total	2.51	0.45	2.96
Cost change under policy alternatives			
RMC + 53 points + retirement at 30 YOS + targeted flat dollar incentive pay[a]			
Army	–0.11	0.01	–0.10
Navy	–0.06	0.02	–0.04
Air Force	–0.05	0.02	–0.04
Marine Corps	–0.01	0.00	–0.01
Total	–0.24	0.04	–0.19
Change (percentage of baseline)	–9.4	9.5	–6.6
RMC + 53 points + retirement at age 60 + targeted flat dollar incentive pay[a]			
Army	–0.06	–0.04	–0.10
Navy	–0.03	–0.03	–0.06
Air Force	–0.03	–0.02	–0.05
Marine Corps	–0.01	–0.01	–0.01
Total	–0.13	–0.09	–0.22
Change (percentage of baseline)	–5.1	–19.8	–7.3
RMC + 53 points + retirement at 30 YOS + flat dollar incentive pay[a]			
Army	–0.07	0.02	–0.06
Navy	–0.03	0.03	0.00
Air Force	–0.04	0.02	–0.02
Marine Corps	0.00	0.00	0.00
Total	–0.14	0.07	–0.08
Change (percentage of baseline)	–5.7	14.5	–2.7
RMC + 53 points + retirement at age 60 + flat dollar incentive pay[a]			
Army	–0.02	–0.04	–0.05
Navy	0.00	–0.02	–0.02
Air Force	–0.01	–0.02	–0.03
Marine Corps	0.00	–0.01	0.00
Total	–0.03	–0.08	–0.10
Change (percentage of baseline)	–1.0	–17.1	–3.5

Table 5.1—Continued

	Current Cost	Retirement Cost	Total Cost
RMC + 53 points + retirement at 30 YOS + percentage incentive pay[a]			
Army	–0.05	0.03	–0.03
Navy	–0.02	0.04	0.02
Air Force	–0.02	0.02	0.00
Marine Corps	0.00	0.00	0.00
Total	–0.10	0.09	–0.01
Change (percentage of baseline)	–3.8	19.3	–0.3
RMC + 53 points + retirement at age 60 + percentage incentive pay[a]			
Army	0.01	–0.03	-0.01
Navy	0.02	–0.01	0.01
Air Force	0.00	–0.01	-0.01
Marine Corps	0.01	0.00	0.00
Total	0.04	–0.06	–0.02
Change (percentage of baseline)	1.7	–13.2	–0.6

a. By design, RC force size has been held constant.

The results in Table 5.1 show that the total-force pay approach where RMC is coupled with incentive pay yields cost savings when the incentive pay is structured in terms of a flat dollar amount, and the cost savings are larger when the flat dollar amount is targeted to personnel in specific years of service. Furthermore, the cost savings are larger with retirement at age 60 rather than earlier, at 30 YOS. When incentive pay is structured as a percentage of annual basic pay, the cost savings are more modest.

These policies differ in terms of the level of current pay. Illustrative examples are given in Chapter Three. Incentive pay based on a percentage of annual basic pay grows with YOS. This is a desirable structure to the extent that the gap between RMC and baseline pay also grows with YOS. Thus, to the extent that there is interest in restoring baseline pay, incentive pay that grows with YOS is attractive. Incentive pay that is a flat dollar amount does not vary with YOS and simply shifts the RMC curve up. Consequently, restoring baseline pay for more-senior personnel will mean overpayment relative to baseline pay for junior personnel, or conversely, restoring baseline pay for junior personnel will mean underpayment for senior personnel. The flat dollar approach leads to greater cost savings, also an attractive feature. One approach, not modeled here, to achieving cost savings as well as moving toward restoring baseline pay is to set more than one flat dollar incentive pay, say two or three, that would increase with YOS.

Incentive pay that is targeted to specific YOS can yield additional savings, because the total dollar amount needed to keep prior-service RC force size constant is less than the amount needed under either of the nontargeted alternatives. However, it may be difficult for this kind of incentive to gain acceptance, as service members outside the targeted range would stand to earn considerably less than their more senior or junior peers. This issue could be addressed by judicious allocation of some portion of the cost savings toward special or incentive pays for service members outside the targeted range, both prior-service and non–prior-service. That is, like prior-service reservists, non–prior-service reservists would not receive targeted incentive pay until YOS 8 to 15, but special or incentive pays such as reserve enlistment or affiliation bonuses could be used in earlier years, as needed to sustain non–prior-service participation.

As shown in Table 5.1, for RMC plus a targeted incentive and the 30-YOS retirement option, current cost decreases by 9.4 percent from baseline, or $240 million; retirement cost increases by 9.5 percent, or $40 million; and total cost savings are 6.6 percent, or $190 million. With the age-60 retirement option, current cost savings are 5.1 percent, or $130 million; retirement cost savings are 19.8 percent, or $90 million; and total cost savings are 7.3 percent or $220 million.

Current cost savings are more modest if the incentive pay is structured as a flat dollar amount and is untargeted. With RMC and earlier retirement, current cost savings are $0.14 billion annually, or 5.7 percent of baseline cost; with RMC plus retirement at age 60 with a flat dollar incentive pay supplement, cost savings are $0.03 billion, or 1.0 percent of baseline cost. When the incentive pay is structured as a percentage of annual basic pay, the cost savings are even more modest for earlier retirement and are actually negative (i.e., current costs increase) for retirement at age 60.

As discussed in Chapter Four, retirement cost is higher than baseline retirement cost under the 30-YOS retirement alternatives and is lower under those with retirement at age 60. The difference in retirement cost makes some difference in total cost savings.

Relation to CNGR Objectives for Compensation Reform

The policy options under consideration by the 11th QRMC and our findings on them imply the following with respect to the CNGR objectives for compensation reform:

- **Force management.** Overall, the $80 million to $100 million of cost savings if incentive pay is structured as a flat dollar, or $190 million to $220 million if incentive pay is targeted between YOS 8 and 15, can potentially be programmed for special and incentive pays, professional military education and development programs, and reserve family support programs that address persistent and emergent high-priority RC force-management objectives. The cost savings can also be directed toward enlistment and affiliation bonuses for non–prior-service personnel to sustain their participation in the face of a shift to RMC.
- **Flexibility.** A change to RMC plus incentive pay would increase flexibility to the extent that incentive pay was structured to promote flexibility. Our findings imply that supplemental pay such as incentive pay must be part of a policy package that shifts from current reserve pay to RMC if force size is to be sustained, but we do not define how best to use incentive pay. The RC has, or can obtain, detailed information to identify promising possibilities for where and when to add incentive pay to a reservist's RMC. Our analysis also found that RMC plus a flat across-the-board or targeted dollar incentive could obtain the current force at less cost, and the cost savings could be another source of funds to support flexibility. For instance, although the idea of a continuum of service is widely supported, what it means in practice is still being defined. The cost savings could help to pay for continuum-of-service policies and programs.
- **Simplification.** Without doubt, the shift to RMC would be a significant simplification of reserve compensation. A reservist who first served in an AC, would no longer need to learn a new pay system, as is now the case. A reservist who transitions from inactive to active status would no longer encounter a difference in pay rates.
- **Transparency.** Transparency is similar to simplification. RMC would put RC compensation on the same pay schedules as AC compensation. These schedules are widely available on the Internet and seem easy to understand. However, the published schedules show AC compensation on a monthly basis, whereas reservists would be paid per day of reserve service. This suggests that transparency would be improved for reservists if daily-rate schedules were also published.
- **Fairness to service members and their families.** The proposals under consideration would be as fair to service members and their families as the current system, and perhaps more so. This of course depends what is meant

by "fairness" and, further, how fairness interacts with the objective of force readiness. To the extent that the current system provides individuals with equal opportunity to join the reserves, join a particular reserve unit, and enter a given specialty, the alternatives under consideration can be expected to do the same. Further, the proposed systems, like the current system, would have pay and retirement benefit schedules that are common across specialties, units, and components. Importantly, paying RMC to RC members in the same way RMC is paid to AC members highlights the equality of payment for service from either component. However, a shift from the current system to one involving RMC and incentive pay could lead to greater differentiation in pay among reservists. Currently, some reservists may be paid more than necessary to secure their services—this is called *economic rent*. The shift from baseline pay to RMC decreases pay, but these reservists would still be willing to participate. Reservists of a second type are on the margin—perhaps their specialty is undermanned or suffers from high turnover—and incentive pay would be needed to sustain their participation. Under RMC plus incentive pay, both types of reservists would be paid more efficiently. The first type would have less rent, and in this sense, the new system would be fairer.

- **Efficiency.** A direct measure of efficiency is meeting an objective at least cost. Applying the concept of efficiency can be complicated when an objective has many dimensions and cost includes direct and indirect costs, including externalities. Our research provides one reading on efficiency. We show that the main proposals under consideration in the 11th QRMC can keep reserve force strength at current levels and do so at the same or lower personnel cost. There might be some change in force shape, i.e., greater or less participation at junior or senior levels, but these changes are small. Being able to reproduce the current force size and shape at lower cost suggests that there would be few indirect costs or externalities, but claiming so outright goes beyond the scope of our model and findings. For instance, the shift to RMC will by itself decrease reserve pay and would therefore decrease participation. Our analysis shows that incentive pay can restore participation, a finding based on applying an average amount of incentive pay to all reservists at each YOS (or in the targeted range). But in actual application of incentive pay, the amount could differ across reservists, with some reservists possibly receiving no incentive pay and others receiving a relatively large amount. The reservists receiving no incentive pay would experience a pay cut, and if they have a strong loss aversion, their

willingness to stay in the reserves could be less than our model predicts. In that case, they would ultimately need to receive some incentive pay to support their participation.

- **Market-based compensation.** The CNGR has identified market-based compensation as a goal of reformed reserve compensation. Hallmarks of market-based compensation are its capacity to attract workers, retain them as long as desired, motivate them to exert effort and direct that effort where desired, reveal their abilities, communicate information to their supervisors and fellow workers, provide incentives and opportunities for advancement, treat workers in similar circumstances similarly, and separate workers efficiently. There is no single best form of market-based compensation; its form depends on the objectives of the organization and the nature of the job. In comparison with market-based compensation, the military compensation system has been criticized for having too little differentiation in pay across specialties, careers that were too similar in length despite differences in recruiting and training cost and gains from on-the-job experience, weak incentives for innovation and risk taking, and retirement benefits that back-load too much of total compensation. Contrary to these assertions, the military compensation system has also been defended as fair, scalable in times of war and peace, capable of recruiting and retaining personnel to meet manning requirements, and effective in separating personnel. Without attempting to settle these differences here, we can safely observe that RMC, incentive pay, and funds available from cost savings have the potential to add flexibility to reserve compensation and better serve reserve force manning objectives. In this very general sense, the QRMC proposals respond to the idea of market-based compensation.

The CNGR mentions three other desirable elements of a new system: systemic benefit, expanded choice, and ability to draw on the private sector.

The systemic benefit of the compensation options under consideration in the 11th QRMC comes from the assurance of being able to maintain force size with little effect on force shape, while having resources to implement or expand programs that promote greater flexibility to manage personnel.

The shift to RMC plus incentive pay does not by itself expand choice, nor does it diminish it. Today, an individual can choose which reserve component to participate in, which unit to join, and which occupation to enter, but as with the AC, these choices also depend on organization factors, namely, whether there are openings in the component, unit, and occupation desired. Expanded choice might take the form

of different reserve contracts than currently exist. For instance, contracts could call for a high versus low expectation of activation or could contain incentives for reservists to be medically ready, to remain duty-qualified, or to acquire certain skills and knowledge such as language skills or knowledge of an area's culture. New contracts might also help the reserves to obtain certain civilian expertise on retainer, as has been suggested under the banner of continuum of service.

We cover the ability to draw on the private sector above in arguing that incentive pay and cost savings could be used for greater differentiation in pay and the introduction of novel contracts, changes that could improve the reserves' ability to draw on the private sector. Still, meeting overall reserve manning requirements is of fundamental importance, and our findings show that RMC plus incentive pay can do that.

Limitations of Our Modeling

Our model provides a cohesive framework for active retention and reserve participation, and our parameter estimates are precise, but no model is perfect. Here are some of the limitations of our modeling.

We have not analyzed non–prior-service reservists. We expect that a policy shift to total-force pay will require the use of incentive pay to maintain non–prior-service participation. We have estimated incentive pays that maintain prior-service participation, but we do not know if they are sufficient to hold force size constant for non–prior-service reservists. Also, while targeted incentive pay achieves the greatest cost saving with respect to prior-service participation, many non–prior-service reservists have short reserve careers, as shown in Chapter Two. This suggests that targeted incentive pay over YOS 8 to 15 might have little influence on these reservists at the outset of their career, as many of them probably do not expect to participate in the reserves as many as eight years. Enlistment or affiliation bonuses might be required to sustain non–prior-service participation, and the breadth and size of such bonuses have not been determined. However, the participation history of non–prior-service reservists that do reach mid-career reveals their preference to serve in the reserves, so their response to policy alternatives may be similar to that of prior-service reservists, which we have analyzed.

Our analysis is steady-state and assumes that real military and civilian pay and benefits and military promotion policies are stable over time. This is a useful approximation given the historical stability of military pay and the vital necessity under an all-volunteer force of keeping military pay competitive with outside opportunities. However, our analysis does not account for changes in economic conditions and demographic trends that could affect retention and participation. Also, we have used

military and civilian pay as of FY 2007. Had we chosen other years, our results might have been somewhat different, but the structures of military pay tables and civilian pay have been fairly stable over the past 20 years. As a result, the use of pay tables for other years probably would have led to little difference in our estimates of the *change* from baseline in retention, reserve participation, and cost.

The analysis assumes a constant personal discount rate over time and across members. We estimate the discount rate by branch of service, for officers and for enlisted personnel. Within any of these groups, however, discount rates may differ across members and might decrease with age. (Frederick et al. [2002] survey the literature.) Having a single discount rate might mask variation in the range of response to a policy proposal, though we think much of this would average out.[10]

The analysis does not consider deployment and deployment-related pays. We think the inclusion of deployment would have a small effect on the changes in participation and cost that we simulate under the policy alternatives we consider. The payment of deployment-related pay is a compensation for the arduous duty, risk, and separation associated with deployment and helps to keep RC participation at its ex ante level. That is, it is a compensating variation, not simply higher pay with nothing else changed. Still, deployment increases the number of duty days, which means the reservist will accumulate more points toward retirement and have a higher retirement benefit. We expect that this would increase reserve participation in the baseline and under any of the policy scenarios, yet would result in little difference in the change in participation and cost.

We use average civilian pay in estimating the model, whereas individuals no doubt have private information about their civilian pay opportunities. Similarly, they have private information about their military promotion opportunities. To some extent, differences in civilian pay opportunities and internal military promotion opportunities reflect differences in personnel ability. However, available research suggests that incorporating metrics of ability, such as Armed Forces Qualification Test (AFQT) scores, would not change our overall conclusions. More specifically, previous research (Cawley et al., 1999) finds positive returns of AFQT-component test scores to log wage but concludes that there are no consistent patterns across ages or tests in these returns. Buddin et al. (1992) find that an AFQT score hastens the time to promotion, which increases retention, but AFQT has a negative direct effect on retention; the effects of AFQT "net out" and so explain the traditional result that AFQT has little effect on retention. Although promotion and AFQT have been omitted from our modeling, this probably has little impact on our estimates of policy effects relative to

10. We will try to allow for discount-rate heterogeneity in future work. It remains to be seen whether the data are sufficiently rich to identify the parameters of a discount-rate distribution.

baseline, because the simulated policies seem unlikely to alter the promotion speeds or the AFQT mix of individuals joining the military.

Our costing omits costs associated with training and recruitment. However, relative to the cost of current compensation and retirement, these costs are minor, and given our focus on options that hold RC force size constant, they are not likely to change much.

By and large, we think our modeling is accurate within its context. Although relaxing the limitations would affect the results, the impact on the changes in retention, participation, and cost seem likely to be minor.

The Challenge of Implementation

The implementation of a policy change raises many challenges. Our analysis has focused on steady-state participation and cost comparisons, not on the dynamics of implementation. But specific questions will come up if the new policy is to be implemented: Would the policy be phased in over a decade, a few years, or immediately? What would be done to inform reserve leaders and reservists of the change and to explain the reasons for it? To what extent could the reserves count on using some of the cost savings for reserve uses? What would be done to monitor the introduction of the new system, and what would be done to obtain input from reservists before and during the phase-in? Also, what assurance would there be that incentive pay would be set adequately? Implementation will require ongoing monitoring and response to ensure that the new policy operates as effectively as possible. The major "regulator" of the policy is incentive pay, which can change as conditions change, e.g., force size, economic activity, the demographics of personnel, and involvement in military operations, so it is important to allocate incentive pay effectively. These questions will require input from many groups and may require further analysis.

Appendix A. Data and Methods

The changes to reserve compensation considered in the 11th QRMC affect current and future reserve compensation, including retirement benefits. Analyzing these changes required longitudinal data on service members and a model capable of showing how current and future compensation can affect current decisions, such as the decision to participate in the reserves. This appendix describes our data and model and discusses the parameter estimates we obtained by applying the model to the data. The appendix also includes charts indicating the model's goodness of fit and describes the outputs produced by our analysis, including cost.

Data

Our primary dataset is the Work Experience File (WEX), a longitudinal file maintained by DMDC. WEX data come from the active-duty master file and the RC common personnel data system file. WEX tracks by month the military career of every member of the armed forces, active and reserve, who was in service in FY 1990 or entered service later. For each AC component, we drew samples of 25,000 individuals who entered the component in FY 1990–1991, constructed each service member's history of AC and RC participation, and used these records in estimating the model. These earliest WEX cohorts have the greatest amount of information about military careers. Our analytical file ends in FY 2009 and has up to 20 calendar years of data on each person. We use WEX variables to identify an individual's component and branch of service (e.g., AC Army, RC Army Reserve) by year from the date of entry onward. An AC entrant serves some number of years in the AC and then departs, perhaps choosing to participate in the RC and possibly moving back and forth between the RC and civilian status. We use PEBD and component/branch in counting years of AC service and years of RC participation following AC service.[11]

We augmented WEX records with data on AC, RC, and civilian pay. We compute AC, RC, and civilian average pay by year based on the individual's years of AC, RC, and total experience, respectively. AC and RC pay are also related to military retirement benefits, as discussed below. We use 2007 military pay tables, but because military pay tables have been fairly stable over time, with few changes to their structure,[12] we do not expect our results to be sensitive to the choice of year.

Our measure of AC pay is based on RMC, which includes basic pay, BAH, BAS, and an adjustment deriving from the allowances not being subject to federal income tax. We compute AC pay lines for enlisted members and for officers by branch of service. RMC in general depends on AC years of service, pay grade, and dependents status, but pay grade and dependents status are omitted from our model. This means that we do not include probabilities of promotion, up-or-out rules, marriage, or divorce/separation.[13] The AC pay variable at a given year of service is the average

11. The WEX record also includes a member's age, gender, and "transactions" indicating entry/exit day by service component, pay grade, primary occupational code, and unit identification code.

12. An exception was the structural adjustment to the basic pay table in FY 2000 that gave larger increases to mid-career personnel who had reached their pay grade relatively quickly (after fewer years of service). A second exception was the expansion of the BAH, which increased in real value between FY 2000 and FY 2005.

13. Pay grades, promotion probabilities, and up-or-out rules were included in our model for the 10th QRMC, but they have been omitted here because the RC compensation changes under consideration are not aimed at changing promotion speed or up-or-out rules, and the model runs faster without these features.

RMC at that year, where the average is taken over the number of service members in each pay grade at that year and whether or not the members have dependents. Information on grade distribution and dependents comes from the Green Book for FY 2007 (Office of the Under Secretary of Defense, 2006). We obtain a rough estimate of the tax advantage by computing the percentage of AC RMC that is attributable to it and applying that percentage (roughly 6 percent) to the RMC of AC members. While greater precision in estimating the tax advantage would improve our estimates of AC RMC, our purpose is not to provide such an estimate per se, but to provide an input to our model. We believe that our parameter estimates are not sensitive to our approach to computing the tax advantage.

RC pay is based on years of AC service and years of RC participation, and we averaged it over pay grade and dependents status, using RC strength information from the 2007 Official Guard and Reserve Manpower Strengths and Statistics Report (Office of the Assistant Secretary of Defense, Reserve Affairs, undated) Reserve pay in a year is calculated as the sum of drill pay for four drills per month, 12 times a year, plus pay for 14 days of active-duty training, typically done in the summer. Drill pay is 1/30 of monthly basic pay for each drill period, or 4/30 per weekend. During each day of active-duty training, the reservist receives basic pay plus BAS. Single members receive BAH for a service member without dependents, while married members receive BAH for a service member with dependents. In our calculation, RC members receive BAH RC/T (Reserve Component/transit), a housing allowance for certain circumstances, including being on active duty less than 30 days. Given years of service and grade, we compute a reservist's annual pay as:

(12 × weekend drill pay) + (14 × (BAS + daily basic pay))
+ (%married × BAH RC/T for those with dependents)
+ (%single × %on base × BAH RC/T for those without dependents)
+ tax advantage

To incorporate the tax advantage, we use the same adjustment as for AC annual pay, 6 percent. Some reservists receive special and incentive pays such as bonuses, but these are not included. Also, the model does not address the activation and deployment of reservists, although this is an area for future work.[14]

Our model includes AC and RC retirement benefits. Eligibility for AC retirement benefits requires 20 years of AC service. We compute the AC retirement benefit according to the formula 0.025 × years of AC service × high-three basic pay (average

14. The pay of approximately 85 percent of activated reservists is higher than the sum of their reserve pay and civilian earnings when not activated (Loughran et al., 2006).

basic pay in the highest three years of basic pay). Under this formula, a service member retiring at 20 YOS receives 50 percent of high-three basic pay; one retiring at 30 YOS receives 75 percent of high-three basic pay.

Eligibility for RC retirement benefits requires 20 years of creditable service. Years of creditable service include AC years plus years of RC participation where the reservist earned at least 50 points. A reservist receives 15 points for affiliating with a selected reserve unit, plus one point per drill and one point per day of active-duty training. For example, a reservist who attends all drills and active-duty training might accumulate 77 points (15 + 12 × 4 + 14) and therefore will have a creditable year. We assume an RC participant accumulates 75 points per year. Unlike AC retirement benefits, which start as soon as the AC member retires from service, RC retirement benefits begin at age 60.[15] The formula for RC retirement benefits is the same as that for AC retirement benefits, with several provisos: RC retirement points are converted into YOS (for the purpose of retirement) by dividing total points by 360, and a year of AC service counts as a full year. Reservists who qualify for reserve retirement benefits can transfer to the "retired reserve," which means that their high-three pay is based on the basic pay table in place on their sixtieth birthday, and their basic pay is based on their pay grade and years in grade, where the latter include years in the retired reserve.[16]

Civilian pay is based on average earnings in 2007 of male, year-round full-time workers, by educational attainment.[17] For enlisted RC members, civilian earnings are those of associate's degree holders. For officers, civilian earnings are those of workers with a bachelor's degree or more.

Model

We developed a dynamic model of AC retention and RC participation for the 10th QRMC (Asch et al., 2008) and have rewritten its code to improve its speed and convergence. The first application of dynamic stochastic programming to the retention of military personnel was a model of Air Force officer retention developed by

15. As noted in the text, recent legislation affects the retirement date. If the RC member has been deployed in the period beginning on January 28, 2008, retirement age is decreased by three months for every 90 consecutive days of deployment. This change is not included in our model because the model does not include deployment.

16. In addition, military retirees, including reserve retirees receiving retired pay, are eligible to receive health care through TRICARE for the remainder of their lives, as can their spouses, and coverage continues for the spouse if the retiree dies and she or he does not remarry. "Gray area" retirees, members of the retired reserve who are not drawing retired pay, may purchase TRICARE coverage under the TRICARE Retired Reserve (TRR) program until they become eligible for TRICARE. We do not model the health benefit, however.

17. Table 687 in U.S. Census Bureau, 2008, reports average earnings by age group (18–24, 25–34, 35–44, 45–54, 55–64, 65 and older). We fit a line to the averages to obtain earnings by age.

Gotz and McCall (1984). Our model extends the Gotz/McCall model in two ways. First, it allows individuals leaving AC to choose whether to participate in the RC or be a civilian, whereas the Gotz/McCall model did not consider reserve and civilian as separate statuses. In our model, the individual revisits the reserve/civilian choice in each period and can move back and forth between statuses, a behavior seen in WEX data. A civilian holds a job and receives a civilian wage, and a reservist holds a job and also receives reserve compensation and accumulates retirement points.[18] Second, our model allows reserve and civilian statuses to have a common random shock (because under either status the individual holds a civilian job) as well as reserve-specific and civilian-specific shocks. The model allows for this with a nested specification in which reserve and civilian statuses have their own shocks as well as a common shock. Our parameter estimates confirm that this specification is statistically superior to one that does not allow for a common shock.

The model assumes that an individual maximizes utility over a finite planning horizon from age 20 to age 60, and time is in discrete periods (years). At the onset of each year, the individual is in one of three statuses—active, reserve, or civilian—and chooses what status to enter in the coming year. An active member can choose among all three statuses, but an individual who has left active duty may not reenter it. Thus, a reservist or a civilian can choose between only reserve and civilian statuses.

The value of each alternative at the outset of a year depends on current pay, the individual's preference for the alternative, random shock(s) associated with the alternative, and the discounted expected value of the choice next year given the alternative chosen this year.

Current pay differs across alternatives. Active pay is RMC given years of active duty, civilian pay is the average civilian wage given years of experience and education, and reserve pay is the civilian wage plus RC pay given years of active and reserve service. Civilian experience is normalized to be years since age 20.

Each person has two tastes, or preferences, one for AC service and one for RC service. The tastes are differential from the civilian taste, which is assumed to be zero, and are denoted in the same monetary units as the pay, e.g., an individual in the RC receives the monetary value of his reserve taste. The tastes are constant over time but differ across individuals, who are heterogeneous in their tastes. Tastes are not observed, but the model imposes structure on tastes by assuming that they have a bivariate normal distribution among AC entrants. Given this distribution, AC and RC tastes can have different means and different variances, and they may

18. We recognize that some reservists are in college full time or part time. By assuming that reservists work full time at civilian jobs, we are in effect assigning an opportunity cost of time to those in school. The opportunity to enroll in college is enhanced by reserve educational benefits.

be correlated. Other things equal, a higher AC taste increases AC retention, and a higher RC taste increases RC participation. The taste distribution evolves over time among those staying on active duty as those with lower AC taste tend to leave the military. For similar reasons, the evolution of RC taste distribution is conditional on years of AC and RC service. Individuals with higher RC taste are more likely to have more years of RC participation during their career, just as individuals with higher AC tastes have more years of AC service. If AC and RC tastes are positively correlated, which we find, they will be relatively high among individuals with high AC and RC YOS. When estimating the model, we seek to identify the parameters of the taste distribution of AC entrants. This can be thought of as the distribution of tastes for the population of AC entrants, or the a priori taste distribution.

We assume a random shock in each year for each feasible status and a reserve/civilian nest shock. The individual observes the shocks for the upcoming year but does not know the shocks in future years. Instead, he or she is assumed to know the distributions from which shocks are drawn, and the distributions are the same in all years. The individual uses this information in making an assessment of the value of future choices. We, as researchers, do not observe the shocks. Instead, we use the assumed structure of the model, including the form of the shock distributions, together with data about AC retention and RC participation by year for each individual and about military pay and retirement benefits, to estimate the parameters of the model (described below).

The discounted expected value of future choices assumes that an optimal choice is made in every future year. The alternative chosen in any year can affect value of the choice in all future years. For example, participating in the reserves for another year adds a year of reserve service and increases reserve pay in future periods, moves the individual a year closer to retirement eligibility, and increases retirement benefits should the individual become eligible. Similarly, past participation in the reserves means that current reserve pay is higher. Thus, in the dynamic framework, history matters, as does the future. The model's planning horizon extends to age 60, the age at which eligible reservists start to receive retirement benefits.

To understand how the model works, consider a 50-year-old former-AC member who can choose between reserve and civilian alternatives and who has fewer than 20 years of AC service and fewer than 30 total YOS. The choice depends on the value of each alternative. The value of the reserve alternative depends on the sum of the reserve pay, reserve taste, and reserve shock in the coming year plus the discounted value of the reserve/civilian choice in the next year given reserve status in the coming year. Similarly, the value of the civilian alternative depends on the civilian pay and civilian shock in the coming year and the discounted value of the reserve/civilian

choice in the next year, given civilian status in the coming year. Either way, the choice in the next year, viewed from the current year, is similar to the choice in the current year but differs in that the values of next year's shocks are not known in the current year. Because these values are not known, the best the individual in the current year can do is to compute an expected value of making the optimal choice next year.

Given the randomness of the shocks, there is some chance that next year the value of the reserve alternative will exceed the value of the civilian alternative and some chance of the reverse. These chances and the values of the reserve and civilian alternatives next year depend on the choice made in the current year. As mentioned, choosing the reserve in the current year causes reserve pay to be higher next year and to be at that higher amount in every future year; reserve retirement eligibility will be a year closer and reserve retirement benefits will be higher; and civilian pay will also be higher because of another year of experience. Choosing civilian status in the coming year leaves reserve pay and retirement unchanged next year, while civilian pay will increase because of experience.

The value of the reserve/civilian choice next year depends on the value of the reserve alternative versus the civilian alternative in the year after next. As in the current year, those values depend on then-year pay, shocks, taste, and the discounted expected value of the optimal choice in the following year. This recursive decision-making structure continues until the final decision at age 59. At age 60, the individual makes no further reserve/civilian decisions but becomes a civilian. The model reaches its terminal year, and the individual receives whatever payoffs are available at that point.

In our example, every possible terminal state that a member could achieve involves 40 years of experience (the individual has completed a 40-year career), at least one year of AC service (everyone begins in an AC), and some combination of AC and RC years up to the limit allowed by the model for those who leave the AC and participate in the RC, namely, 30 total YOS. If there are fewer than 20 years of creditable service, the reserve retirement benefit is zero. If there are 20 or more years of creditable service, the reserve retirement benefit is computed as described above. The model assumes the benefit will be received for the remainder of the individual's life and computes the present discounted value of the retirement benefit as of age 60, using the personal discount rate.

Knowing the payoffs in all the possible end states, we can write an expression for the value of the optimal reserve/civilian choice at age 59 for each possible state at that age. The possible states are defined by years of AC service, years of RC service, and years of experience. Because the individual in the current year does not know the shocks in future years, e.g., at age 59, the expression for the value of the optimal

choice is an expected value. In particular, it is the expected value of the maximum of the value of the reserve alternative and the civilian alternative at age 59.

With expressions for the value of the optimal choice at age 59 given one's state at age 59, the same approach is used to obtain such expressions for the optimal choice at age 58 given one's possible states at age 59 and current state at age 58. Following this process, rules for optimal decisions are obtained back to age 50, the age in our example. At age 50, then, we have expressions for the values of the reserve and civilian alternatives given one's state at age 50, and these expressions embed the discounted expected values of choices in future years.

The same approach applies for an individual on active duty, though that individual has a larger number of possible terminal states. Even so, the number of terminal states is finite, and again we can devise rules for the optimal choice at age 59 given one's state at 59 and then use these rules to devise rules at 58, and so on. AC decisionmaking is somewhat different, however, in that the model assumes that the AC member evaluates the alternatives of remaining on active duty or choosing to leave, and if the latter, choosing the better of the reserve and civilian alternatives. The model treats the reserve and civilian alternatives as belonging to a nest, and there is a nest-specific shock in addition to the reserve and civilian alternatives having their own random shocks. The nest shock is in effect a common shock to the reserve and civilian alternatives. Given the expected value of the choice between reserve and civilian and the nest shock, the individual decides whether to continue on active duty or to leave the military and take the better alternative in the nest.

To summarize, the AC/RC DRM incorporates information about AC, RC, and civilian pay and AC and RC retirement benefits, assumes individuals are heterogeneous in their tastes for AC and RC service, builds in uncertainty in the form of random shocks affecting each choice, and assumes that individuals act rationally over a multi-year horizon and reoptimize each year given information available in that year and their state in that year.

Estimation

Method

We estimate parameters for the probability densities of the two shock terms and the probability density of the population distribution of the tastes for active and reserve service relative to a civilian alternative. As mentioned, the population consists of service members at the outset of the AC service. The densities for the two shock terms are assumed to be extreme-value with mode zero; thus two shape parameters need to be estimated: one for the nest and one specific to the civilian/

reserve alternatives in the nest. The density for the population distribution of taste is assumed to be bivariate normal with five parameters, the means and standard deviations of active and reserve taste and the correlation between active and reserve taste. We also estimate a per-period personal discount factor. Thus the basic model has eight parameters.

In addition, we estimate parameters for switching costs. These reflect the cost associated with switching from one state to another.

The model is estimated by maximum likelihood. Writing a likelihood function is fairly straightforward, as using extreme-value distributed shock terms allows us to solve the dynamic program analytically given values for active and reserve taste. The solution of the dynamic program gives us closed-form solutions for the probability of choosing each of the two or three alternatives available at any given time. That is, given values for the active taste, the reserve taste, the discount rate, the current time period, the current state, and the parameters of the shock distributions, we can compute the probability of entering any state in the following period. If we observe a career consisting of some sequence of active, civilian, and reserve states, we can write out a series of expressions for the probability of being in the observed state in the observed period, which when multiplied gives the likelihood of observing a particular career sequence. We then can numerically integrate out the unobserved heterogeneity in active taste and reserve taste, assuming some population distribution for taste.

Numerical optimization is done using a BHHH standard hill-climbing algorithm (Berndt et al., 1974).

Standard errors are computed using numerical differentiation of the likelihood function at the parameter estimates to produce the matrix of second derivatives, the Hessian matrix. The standard errors are computed using the customary method, i.e., the square root of the absolute values of the diagonal of the inverse of the Hessian.

Some Technical Details

Instead of estimating the parameters directly, we estimate the natural logarithm of each parameter, with the exception of the correlation, for which we estimate the inverse hyperbolic tangent. We do this to make things easier for the numerical optimization, in that it is easier to solve a problem where any of the entities can take on any real value, positive or negative, rather than being constrained to be positive or in the interval [-1,1]. Using the natural logarithm is better than using, say, the absolute value, as it is a smooth transformation; numerical differentiation routines are apt to become confused when confronted with values near zero if

an absolute-value transformation is used. The inverse hyperbolic tangent provides a convenient means of transforming a number on the real line to one that falls within the interval [-1,1].

One of the necessary steps for computing the likelihood function is to integrate out the unobserved heterogeneity in active taste and reserve taste. Unfortunately, this cannot be done analytically. We do this using a variant of Monte Carlo integration using samples of a standard bivariate normal distribution generated by a Halton sequence. A Halton sequence is an example of a "low-discrepancy" sequence, a deterministic sequence that produces samples from a distribution with desirable properties in terms of being well distributed throughout a distribution. Care must be taken in selecting a Halton sequence that has desirable properties; because the sequence is deterministic, a poor choice of generating parameters can lead to generating a sequence that only covers part of a distribution or produces a distinct pattern of coverage as opposed to a pseudo-random "pattern." We draw 23 points from a standard bivariate normal distribution, and we use these same points (suitably transformed) every time we perform a numerical integration. Figure A.1 shows the distribution of our sample points. We perform the pseudo–Monte Carlo integration by computing the likelihood at each one of these points and taking the average.

We transform the samples of the standard normal bivariate distribution by multiplying by the Cholesky decomposition of the variance-covariance matrix implied by the parameters of the population distribution of taste.[19] (If the optimizer attempts to use values of the parameters that produce a variance-covariance matrix that cannot be decomposed, the likelihood function returns a value of negative infinity, causing the optimizer to seek values closer to previously used feasible values for the population distribution.) This allows us to stick with the "same" sample points from iteration to iteration and results in a smooth and well-behaved integration routine that produces results that vary smoothly with changes in input parameters. This would not be the case if we, for example, performed a fresh draw of the random sequence at each iteration.

19. Train (2003) describes the Cholesky decomposition. It is also described in the RAND study for the 10th QRMC (Asch et al.,2008, pp. 98–99).

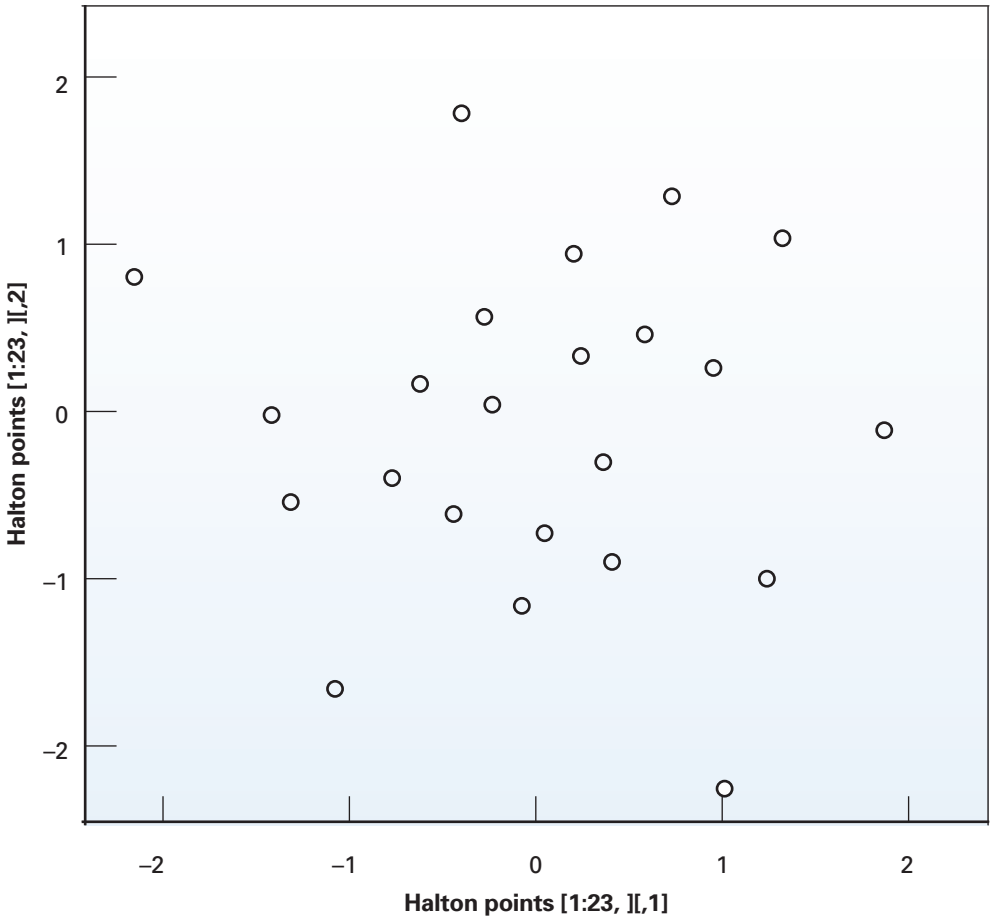


Figure A.1. Halton Sequence for the Standard Bivariate Normal Distribution

Parameter Estimates

Estimates and Standard Errors

Tables A.1 and A.2 provide the raw and transformed parameter estimates for enlisted personnel, and Tables A.3 and A.4 do so for officers. The estimates for each service are highly statistically significant. Our discussion focuses on the transformed estimates.

Table A.1. Parameter Estimates and Standard Errors (SE) for Enlisted Personnel, by Service

	Army		Navy		Air Force		Marines	
Coefficient	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
ln(Tau)	3.494	0.071	3.803	0.065	3.137	0.063	3.753	0.088
ln(Lambda)	2.751	0.072	2.206	0.078	2.001	0.056	2.979	0.119
ln(–1*(Mean Active Taste))	2.752	0.048	2.806	0.051	1.902	0.028	3.079	0.068
ln(–1*(Mean Reserve Taste))	3.111	0.062	3.406	0.070	2.773	0.047	4.791	0.128
ln(SD Active Taste)	1.788	0.082	1.295	0.106	1.213	0.085	0.779	0.149
ln(SD Reserve Taste)	2.524	0.079	2.678	0.087	2.170	0.067	4.188	0.134
atanh(Taste Correlation)	0.819	0.021	1.118	0.034	0.752	0.018	1.225	0.031
ln(–1*(Leave Active in First Two Years))	4.005	0.068	3.968	0.067	3.541	0.061	4.441	0.088
ln(–1*(Switch Civilian to Reserve))	4.206	0.072	3.612	0.079	3.608	0.056	4.343	0.118
ln(-1*(Leave Active After First Two Years))	2.705	0.076	2.418	0.088	2.381	0.061	2.881	0.123
ln(Beta)	–0.113	0.005	–0.097	0.004	–0.161	0.005	–0.083	0.005
–1*Log Likelihood	122,056		93,692		101,408		80,278	
N	29,619		29,942		29,928		29,931	

NOTE: Tau is the shape parameter of the nest error; Lambda is the shape parameter of the error specific to each alternative in the nest—here, "reserve" and "civilian"; Leave Active in First Two Years is a switching cost; Switch Civilian to Reserve is a switching cost; Leave Active After First Two Years is a switching cost; Beta is the personal discount factor.

Table A.2. Transformed Parameter Estimates for Enlisted Personnel, by Service

Coefficient	Army	Navy	Air Force	Marines
Tau	32.924	44.835	23.027	42.662
Lambda	15.655	9.079	7.398	19.668
Mean Active Taste	–15.680	–16.548	–6.697	–21.741
Mean Reserve Taste	–22.446	–30.152	–16.012	–120.448
SD Active Taste	5.980	3.650	3.364	2.180
SD Reserve Taste	12.482	14.549	8.755	65.913
Taste Correlation	0.674	0.807	0.636	0.841
Leave Active in First Two Years	–54.866	–52.870	–34.505	–84.852
Switch Civilian to Reserve	–67.083	–37.055	–36.885	–76.915
Leave Active After First Two Years	–14.953	–11.228	–10.813	–17.831
Beta	0.893	0.907	0.852	0.920

NOTES: Transformed parameters are denominated in thousands of dollars, with the exception of Taste Correlation and Beta. Tau is the shape parameter of the nest error; Lambda is the shape parameter of the error specific to each alternative in the nest—here, "reserve" and "civilian"; Leave Active in First Two Years is a switching cost; Switch Civilian to Reserve is a switching cost; Leave Active After First Two Years is a switching cost; Beta is the personal discount factor.

Table A.3. Parameter Estimates and Standard Errors (SE) for Officers, by Service

	Army		Navy		Air Force		Marine Corps	
Coefficient	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
ln(Tau)	4.765	0.117	4.894	0.149	5.029	0.295	4.505	0.160
ln(Lambda)	3.684	0.126	2.447	0.184	3.221	0.464	2.623	0.165
ln(–1*(Mean Active Taste))	2.731	0.173	3.283	0.175	2.836	0.692	2.573	0.119
ln(–1*(Mean Reserve Taste))	4.558	0.113	4.083	0.143	4.508	0.377	3.713	0.045
ln(SD Active Taste)	3.241	0.147	2.197	0.327	3.219	0.478	1.892	2.640
ln(SD Reserve Taste)	4.297	0.127	3.645	0.193	4.282	0.446	3.352	0.203
atanh(Taste Correlation)	0.938	0.033	0.885	0.040	0.939	0.103	0.414	0.086
ln(–1*(Leave Active in First 3–4 Years))	6.089	0.115	5.932	0.154	6.085	0.311	7.609	122.7
ln(–1*(Switch Civilian to Reserve))	4.509	0.132	3.108	0.194	4.032	0.468	3.101	0.200
ln(Beta)	–0.063	0.004	–0.056	0.004	–0.057	0.011	–0.066	0.003
–1*Log Likelihood	14,310		12,739		2,142		4,462	
N	3,442		3,170		643		923	

NOTE: Tau is the shape parameter of the nest error; Lambda is the shape parameter of the error specific to each alternative in the nest—here, "reserve" and "civilian"; Leave Active in First Two Years is a switching cost; Switch Civilian to Reserve is a switching cost; Beta is the personal discount factor.

Table A.4. Transformed Parameter Estimates for Officers, by Service

Coefficient	Army	Navy	Air Force	Marine
Tau	117.380	133.477	152.782	90.483
Lambda	39.786	11.557	25.049	13.780
Mean Active Taste	–15.349	–26.658	–17.056	–13.105
Mean Reserve Taste	–95.395	–59.299	–90.761	–40.983
SD Active Taste	25.567	8.997	24.997	6.633
SD Reserve Taste	73.484	38.298	72.374	28.549
Taste Correlation	0.734	0.71	0.735	0.392
Leave Active in First Two Years	–440.943	–376.848	–439.102	–2016.261
Switch Civilian to Reserve	–90.837	–22.371	–56.369	–22.214
Beta	0.949	0.945	0.945	0.936

NOTES: Transformed parameters are denominated in thousands of dollars, with the exception of Taste Correlation and Beta. Tau is the shape parameter of the nest error; Lambda is the shape parameter of the error specific to each alternative in the nest—here, "reserve" and "civilian"; Leave Active in First Two Years is a switching cost; Switch Civilian to Reserve is a switching cost; Beta is the personal discount factor.

Tastes

The mean taste for service in an active component is negative. For example, it is between -$7,000 and -$21,000 for enlisted personnel. Although the mean taste could be positive or negative, a negative mean taste is not surprising given the demands and risks of military service. The military must offer relatively high pay to compensate for the negative taste and attract and retain a sufficient number of volunteers to meet manning requirements. For instance, the 10th QRMC estimated that current military compensation was above the seventieth percentile of the civilian wage distribution for workers of similar education and experience. The standard deviation of AC enlisted taste is $2,000 to $6,000. Mean AC taste for officers is approximately in the same range as that for enlisted personnel, though the standard deviation of taste is large, e.g., $6,000 to $26,000.

Mean RC taste is also negative and less than mean AC taste. Mean RC taste for enlisted personnel is –$16,000 to –$30,000, except in the Marine Corps, where it is –$120,000, and the standard deviation of RC taste is several times larger than that of AC taste.[20] The lower RC taste may reflect the difficulty of balancing reserve participation with a civilian career and family life. The lower mean taste is consistent with only a fraction of those who served in an AC joining an RC after they leave the active force. However, the correlation between AC and RC taste is positive and "high"—it is 0.67 for Army enlisted personnel, for instance—implying that individuals who are likely to have longer careers in the AC are also more likely to participate in the RC. The higher standard deviation of RC taste suggests that RC taste may play a more prominent role in RC participation than AC taste does in AC retention; individuals with a high RC taste are those most likely to participate continuously or repeatedly in an RC.

The standard deviation of the shock for AC and for the reserve/civilian nest is equal to $\left(\pi / \sqrt{6}\right)\text{Tau} \approx 1.28\,\text{Tau}$. For enlisted members, the standard deviation of the shock is roughly three times the size of the mean AC taste, and for officers, it is six or seven times the mean AC taste. A combination of large negative AC shocks and/or large positive reserve/civilian shocks might induce an AC member to leave the service, for example. But if both the AC and reserve/civilian shocks were either positive or negative, the shocks would tend to cancel each other and might have little effect on AC retention. Once an individual has left the AC, he or she chooses between reserve and civilian status. At this point, the common shock to these statuses no longer influences behavior; because the shock is common, it nets out of

20. This does not mean that members of the Marine Corps Reserve (MCR) have a low taste for reserve service. The MCR is relatively small, with about 39,000 members, and a mean taste of –$120,000 implies that only those Marines with the highest taste for reserve service participate in the MCR.

the choice. Apart from the common shock, the reserve and civilian alternatives have their own shocks. The standard deviation of these shocks is half or less the size of the mean reserve taste. These shocks are a determinant of the choice between reserve and civilian status, and they affect the expected value of their maximum. However, the standard deviation of these shocks is not as large as that of the common shock, so the common shock is likely to be more influential in the choice between AC and the reserve/civilian nest.

Estimates of the personal discount factor are around 0.90 for enlisted members, though lower for the Air Force (0.86), and about 0.94 for officers. The personal discount factor is 1/(1 + personal discount rate), and factors of 0.90 and 0.94 imply personal discount rates of 11.1 percent and 6.4 percent, respectively.

The switching costs are implicit, i.e., the individual does not pay them outright but behaves as though they must be incurred. The switching cost estimate for leaving the AC in the first two years reflects the military's reluctance to lose a good, trained recruit and the fact that a member leaving early might have to repay part of an enlistment bonus and might forgo an educational benefit supplement. After the first two AC years, the cost of switching from AC to RC might reflect the cost of locating a suitable RC opening, i.e., an opening in a unit located near where the individual wants to live and at a suitable level of responsibility (rank) given years of AC service. The switching cost from civilian to RC also might reflect the cost of locating a suitable unit and an opening within it, as well as the possible impact of RC participation on civilian career opportunities and family life.

Approach to Simulation

Using our empirically grounded parameter estimates, the model simulates behavior under alternative policies. We first create a synthetic population of some number—we use 10,000—by randomly drawing tastes from the estimated AC/RC taste distribution. Each pair of AC and RC taste draws represents an individual entering active duty. We also draw shocks for each year for each synthetic individual from the shock distributions. We assume that the synthetic individuals follow the logic of the model,[21] and we specify the compensation policy for the simulation. Our point of departure is the simulation of behavior under the current compensation policy, the baseline, and we then simulate under the policy alternatives. The simulations produce a 40-year record of AC retention and RC participation for each member of the synthetic population under each compensation policy.

21. The synthetic individual knows only the shocks in the current year and not those in future years. Shocks in a future year are revealed to the individual when that year is reached.

We use the datasets of simulated behavior to tabulate AC retention and RC participation and, along with information on compensation, to compute policy cost. The outputs of the simulations include graphs of AC retention by year of service, RC participation by year of active-plus-reserve service, and the following measures:

- AC force size
- AC current cost
- AC retirement cost
- AC total cost
- RC prior-service force size
- RC prior-service current cost
- RC prior-service retirement cost
- RC prior-service total cost.

Under the assumption of a steady state, the AC force size of the simulated population is the count of individuals present in each year up to year 40.[22] This count, which is based on our synthetic population, is scaled up to AC force size (see below). AC current cost is computed as RMC at each year of service times the number in AC in that year, summed over all years. AC retirement cost is computed as a normal cost percentage of the basic pay bill for the AC force. This approach is consistent with the practice of the DoD Actuary and gives an amount, an accrual charge, sufficient to cover the retirement liability of AC service members who retire from the AC plus a portion of the retirement liability of AC members who retire from the RC. AC current and retirement costs are also scaled up. AC total cost is the sum of AC current cost and AC retirement cost.

RC prior-service force size is based on the count of simulated individuals participating in the RC at each year of service, scaled up to the RC force size in the benchmark year. As mentioned, RC YOS is based on active plus reserve years.[23] RC

22. All individuals begin in the AC at time zero and can have an AC career of up to 40 years. An AC career is normally limited to a maximum of 30 years, but waivers permit longer service. We allow for a 40-year career, and in our simulations only a small percentage have careers longer than 30 years. This small percentage is consistent with actual data. We limit RC careers to 30 years of AC plus RC. We explored allowing reservists to have as many as 40 years, but this led to counts of RC participation beyond 30 years that were higher than in the actual data. Limiting RC careers to 30 years avoided this problem and produced results consistent with the actual data.

23. As an example of this count, consider someone who over the course of 40 years (ages 20 to 60) had 5 years of AC and 5 years of RC service. This individual would be present in the RC at YOS 6 (5 + 1), 7 (5 + 2), 8, 9, and 10. (Participation in the RC could have occurred in nonconsecutive calendar years.) In each of these

current cost equals the product of RC pay by year of service plus any addition to current compensation under the compensation alternative being considered times the number of reservists at that year, summed over years and scaled up. Several of the total-force pay alternatives include incentive pay or other supplemental pay, and we include the costs of these additional forms of current compensation in our computation of RC current cost. RC retirement cost, which is also scaled up, is based on the reserve retirement liability for the simulated reserve force less the funding credited to the reserve retirement account from the accrual charges made during its AC service. This follows the practice of the DoD Actuary. Specifically, the amount transferred from the AC retirement fund to the RC retirement fund is based on calculations involving the number of AC members who leave at each year of AC service and subsequently qualify for RC retirement.[24] RC total cost is the sum of RC current cost and RC retirement cost.

Model Fit

Figures A.2 and A.3 show the model fit for enlisted personnel and officers, respectively, by branch of service. In the left-side panels for each service, small circles are used to show actual AC retention and a line is used to show simulated retention. In the right-side panels, the circles indicate RC participants at each year of service (including both AC years and RC years), and the lines show RC participants as simulated by the model. The simulations, which are based on the current compensation system,[25] are quite close to the actual data, providing evidence that the model fits the data well. In all cases, the model accurately predicts the percentage of members who reach 20 YOS in the AC and the RC.

---

years, the individual would be counted in the steady-state RC force. Because everyone begins in the AC, the smallest RC YOS entry is 2 (1 + 1).

24. The actuarial calculation is made for AC leavers by AC year of service. For example, consider 100 AC service members in YOS 10 and suppose that 80 later qualify for AC retirement and six leave the AC at the end of YOS 10 and later qualify for RC retirement. With our simulated population, we can determine the YOS and pay at which they retire, and from survival tables we know how long they are likely to live. This allows us to compute the total retirement liability of RC retirees. Our understanding is that 6 percent of the AC accrual charges during AC years 1 through 10 are transferred to the RC retirement fund on behalf of the six individuals who will retire from the RC.

25. This system has remained in place, though with some changes, over the 20-year period represented in our data, including a change in FY 2000 to allow members who entered after August 1986 to choose at 15 YOS between the high-three retirement system and the REDUX retirement system with a bonus. In the late 1990s, military pay lagged civilian pay, and Congress mandated a catch-up basic pay increase for FY 2000 and higher-than-usual basic pay increases over the next six years. Higher-than-usual increases in fact continued through FY 2009. The BAH was increased in FY 2003 and 2004, and bonuses were used extensively in 2005–2008. Military retirement benefits and eligibility rules did not change. TRICARE for life was implemented, giving military retirees continued eligibility for TRICARE after becoming eligible for Medicare.

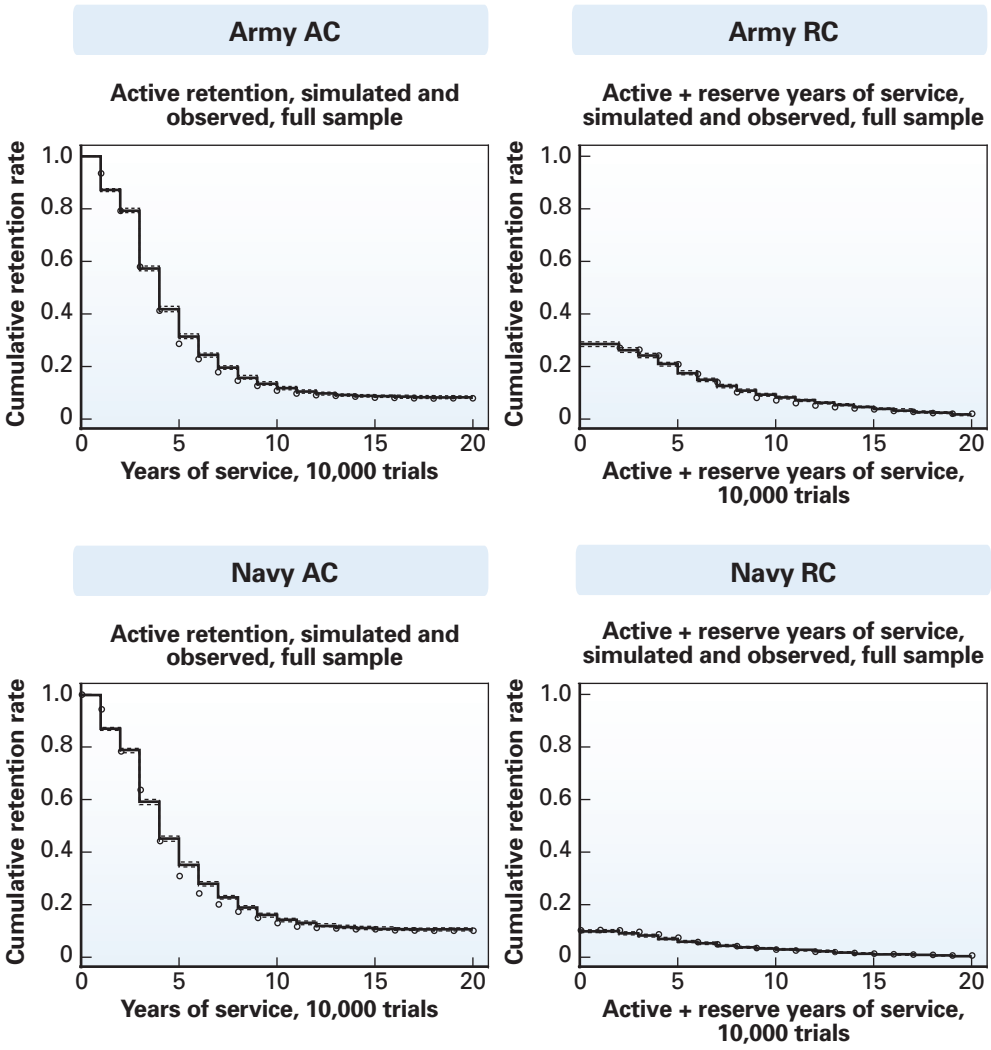


Figure A.2. Model Fit for Enlisted Personnel

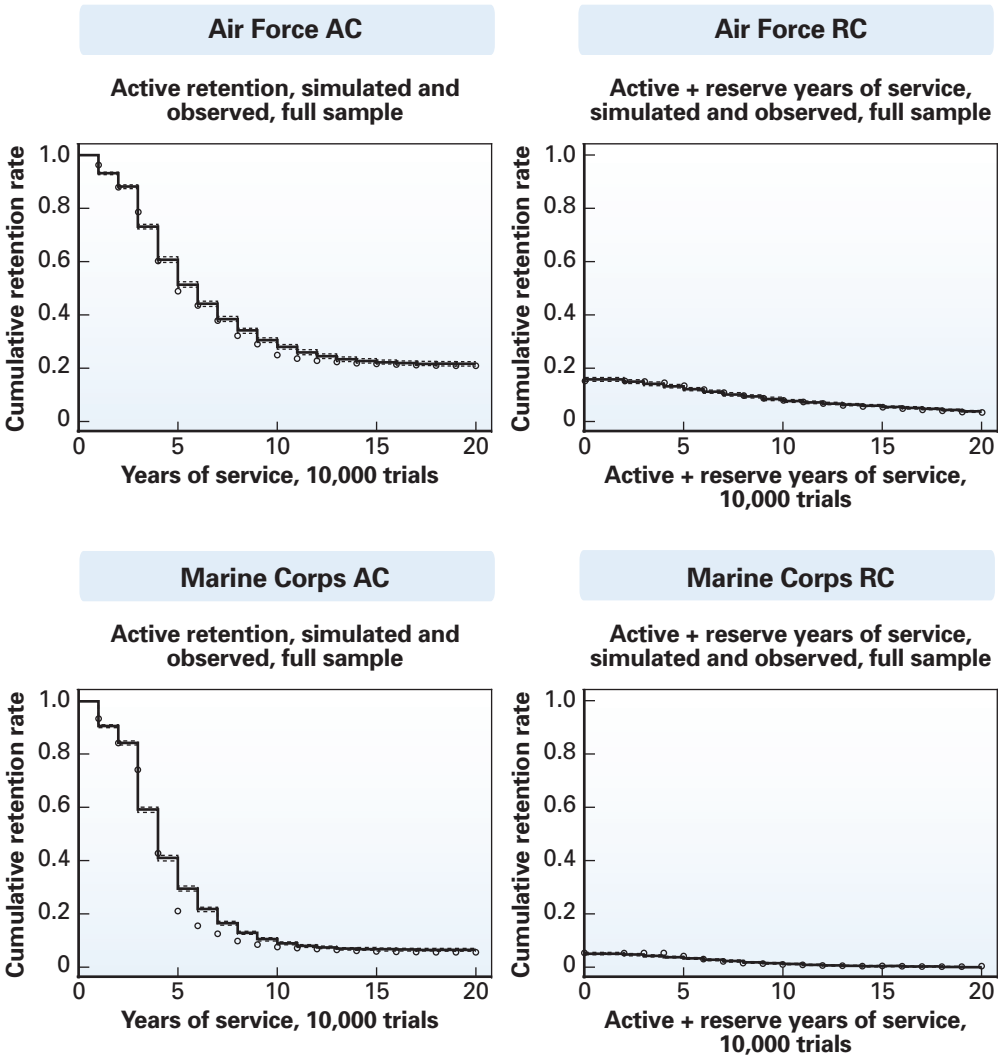


Figure A.2—Continued

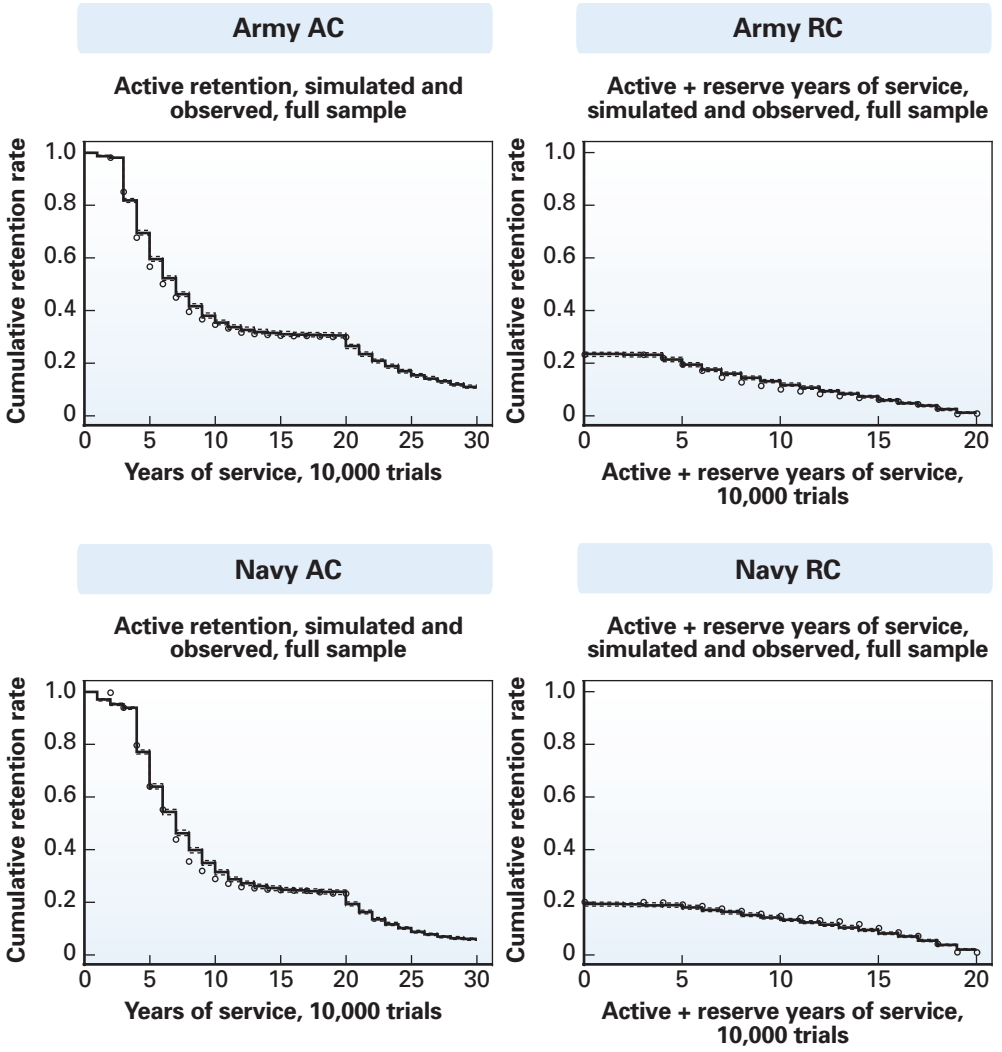


Figure A.3. Model Fit for Officers

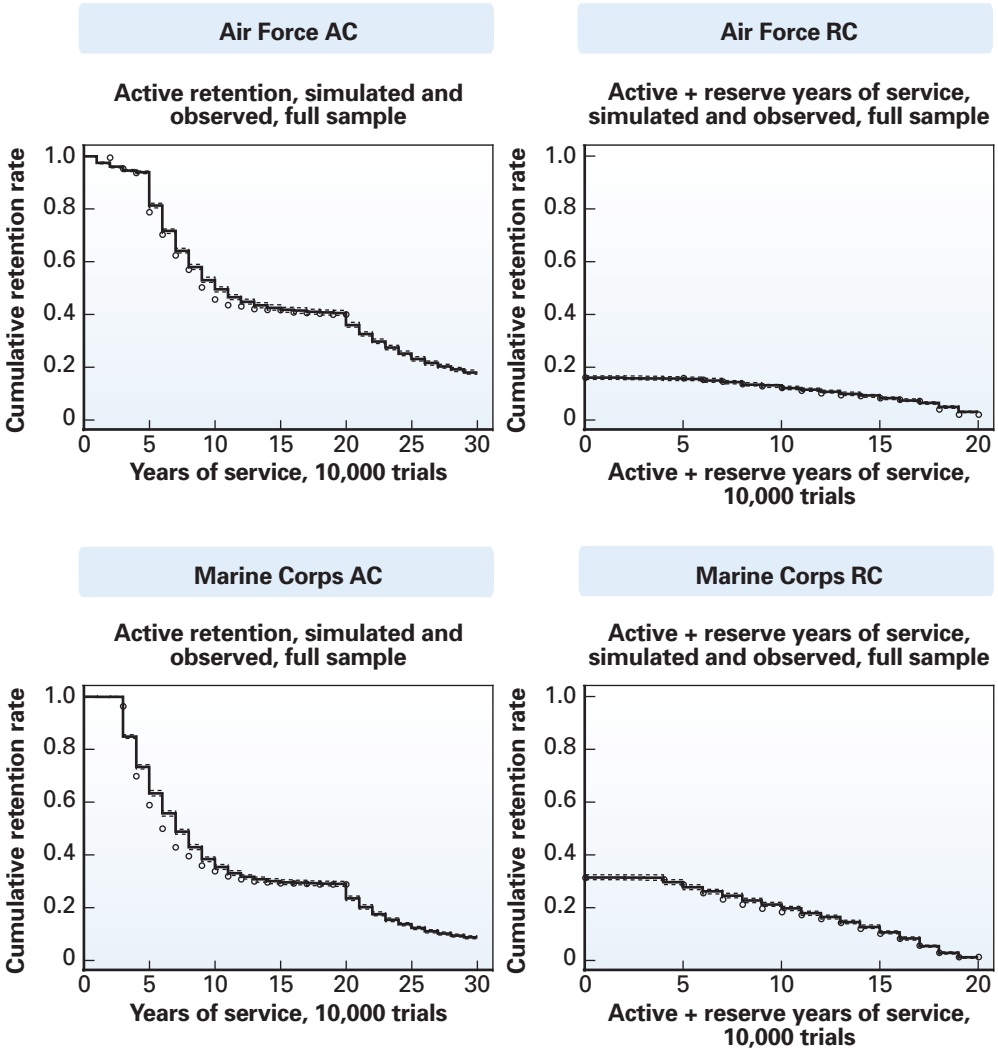


Figure A.3—Continued

Summary

For our simulations, we use WEX data for AC entrants in FY 1990 and FY 1991 and follow them to FY 2009. These data are augmented with data on AC, RC, and civilian pay.

We use a stochastic DPM of AC retention and RC participation. The model embeds information about AC and RC compensation, including retirement, and assumes that individuals behave rationally in the face of future uncertainty. Individuals may differ in their tastes for AC and RC service and face different circumstances each year, represented as random shocks. An individual knows the shocks in the current year but not those in future years. Each year, the individual makes the optimal decision given his state (years of AC service, years of RC service, and total experience), status (active, reserve, civilian), and assessment of the choices in future years, assuming that they, too, will be made optimally.

We estimate the model using the WEX data, thereby grounding the parameter estimates in actual behavior. The model fits the data well for both the AC and RC. The estimated parameters include mean AC and RC taste, AC and RC taste variances and covariance, parameters for the shock distributions, the personal discount factor, and the switching costs. We apply the estimated model to simulate AC retention and RC participation under the current (baseline) and alternative compensation policies.

Appendix B. Additional Results

This appendix shows the effects for Army enlisted personnel and officers of using the RMC pay approach for the RC on AC retention and RC participation (Figure B.1). The purpose is to demonstrate the importance of including additional components in the total force compensation package. This appendix also presents tables of simulation results for enlisted personnel and officers in the Navy, Air Force, and Marine Corps, similar to Figures 4.1 and 4.3, as well as Tables 4.1 and 4.3 that were shown for the Army (Figures B.2–B.7).

Finally, the appendix shows comparisons of results by service when we simulate the effects of changing RC retirement eligibility to YOS 30 (or age 60, whichever occurs first) versus changing RC retirement eligibility to an immediate annuity. Figures B.8 and B.9 show the AC results for enlisted personnel and officers, respectively, and Figures B.10 and B.11 show the RC results, respectively. More specifically, we consider alternative 11 (see Table 3.5) and compare the results to a similar alternative

but where RC members are eligible for an immediate annuity upon reaching 20 years of creditable service. The purpose of this analysis is to illustrate that a package that includes an immediate annuity induces greater RC participation among those with fewer than 20 years and less participation among those with more than 20 years. That is, an immediate annuity induces more junior RC members to stay in service and then also induces them to leave once they reach 20 years. Thus, this alternative results in a more junior RC force than the 30-year alternative.

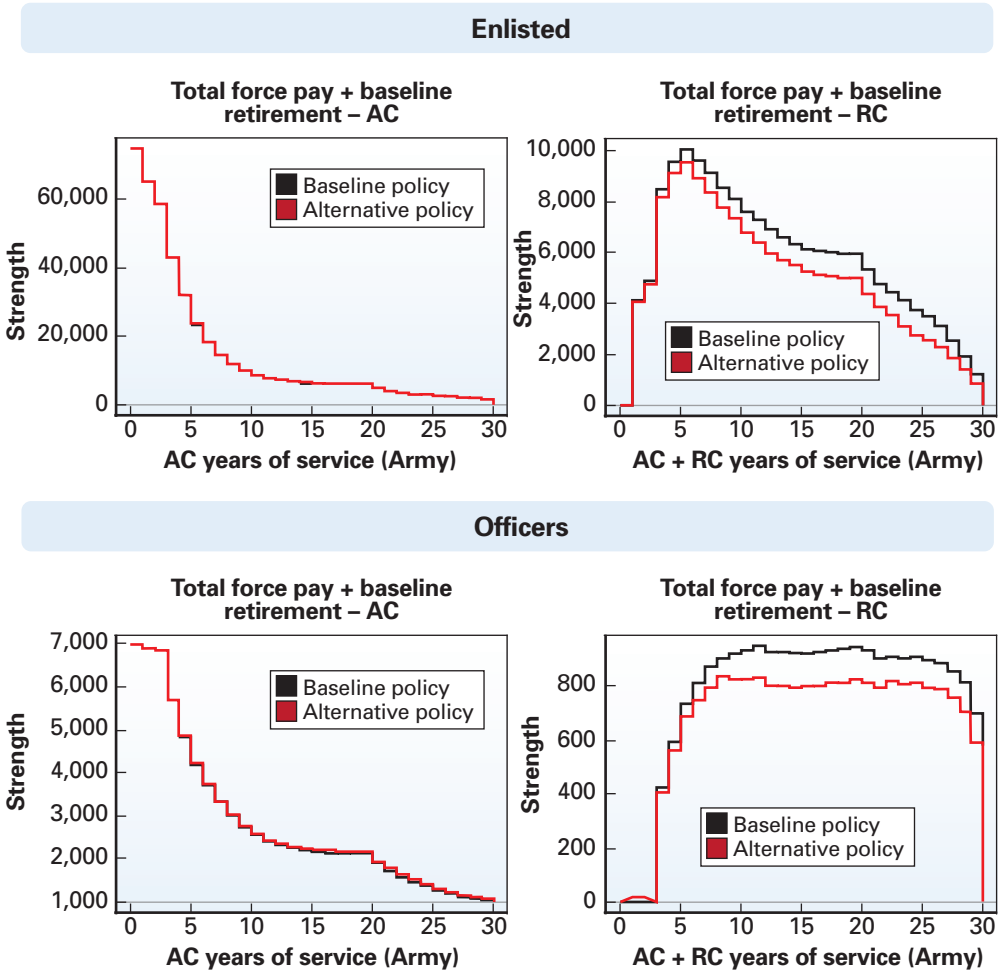


Figure B.1. Policy Simulations for Army Enlisted Personnel and Officers: The Effect of Total Force Pay and Baseline Retirement

Table B.1. Results for Navy Enlisted Personnel

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	2.49%	Flat $747	Targeted $1,671	3.14%	Flat $938	Targeted $2,075
Active Component						
Force size, baseline	272,208	272,208	272,208	272,208	272,208	272,208
Force size, new	271,862	271,702	272,616	271,973	271,665	272,192
% change	0	0	0	0	0	0
Current cost, baseline	13.338	13.338	13.338	13.338	13.338	13.338
Current cost, new	13.307	13.299	13.356	13.326	13.309	13.338
% change	0	0	0	0	0	0
Retirement cost, baseline	2.241	2.241	2.241	2.241	2.241	2.241
Retirement cost, new	2.208	2.207	2.226	2.238	2.231	2.239
% change	–1	–1	–1	0	0	0
Total cost, baseline	15.579	15.579	15.579	15.579	15.579	15.579
Total cost, new	15.515	15.505	15.582	15.564	15.540	15.577
% change	0	0	0	0	0	0
Reserve Component						
Force size, baseline	35,229	35,229	35,229	35,229	35,229	35,229
Force size, new	35,147	35,241	35,237	35,200	35,229	35,246
% change	0	0	0	0	0	0
Current cost, baseline	0.223	0.223	0.223	0.223	0.223	0.223
Current cost, new	0.217	0.215	0.212	0.223	0.220	0.218
% change	–2	–3	–5	0	–1	–2
Retirement cost, baseline	0.040	0.040	0.040	0.040	0.040	0.040
Retirement cost, new	0.043	0.042	0.042	0.032	0.031	0.032
% change	8	6	6	–18	–21	–20
Total cost, baseline	0.262	0.262	0.262	0.262	0.262	0.262
Total cost, new	0.259	0.257	0.254	0.255	0.251	0.249
% change	–1	–2	–3	–3	–4	–5

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

Table B.1—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	272,208	272,208	272,208	272,208	272,208
Force size, new	271,718	272,583	272,764	272,768	272,064
% change	0	0	0	0	0
Current cost, baseline	13.338	13.338	13.338	13.338	13.338
Current cost, new	13.297	13.358	13.379	13.380	13.319
% change	0	0	0	0	0
Retirement cost, baseline	2.2410	2.2410	2.2410	2.2410	2.2410
Retirement cost, new	2.2055	2.2333	2.2609	2.2609	2.2103
% change	–1	0	1	1	–1
Total cost, baseline	15.579	15.579	15.579	15.579	15.579
Total cost, new	15.503	15.591	15.640	15.640	15.529
% change	0	0	0	0	0
Reserve					
Force size, baseline	35,229	35,229	35,229	35,229	35,229
Force size, new	36,596	28,474	26,914	28,190	35,892
% change	4%	–19%	–24%	–20%	2%
Current cost, baseline	0.223	0.223	0.223	0.223	0.223
Current cost, new	0.230	0.151	0.141	0.148	0.228
% change	–1	–16	–17	–17	1
Retirement cost, baseline	0.040	0.040	0.040	0.040	0.040
Retirement cost, new	0.043	0.036	0.027	0.031	0.044
% change	4	13	–11	–1	10
Total cost, baseline	0.262	0.262	0.262	0.262	0.262
Total cost, new	0.273	0.187	0.168	0.180	0.273
% change	0	–12	–16	–14	2

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.

Table B.2. Results for Air Force Enlisted Personnel

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	2.37%	Flat $717	Targeted $1,642	3.05%	Flat $967	Targeted $2,107
Active						
Force size, baseline	263,351	263,351	263,351	263,351	263,351	263,351
Force size, new	263,098	262,794	262,967	263,025	262,385	262,842
% change	0	0	0	0	0	0
Current cost, baseline	13.559	13.559	13.559	13.559	13.559	13.559
Current cost, new	13.540	13.523	13.527	13.541	13.504	13.521
% change	0	0	0	0	0	0
Retirement cost, baseline	3.053	3.053	3.053	3.053	3.053	3.053
Retirement cost, new	3.031	3.027	3.020	3.049	3.039	3.033
% change	–1	–1	–1	0	0	0
Total cost, baseline	16.611	16.611	16.611	16.611	16.611	16.611
Total cost, new	16.571	16.549	16.547	16.590	16.543	16.554
% change	0	0	0	0	0	0
Reserve						
Force size, baseline	52,299	52,299	52,299	52,299	52,299	52,299
Force size, new	52,483	52,338	52,229	52,221	52,202	52,332
% change	0	0	0	0	0	0
Current cost, baseline	0.364	0.364	0.364	0.364	0.364	0.364
Current cost, new	0.350	0.341	0.332	0.358	0.351	0.340
% change	–4	–6	–9	–2	–4	–7
Retirement cost, baseline	0.042	0.042	0.042	0.042	0.042	0.042
Retirement cost, new	0.050	0.048	0.050	0.032	0.031	0.033
% change	16	14	17	–24	–27	–22
Total cost, baseline	0.407	0.407	0.407	0.407	0.407	0.407
Total cost, new	0.400	0.390	0.382	0.390	0.381	0.373
% change	–2	–4	–6	–4	–6	–8

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

Table B.2—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	263,351	263,351	263,351	263,351	263,351
Force size, new	262,277	265,355	265,750	265,750	262,644
% change	0	1	1	1	0
Current cost, baseline	13.559	13.559	13.559	13.559	13.559
Current cost, new	13.490	13.683	13.711	13.711	13.507
% change	0	0	0	0	0
Retirement cost, baseline	3.0527	3.0527	3.0527	3.0527	3.0527
Retirement cost, new	3.0129	3.0941	3.1261	3.1261	3.0110
% change	–1	1	1	1	–1
Total cost, baseline	16.611	16.611	16.611	16.611	16.611
Total cost, new	16.502	16.777	16.837	16.837	16.518
% change	0	0	0	0	0
Reserve					
Force size, baseline	52,299	52,299	52,299	52,299	52,299
Force size, new	54,637	42,394	39,778	40,529	54,912
% change	4	–19	–24	–23	5
Current cost, baseline	0.364	0.364	0.364	0.364	0.364
Current cost, new	0.370	0.244	0.227	0.231	0.386
% change	–3	–17	–18	–18	1
Retirement cost, baseline	0.042	0.042	0.042	0.042	0.042
Retirement cost, new	0.050	0.041	0.025	0.032	0.055
% change	14	20	–23	–1	23
Total cost, baseline	0.407	0.407	0.407	0.407	0.407
Total cost, new	0.420	0.286	0.251	0.264	0.441
% change	–1	–13	–19	–16	3

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

Table B.3. Results for Marine Corps Enlisted Personnel

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	2.50%	Flat $788	Targeted $1,441	3.39%	Flat $1,029	Targeted $1,925
Active						
Force size, baseline	182,366	182,366	182,366	182,366	182,366	182,366
Force size, new	182,366	182,209	182,388	182,117	182,104	182,312
% change	0	0	0	0	0	0
Current cost, baseline	8.482	8.482	8.482	8.482	8.482	8.482
Current cost, new	8.482	8.471	8.483	8.466	8.465	8.478
% change	0	0	0	0	0	0
Retirement cost, baseline	1.075	1.075	1.075	1.075	1.075	1.075
Retirement cost, new	1.072	1.068	1.073	1.069	1.069	1.073
% change	0	–1	0	0	0	0
Total cost, baseline	9.557	9.557	9.557	9.557	9.557	9.557
Total cost, new	9.553	9.539	9.556	9.535	9.534	9.551
% change	0	0	0	0	0	0
Reserve						
Force size, baseline	10,615	10,615	10,615	10,615	10,615	10,615
Force size, new	10,593	10,615	10,606	10,705	10,628	10,625
% change	0	0	0	1	0	0
Current cost, baseline	0.063	0.063	0.063	0.063	0.063	0.063
Current cost, new	0.062	0.062	0.060	0.065	0.064	0.062
% change	–1	–1	–4	2	2	–1
Retirement cost, baseline	0.006	0.006	0.006	0.006	0.006	0.006
Retirement cost, new	0.007	0.006	0.007	0.005	0.005	0.005
% change	12	4	9	–16	–21	–24
Total cost, baseline	0.069	0.069	0.069	0.069	0.069	0.069
Total cost, new	0.069	0.069	0.067	0.070	0.069	0.067
% change	0	–1	–3	1	0	–3

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. Prior service RC force size is held constant.

Table B.3—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	182,366	182,366	182,366	182,366	182,366
Force size, new	182,280	182,449	182,312	182,312	182,411
% change	0	0	0	0	0
Current cost, baseline	8.482	8.482	8.482	8.482	8.482
Current cost, new	8.475	8.488	8.480	8.480	8.484
% change	0	0	0	0	0
Retirement cost, baseline	1.0745	1.0745	1.0745	1.0745	1.0745
Retirement cost, new	1.0691	1.0753	1.0742	1.0742	1.0719
% change	0	0	0	0	0
Total cost, baseline	9.557	9.557	9.557	9.557	9.557
Total cost, new	9.545	9.563	9.554	9.554	9.556
% change	0	0	0	0	0
Reserve					
Force size, baseline	10,615	10,615	10,615	10,615	10,615
Force size, new	11,018	9,049	8,710	9,036	10,980
% change	4	–15	–18	–15	3
Current cost, baseline	0.063	0.063	0.063	0.063	0.063
Current cost new	0.066	0.045	0.043	0.045	0.066
% change	1	–16	–16	–16	1
Retirement cost, baseline	0.006	0.006	0.006	0.006	0.006
Retirement cost, new	0.007	0.006	0.004	0.005	0.007
% change	4	14	–17	2	16
Total cost, baseline	0.069	0.069	0.069	0.069	0.069
Total cost, new	0.073	0.051	0.047	0.050	0.073
% change	1	–13	–16	–14	3

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.

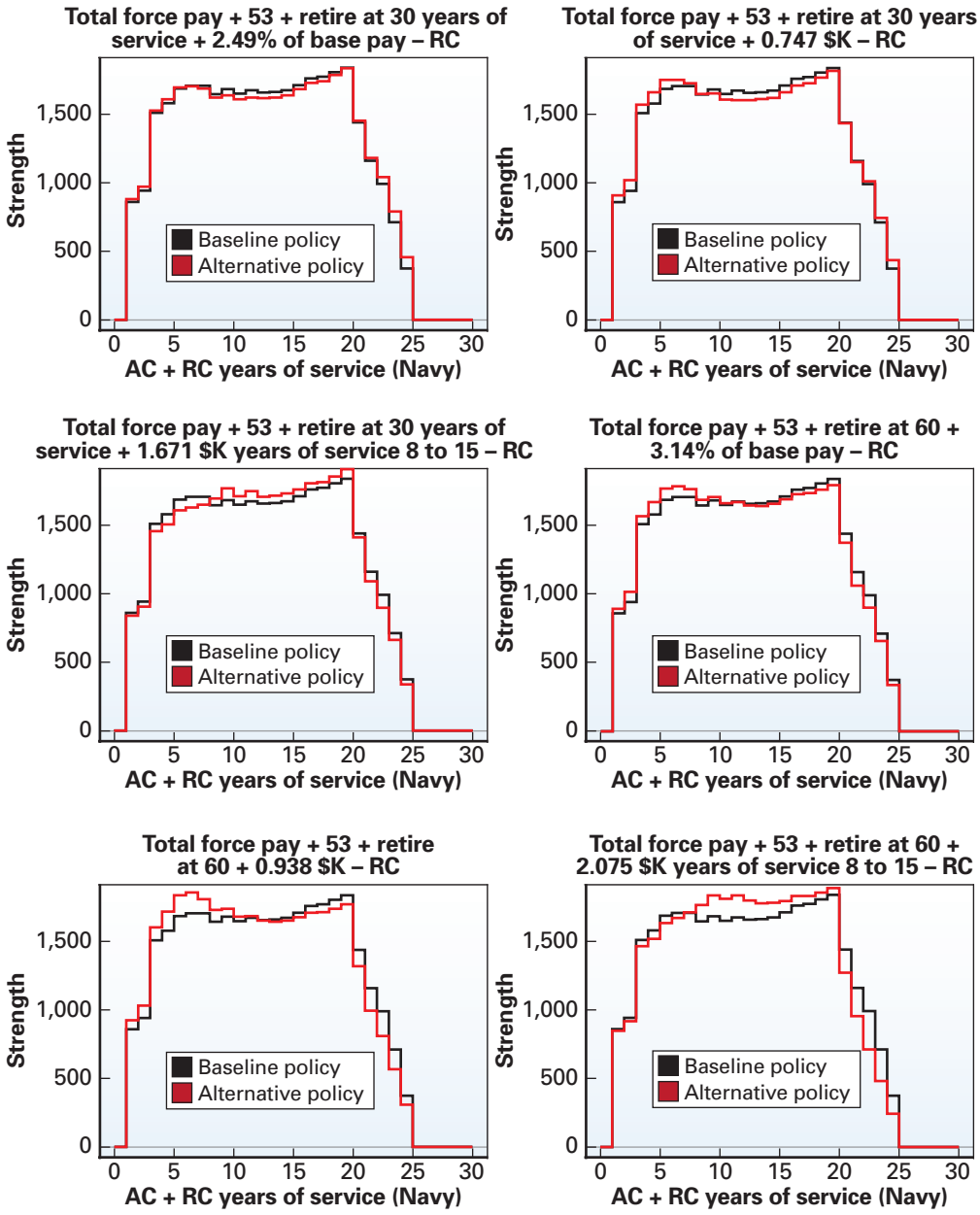


Figure B.2. Reserve Force Size Policy Simulations: Navy Enlisted Personnel

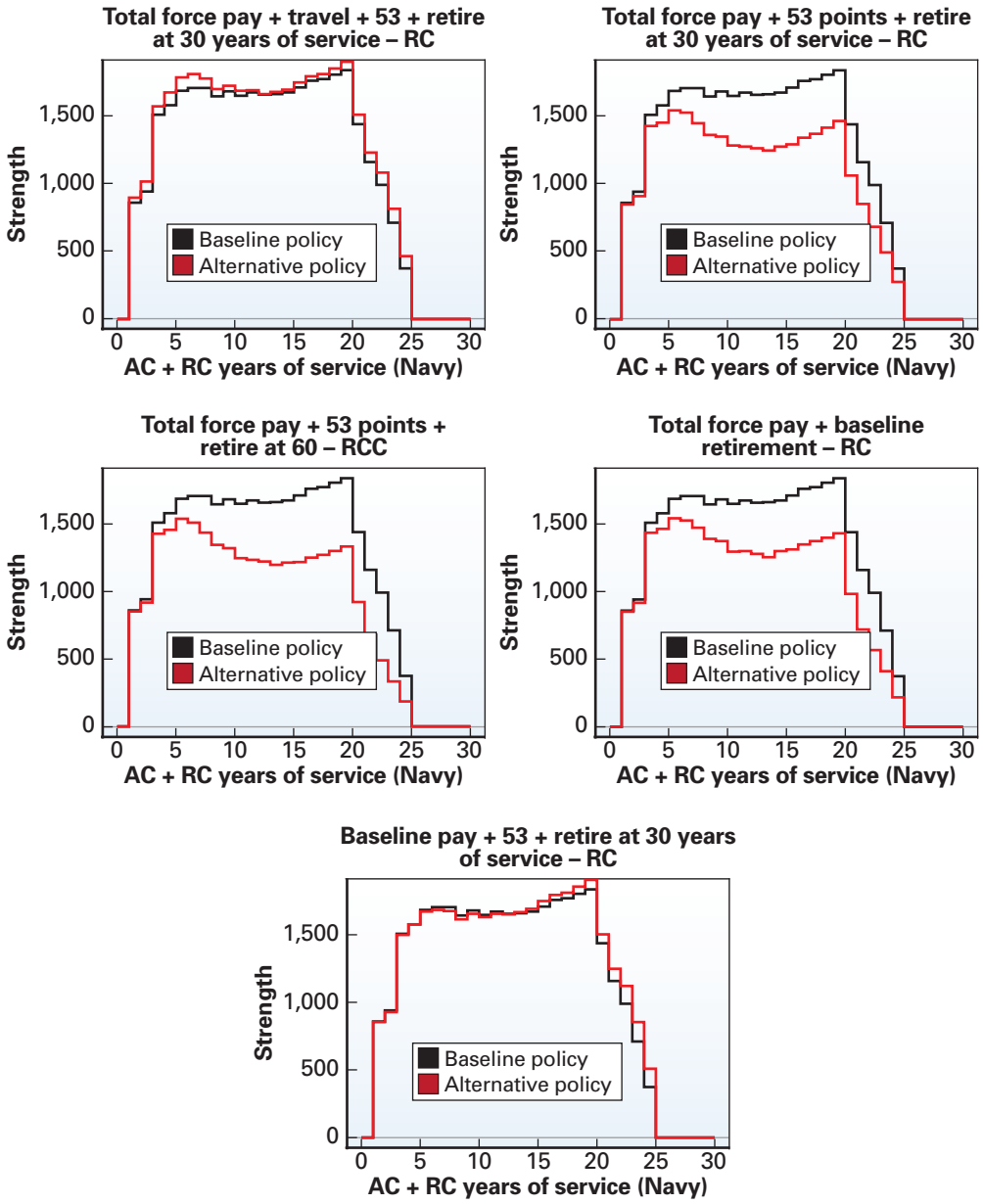


Figure B.2—Continued

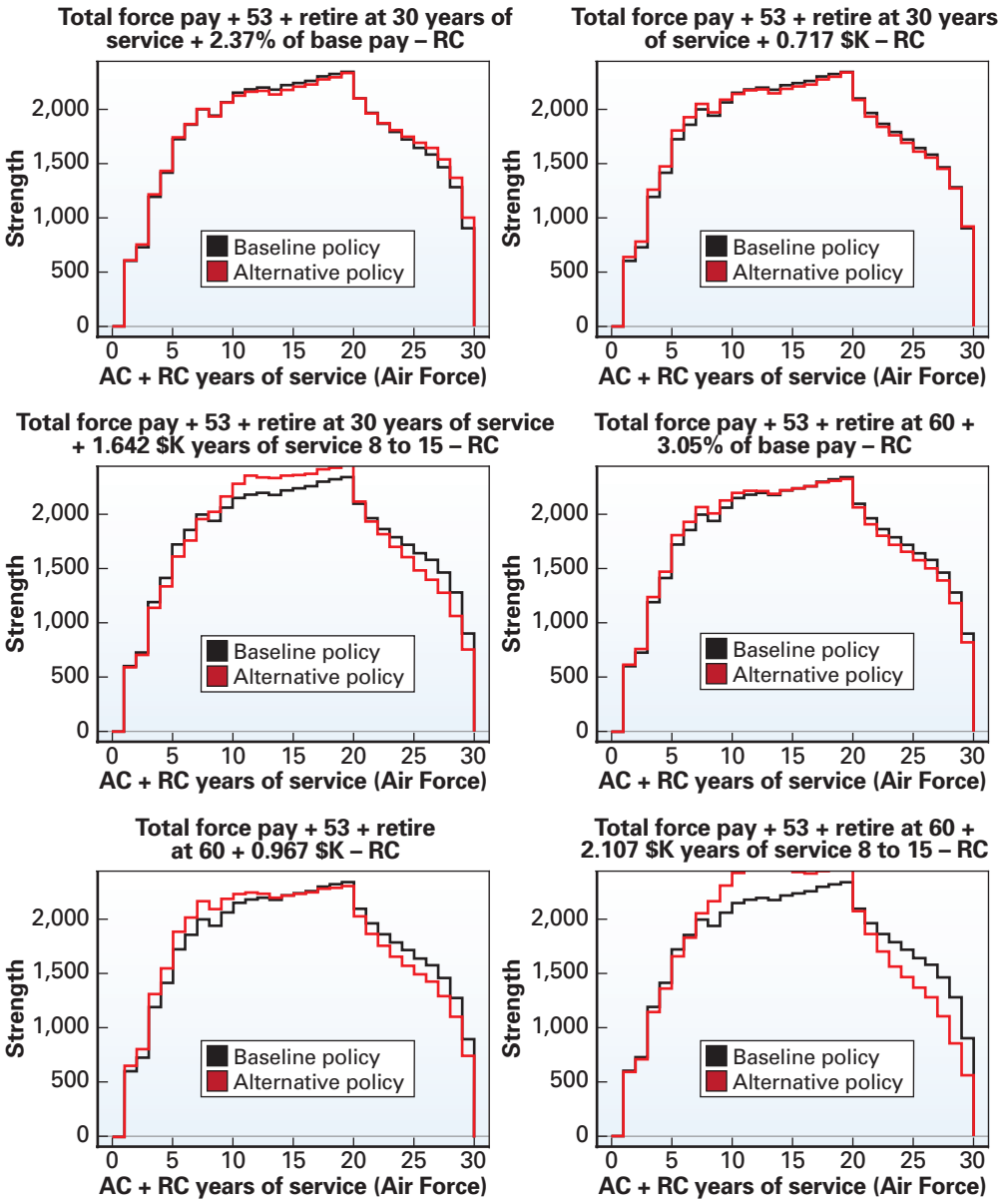


Figure B.3. Reserve Force Size Policy Simulations: Air Force Enlisted Personnel

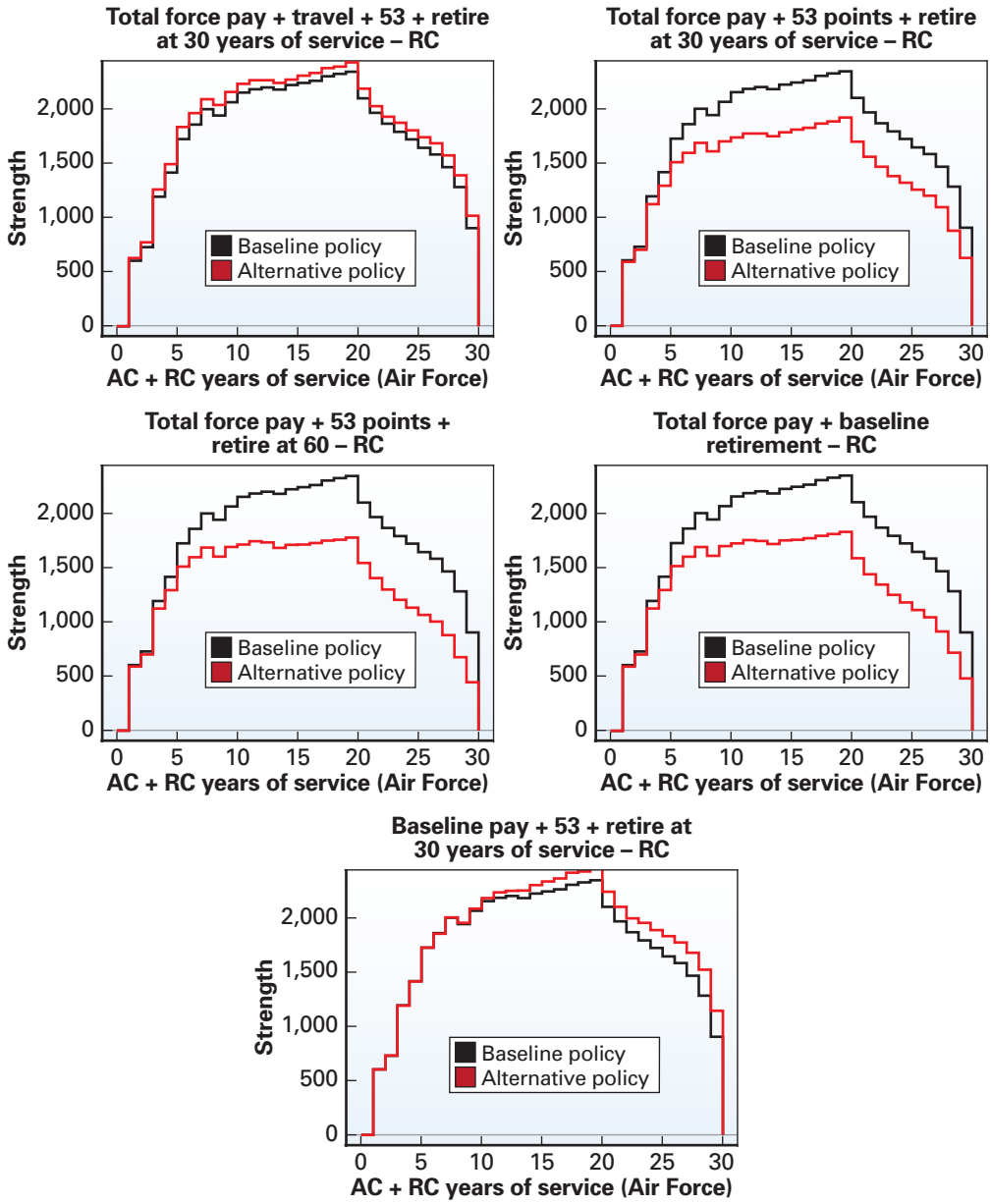


Figure B.3—Continued

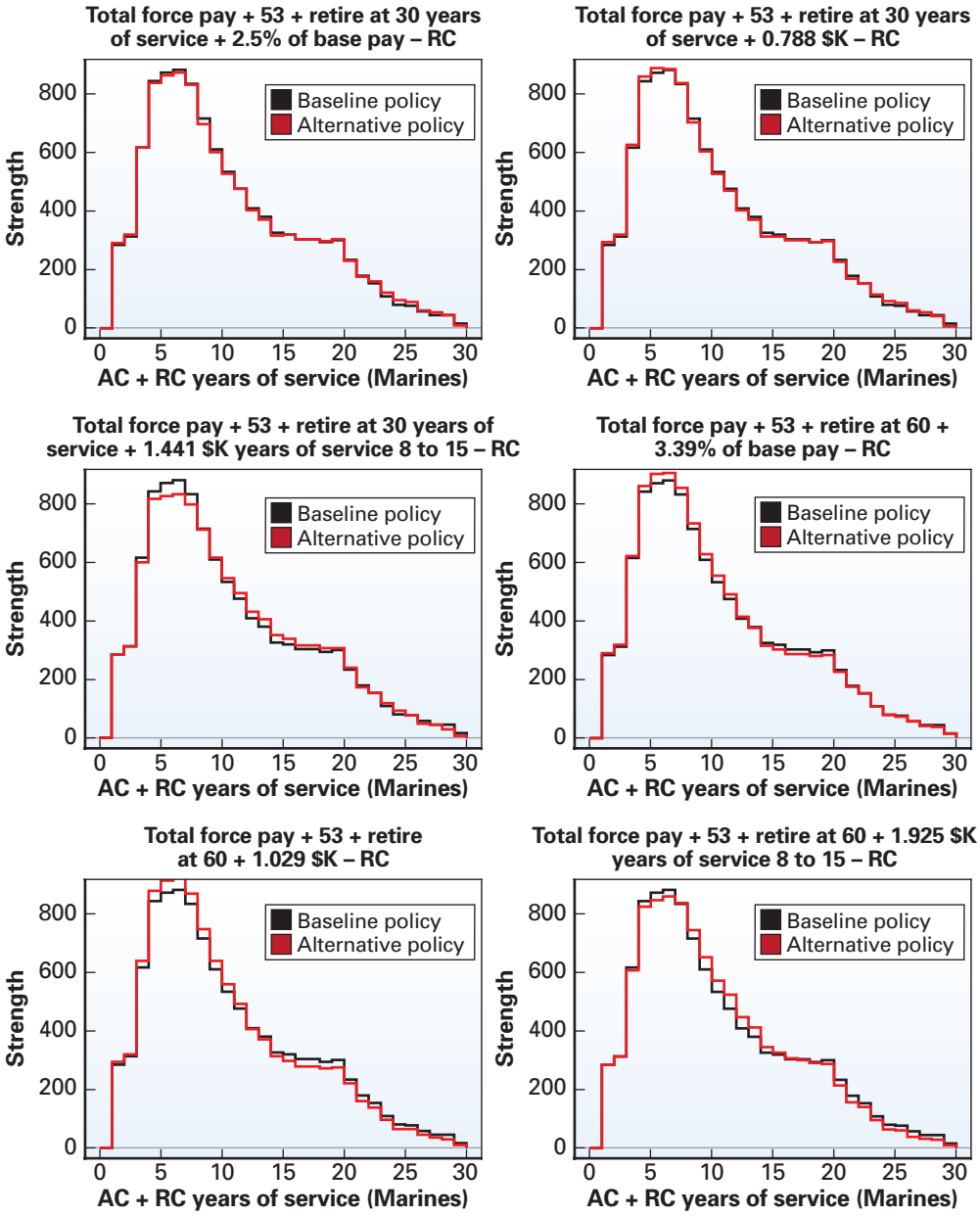


Figure B.4. Reserve Force Size Policy Simulations: Marine Corps Enlisted Personnel

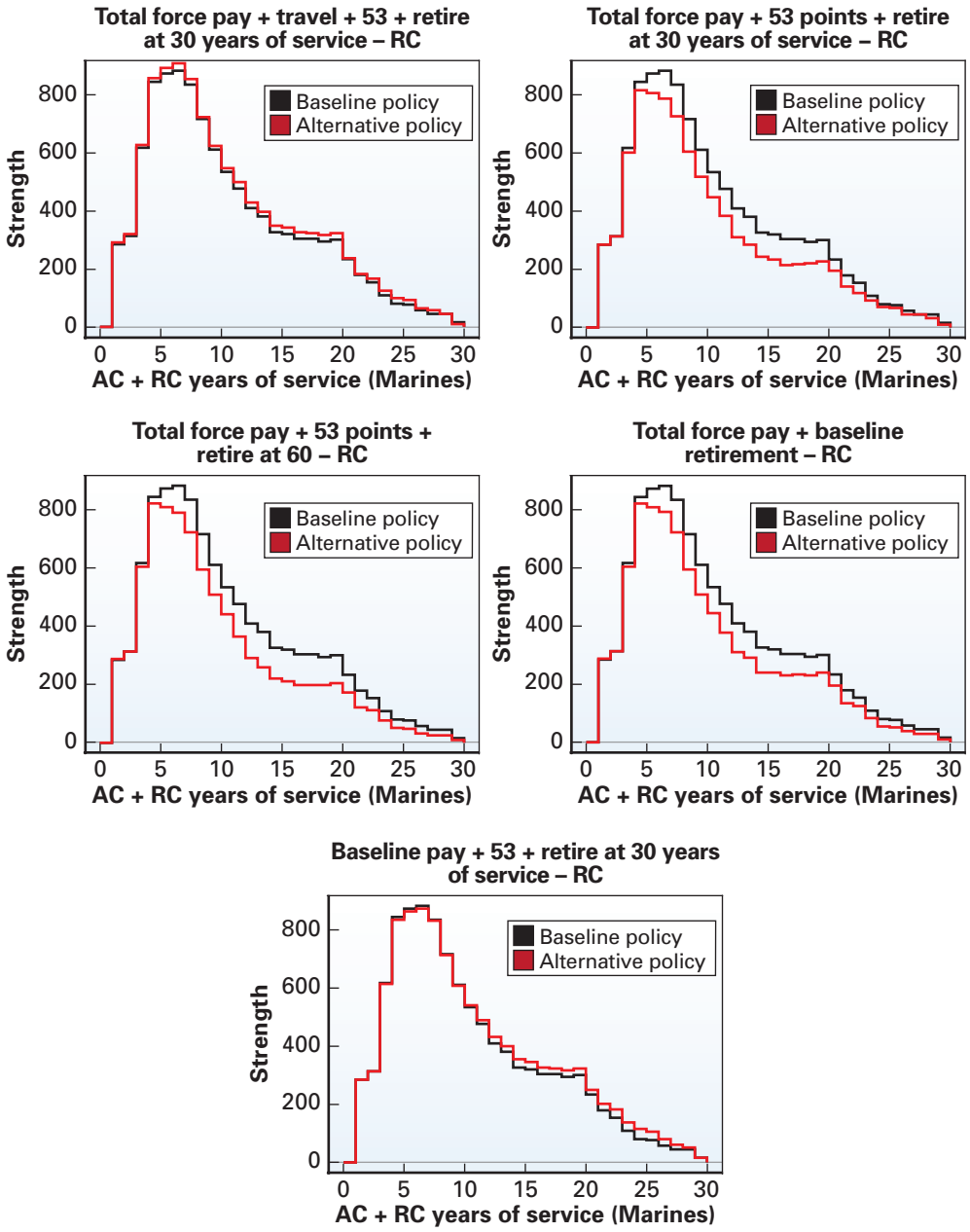


Figure B.4—Continued

Table B.4. Results for Navy Officers

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	5.94%	Flat $3,806	Targeted $8,869	8.56%	Flat $5,294	Targeted $12,195
Active						
Force size, baseline	52,031	52,031	52,031	52,031	52,031	52,031
Force size, new	51,902	51,820	51,661	52,031	51,923	51,687
% change	0	0	–1	0	0	–1
Current cost, baseline	4.504	4.504	4.504	4.504	4.504	4.504
Current cost, new	4.480	4.476	4.462	4.503	4.497	4.477
% change	0	0	0	0	0	0
Retirement cost, baseline	1.042	1.042	1.042	1.042	1.042	1.042
Retirement cost, new	0.999	0.996	0.988	1.045	1.040	1.022
% change	–4	–4	–4	0	0	–1
Total cost, baseline	5.546	5.546	5.546	5.546	5.546	5.546
Total cost, new	5.479	5.472	5.450	5.548	5.537	5.499
% change	–1	–1	–1	0	0	0
Reserve						
Force size, baseline	19,028	19,028	19,028	19,028	19,028	19,028
Force size, new	19,035	19,030	18,957	19,028	19,028	19,019
% change	0	0	0	0	0	0
Current cost, baseline	0.265	0.265	0.265	0.265	0.265	0.265
Current cost, new	0.252	0.241	0.217	0.285	0.267	0.241
% change	–5	–9	–18	8	1	–9
Retirement cost, baseline	0.089	0.089	0.089	0.089	0.089	0.089
Retirement cost, new	0.121	0.116	0.104	0.081	0.077	0.070
% change	36	30	17	–8	–13	–21
Total cost, baseline	0.353	0.353	0.353	0.353	0.353	0.353
Total cost, new	0.373	0.357	0.320	0.367	0.344	0.311
% change	6	1	–9	4	–3	–12

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. RC force size is held constant.

Table B.4—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	52,031	52,031	52,031	52,031	52,031
Force size, new	52,260	52,508	52,990	52,815	51,841
% change	0	1	2	2	0
Current cost, baseline	4.504	4.504	4.504	4.504	4.504
Current cost, new	4.524	4.555	4.619	4.600	4.472
% change	0	0	1	1	0
Retirement cost, baseline	1.042	1.042	1.042	1.042	1.042
Retirement cost, new	1.018	1.034	1.090	1.078	0.996
% change	–3	–2	3	2	–4
Total cost, baseline	5.546	5.546	5.546	5.546	5.546
Total cost, new	5.542	5.589	5.709	5.678	5.468
% change	–1	0	1	1	–1
Reserve					
Force size, baseline	19,028	19,028	19,028	19,028	19,028
Force size, new	17,294	16,086	15,068	15,718	19,437
% change	–9	–15	–21	–17	2
Current cost, baseline	0.265	0.265	0.265	0.265	0.265
Current cost, new	0.185	0.143	0.133	0.139	0.274
% change	–23	–36	–36	–36	1
Retirement cost, baseline	0.089	0.089	0.089	0.089	0.089
Retirement cost, new	0.115	0.110	0.073	0.080	0.124
% change	42	47	4	9	37
Total cost, baseline	0.353	0.353	0.353	0.353	0.353
Total cost, new	0.300	0.253	0.206	0.219	0.398
% change	–7	–15	–26	–25	10

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.

Table B.5. Results for Unrated Air Force Officers

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	5.04%	Flat $3,264	Targeted $8,099	8.41%	Flat $5,460	Targeted $12,756
Active						
Force size, baseline	32,748	32,748	32,748	32,748	32,748	32,748
Force size, new	32,676	32,665	32,631	32,717	32,683	32,640
% change	0	0	0	0	0	0
Current cost, baseline	3.163	3.163	3.163	3.163	3.163	3.163
Current cost, new	3.154	3.154	3.153	3.159	3.158	3.158
% change	0	0	0	0	0	0
Retirement cost, baseline	0.842	0.842	0.842	0.842	0.842	0.842
Retirement cost, new	0.827	0.827	0.825	0.842	0.840	0.835
% change	–2	–2	–2	0	0	–1
Total cost, baseline	4.005	4.005	4.005	4.005	4.005	4.005
Total cost, new	3.982	3.981	3.979	4.001	3.998	3.993
% change	0	0	0	0	0	0
Reserve						
Force size, baseline	6,500	6,500	6,500	6,500	6,500	6,500
Force size, new	6,528	6,500	6,500	6,503	6,502	6,495
% change	0	0	0	0	0	0
Current cost, baseline	0.092	0.092	0.092	0.092	0.092	0.092
Current cost, new	0.083	0.080	0.073	0.099	0.094	0.082
% change	–10	–14	–22	7	1	–11
Retirement cost, baseline	0.047	0.047	0.047	0.047	0.047	0.047
Retirement cost, new	0.061	0.059	0.055	0.044	0.042	0.039
% change	28	26	17	–7	–10	–18
Total cost baseline	0.140	0.140	0.140	0.140	0.140	0.140
Total cost new	0.144	0.139	0.128	0.139	0.136	0.121
% change	3	0	–9	0	–3	–13

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. RC force size is held constant.

Table B.5—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	32,748	32,748	32,748	32,748	32,748
Force size, new	32,857	33,029	33,327	33,255	32,542
% change	0	1	2	2	–1
Current cost, baseline	3.163	3.163	3.163	3.163	3.163
Current cost, new	3.178	3.199	3.237	3.228	3.136
% change	0	0	1	0	0
Retirement cost, baseline	0.842	0.842	0.842	0.842	0.842
Retirement cost, new	0.837	0.844	0.868	0.864	0.821
% change	–1	–1	1	1	–2
Total cost, baseline	4.005	4.005	4.005	4.005	4.005
Total cost, new	4.015	4.043	4.105	4.092	3.957
% change	0	0	1	1	–1
Reserve					
Force size, baseline	6,500	6,500	6,500	6,500	6,500
Force size, new	6,199	5,882	5,512	5,670	6,765
% change	–5	–10	–15	–13	4
Current cost, baseline	0.092	0.092	0.092	0.092	0.092
Current cost, new	0.067	0.053	0.050	0.051	0.097
% change	–24	–37	–37	–37	1
Retirement cost, baseline	0.047	0.047	0.047	0.047	0.047
Retirement cost, new	0.059	0.058	0.041	0.044	0.063
% change	30	35	1	6	27
Total cost, baseline	0.140	0.140	0.140	0.140	0.140
Total cost, new	0.126	0.111	0.090	0.095	0.160
% change	–5	–13	–24	–22	10

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.

Table B.6. Results for Marine Corps Officers

	Policy Alternative					
	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]
Pay	RMC	RMC	RMC	RMC	RMC	RMC
Retirement points per year	53	53	53	53	53	53
Start of benefits	30 YOS	30 YOS	30 YOS	Age 60	Age 60	Age 60
Incentive pay	7.00%	Flat $4,191	Targeted $8,498	7.87%	Flat $4,582	Targeted $9,603
Active						
Force size, baseline	20,709	20,709	20,709	20,709	20,709	20,709
Force size, new	20,680	20,633	20,607	20,679	20,634	20,604
% change	0	0	0	0	0	–1
Current cost, baseline	1.862	1.862	1.862	1.862	1.862	1.862
Current cost, new	1.856	1.852	1.849	1.860	1.856	1.851
% change	0	0	0	0	0	0
Retirement cost, baseline	0.473	0.473	0.473	0.473	0.473	0.473
Retirement cost, new	0.462	0.461	0.459	0.472	0.472	0.466
% change	–2	–2	–3	0	0	–1
Total cost, baseline	2.336	2.336	2.336	2.336	2.336	2.336
Total cost, new	2.318	2.314	2.308	2.332	2.328	2.317
% change	–1	–1	–1	0	0	0
Reserve						
Force size, baseline	7,561	7,561	7,561	7,561	7,561	7,561
Force size, new	7,525	7,561	7,565	7,561	7,561	7,561
% change	0	0	0	0	0	0
Current cost, baseline	0.095	0.095	0.095	0.095	0.095	0.095
Current cost, new	0.096	0.093	0.087	0.100	0.096	0.090
% change	1	–2	–9	5	0	–5
Retirement cost, baseline	0.024	0.024	0.024	0.024	0.024	0.024
Retirement cost, new	0.027	0.026	0.024	0.021	0.020	0.019
% change	14	8	–2	–12	–16	–20
Total cost, baseline	0.120	0.120	0.120	0.120	0.120	0.120
Total cost, new	0.123	0.119	0.110	0.121	0.116	0.110
% change	4	0	–8	2	–3	–8

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.
a. RC force size is held constant.

Table B.6—Continued

	Policy Alternative				
	7	8	9	10	11
Pay	RMC	RMC	RMC	RMC	Baseline
Retirement points per year	53	53	53	75	53
Start of benefits	30 YOS	30 YOS	Age 60	Age 60	30 YOS
Incentive pay	Travel	None	None	None	None
Active					
Force size, baseline	20,709	20,709	20,709	20,709	20,709
Force size, new	20,958	21,149	21,192	21,152	20,716
% change	1	2	2	2	0
Current cost, baseline	1.862	1.862	1.862	1.862	1.862
Current cost, new	1.888	1.910	1.917	1.913	1.860
% change	0	0	1	1	0
Retirement cost, baseline	0.473	0.473	0.473	0.473	0.473
Retirement cost, new	0.476	0.486	0.495	0.493	0.463
% change	–1	0	2	2	–2
Total cost, baseline	2.336	2.336	2.336	2.336	2.336
Total cost, new	2.364	2.395	2.412	2.406	2.323
% change	0	0	1	1	–1
Reserve					
Force size, baseline	7,561	7,561	7,561	7,561	7,561
Force size, new	6,793	6,324	6,203	6,392	7,454
% change	–10	–16	–18	–15	–1
Current cost, baseline	0.095	0.095	0.095	0.095	0.095
Current cost, new	0.067	0.051	0.050	0.052	0.095
% change	–22	–36	–36	–36	1
Retirement cost, baseline	0.024	0.024	0.024	0.024	0.024
Retirement cost, new	0.026	0.025	0.020	0.022	0.028
% change	18	23	0	9	17
Total cost, baseline	0.120	0.120	0.120	0.120	0.120
Total cost, new	0.092	0.076	0.070	0.074	0.122
% change	–14	–24	–29	–27	4

NOTE: Costs are in billions of dollars; percentage changes in costs are changes in costs per member.

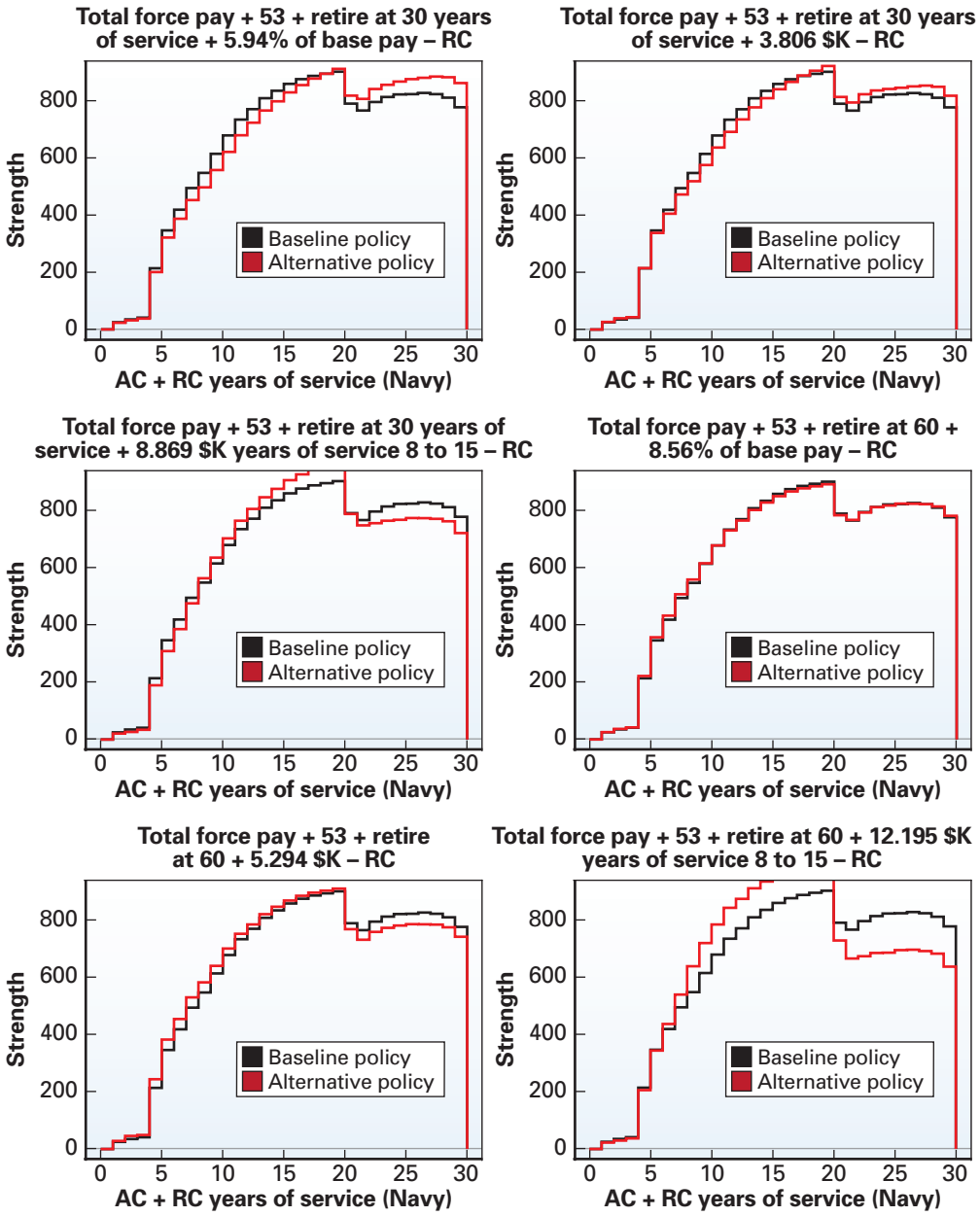


Figure B.5. Reserve Force Size Simulations: Navy Officers

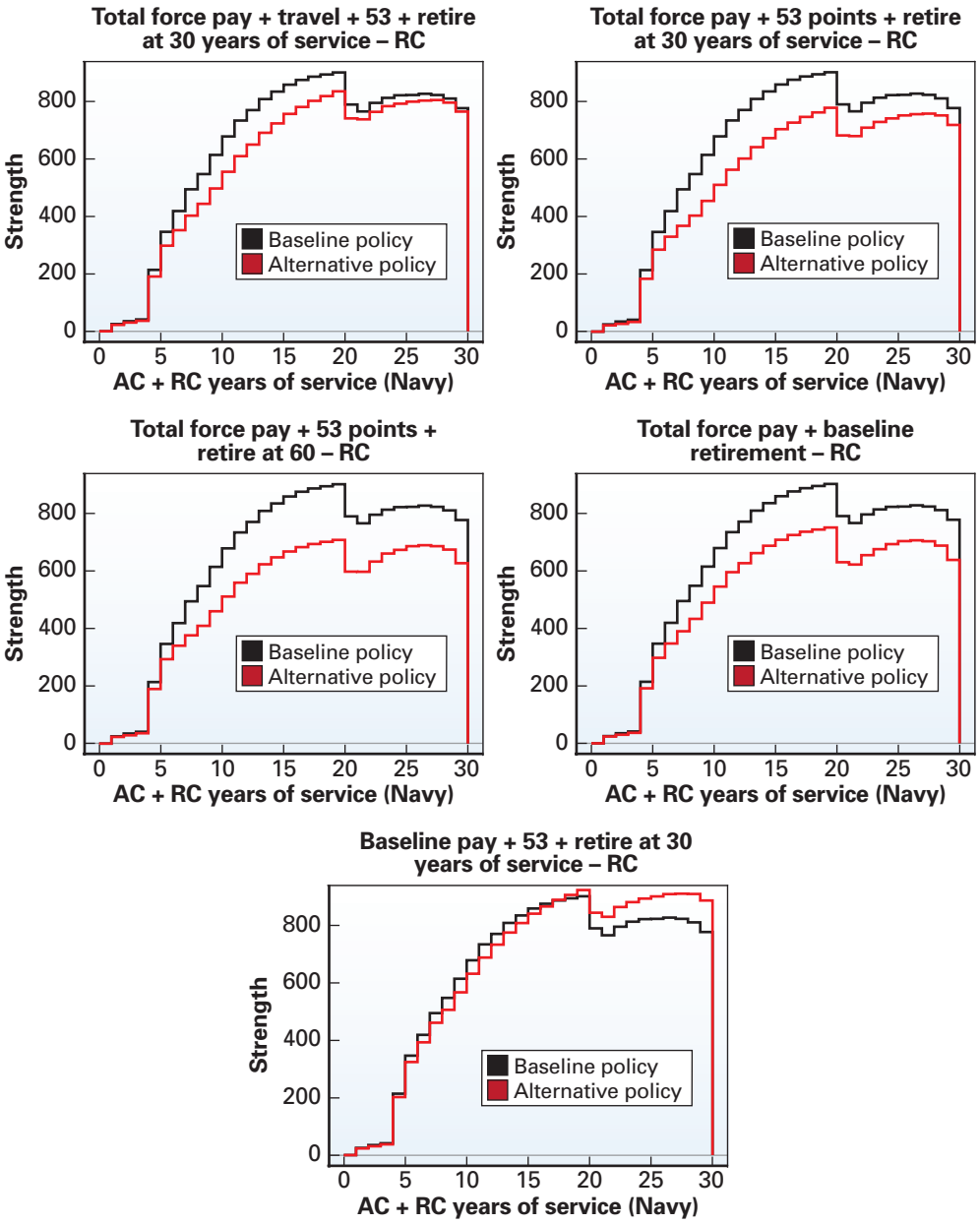


Figure B.5—Continued

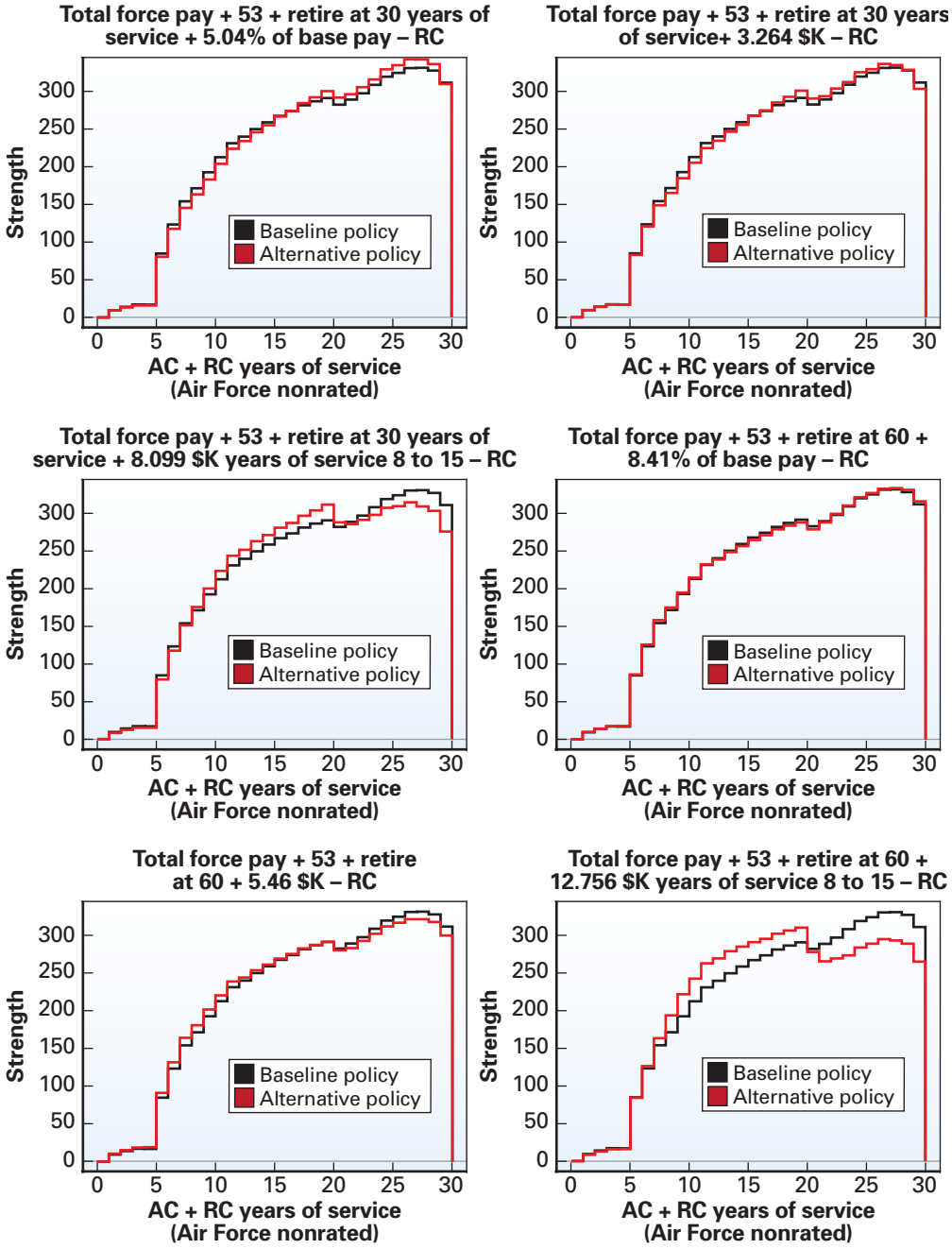


Figure B.6. Reserve Force Size Simulations: Air Force Officers

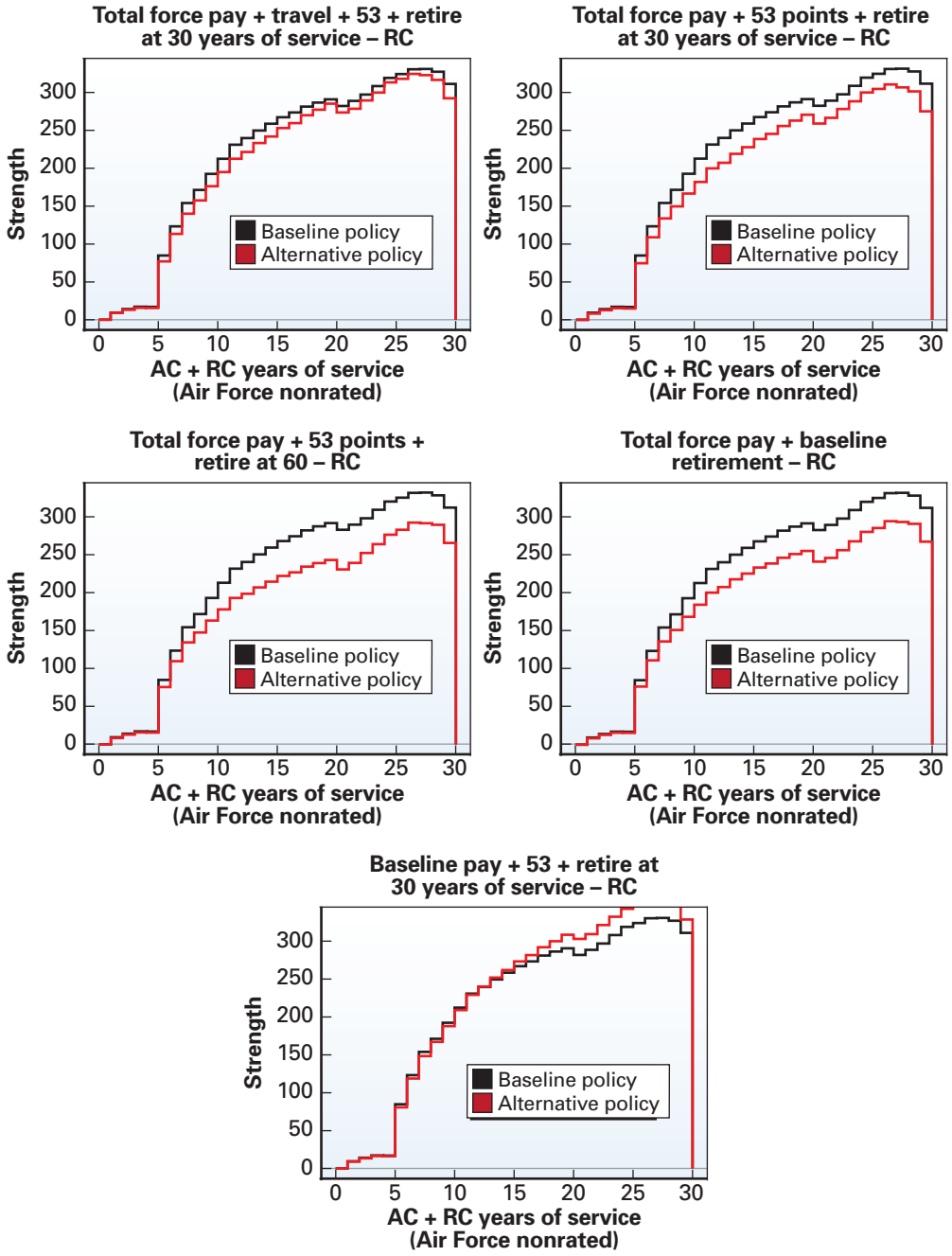


Figure B.6—Continued

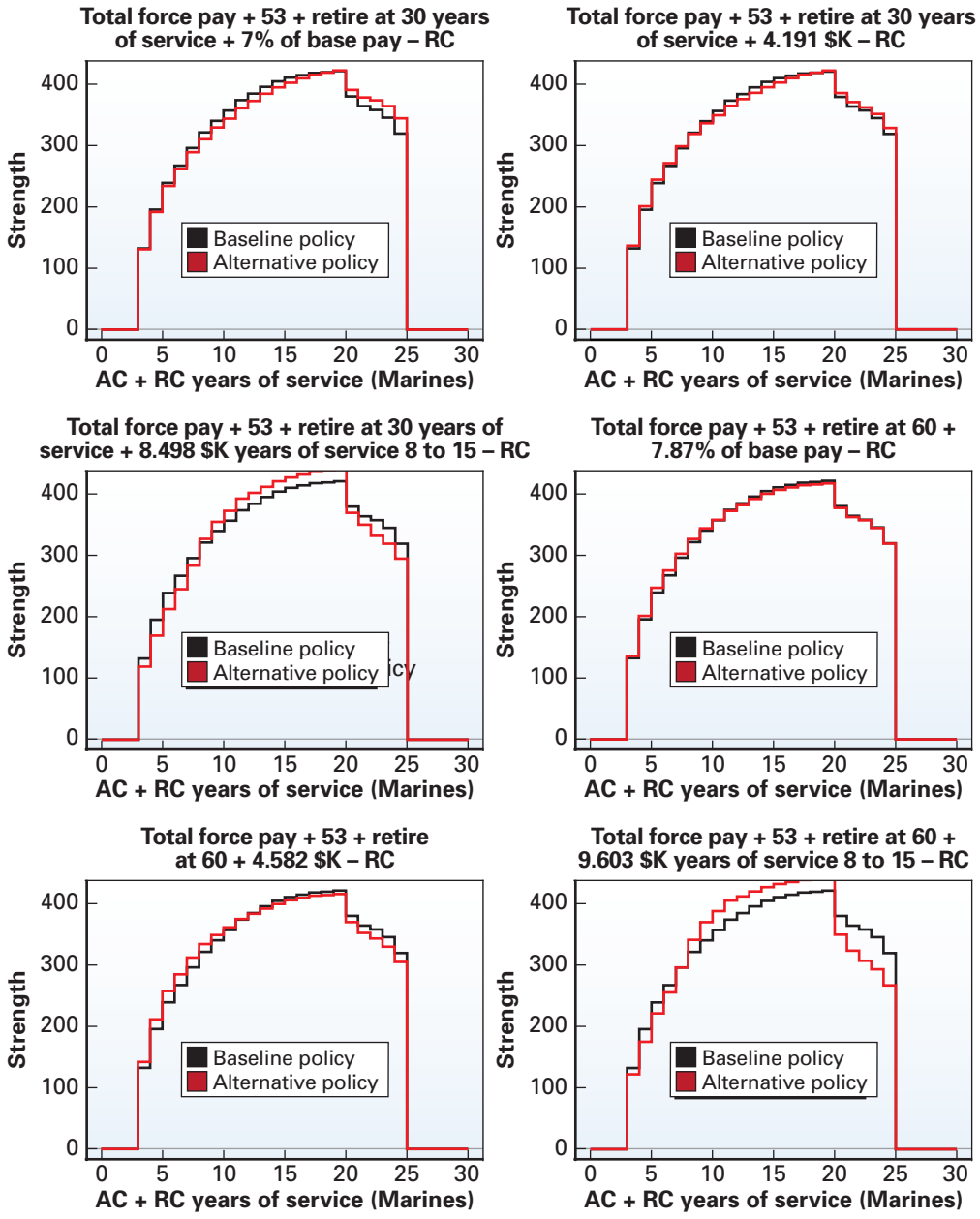


Figure B.7. Reserve Force Size Simulations: Marine Corps Officers

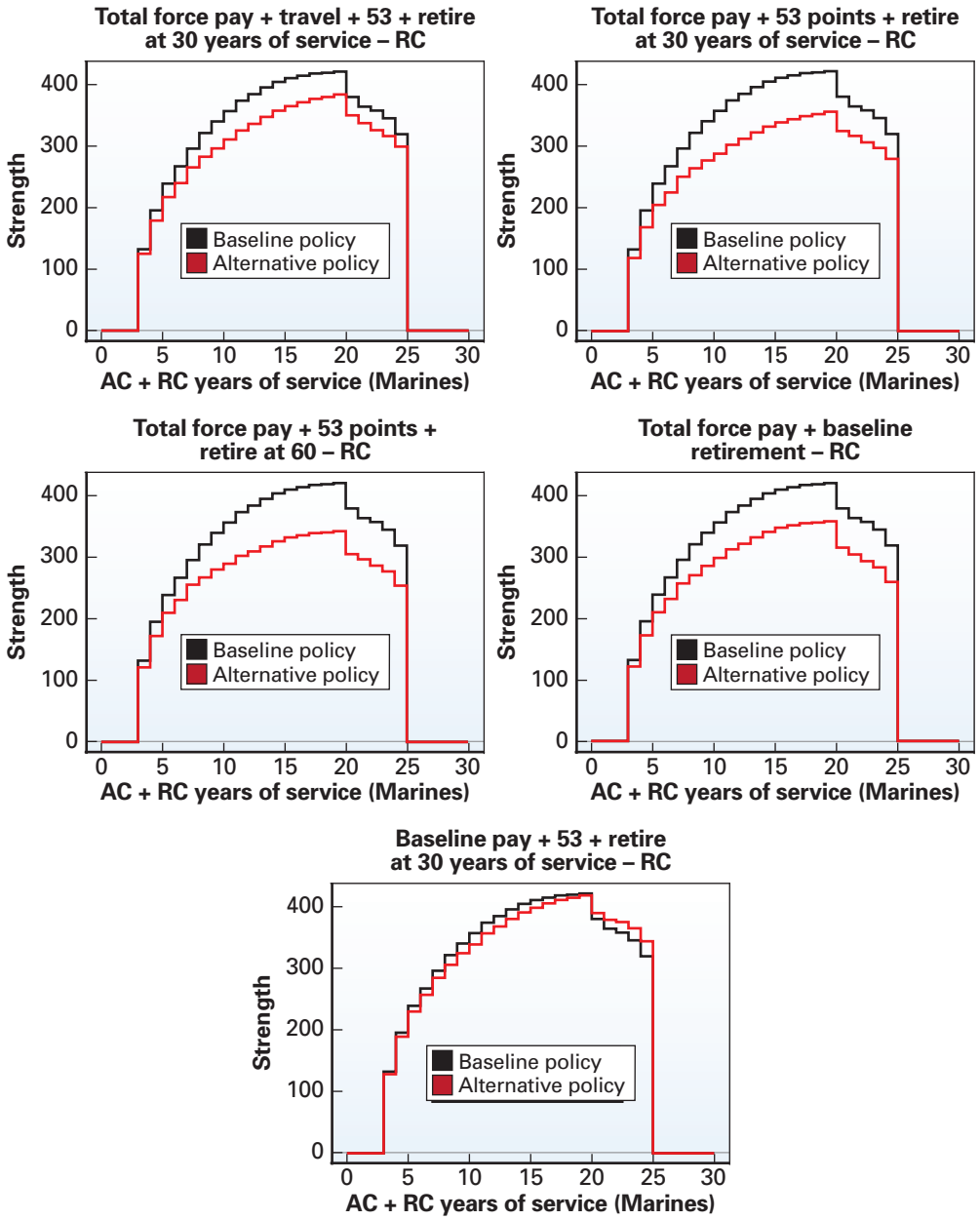


Figure B.7—Continued

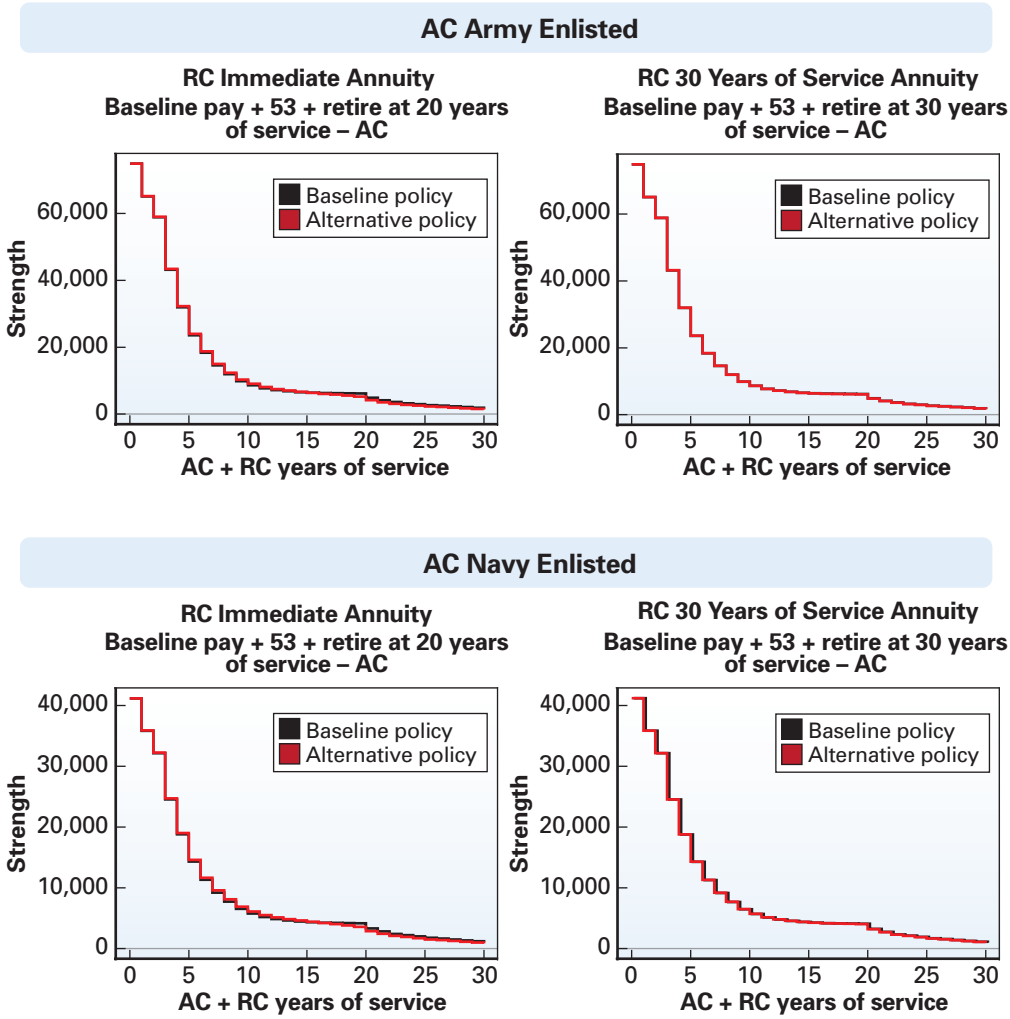


Figure B.8. Active Force Size Simulations for Enlisted Personnel by Service: Immediate Annuity for RC Members Versus 30-Year Retirement Eligibility

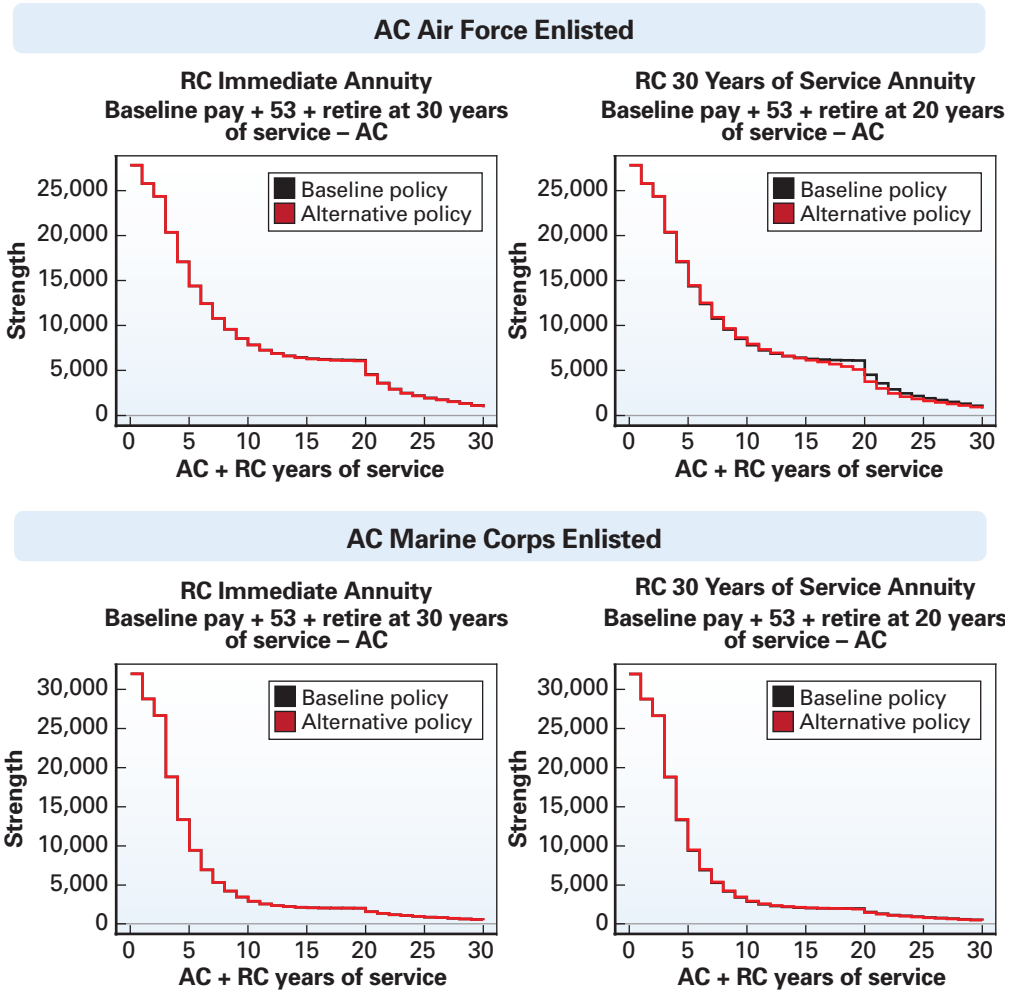


Figure B.8—Continued

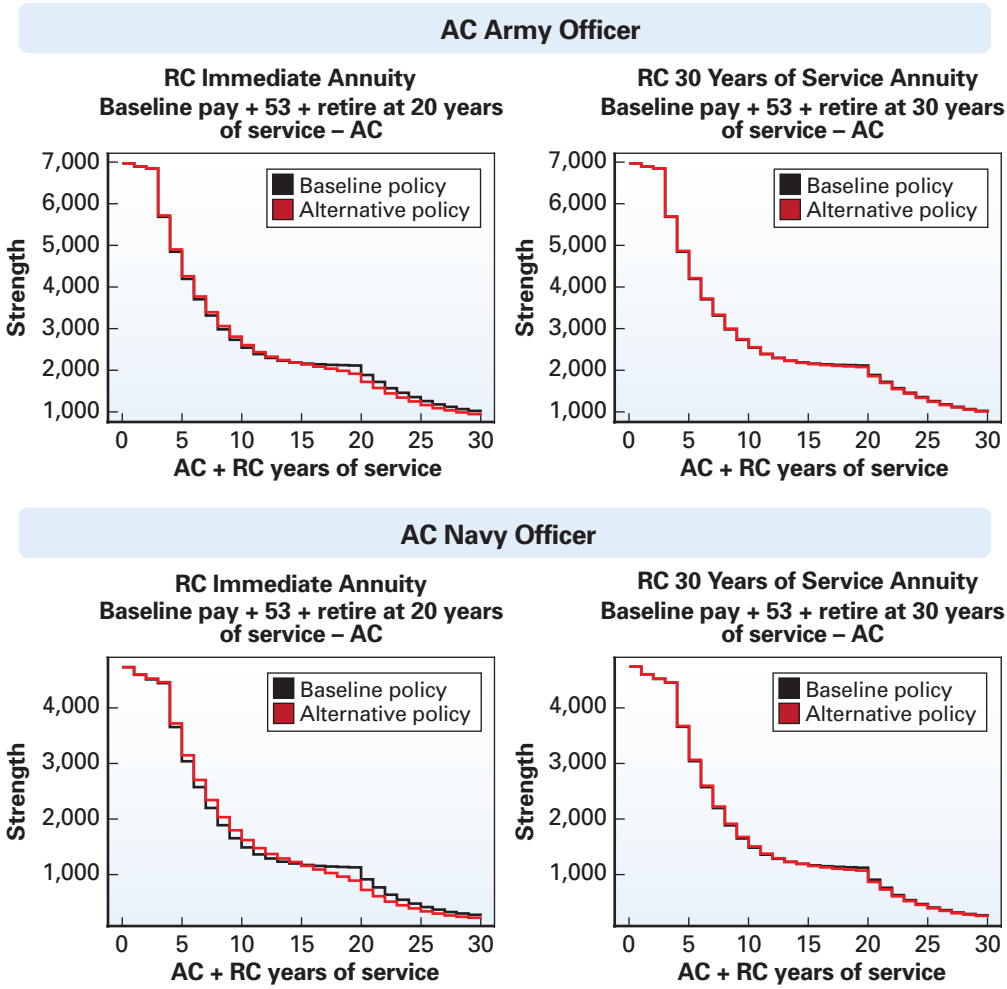


Figure B.9. Active Force Size Simulations for Officers by Service: Immediate Annuity for RC Members Versus 30-Year Retirement Eligibility

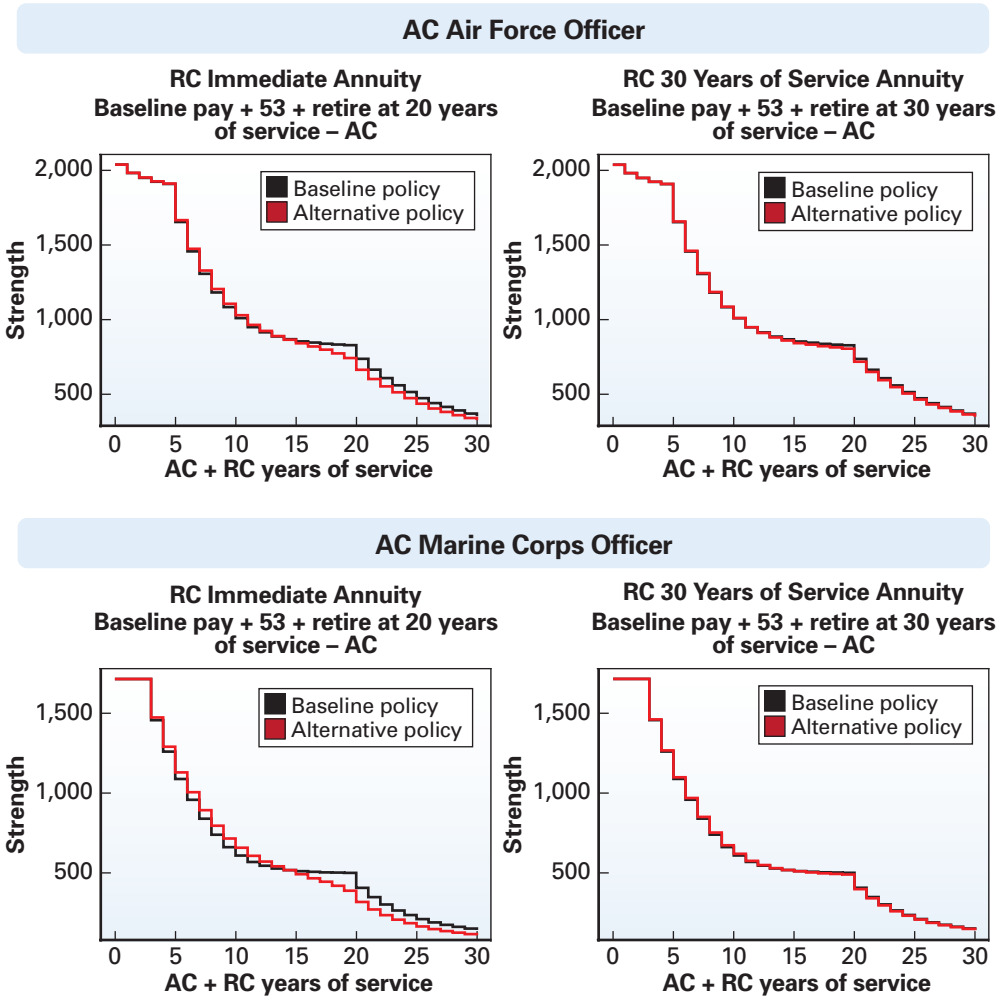


Figure B.9—Continued

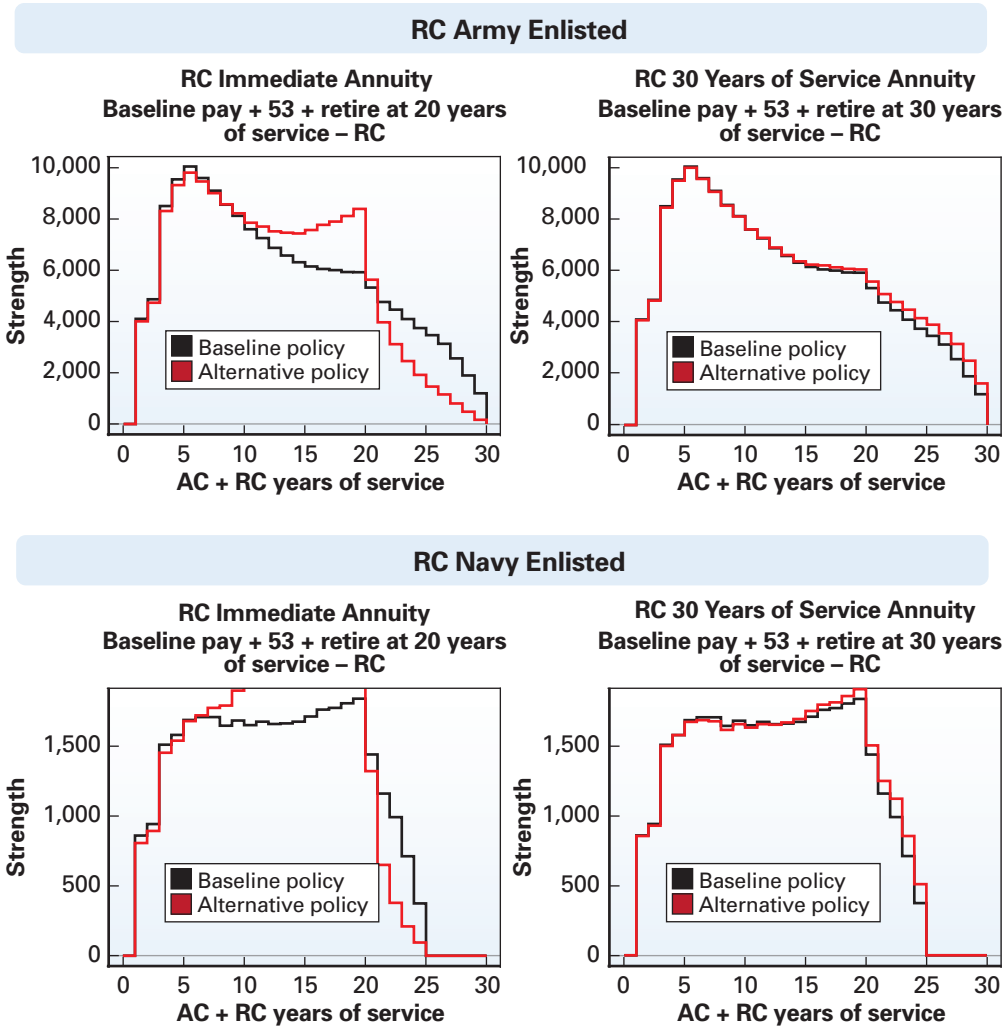


Figure B.10. Reserve Force Size Simulations for Enlisted Personnel by Service: Immediate Annuity for RC Members Versus 30-Year Retirement Eligibility

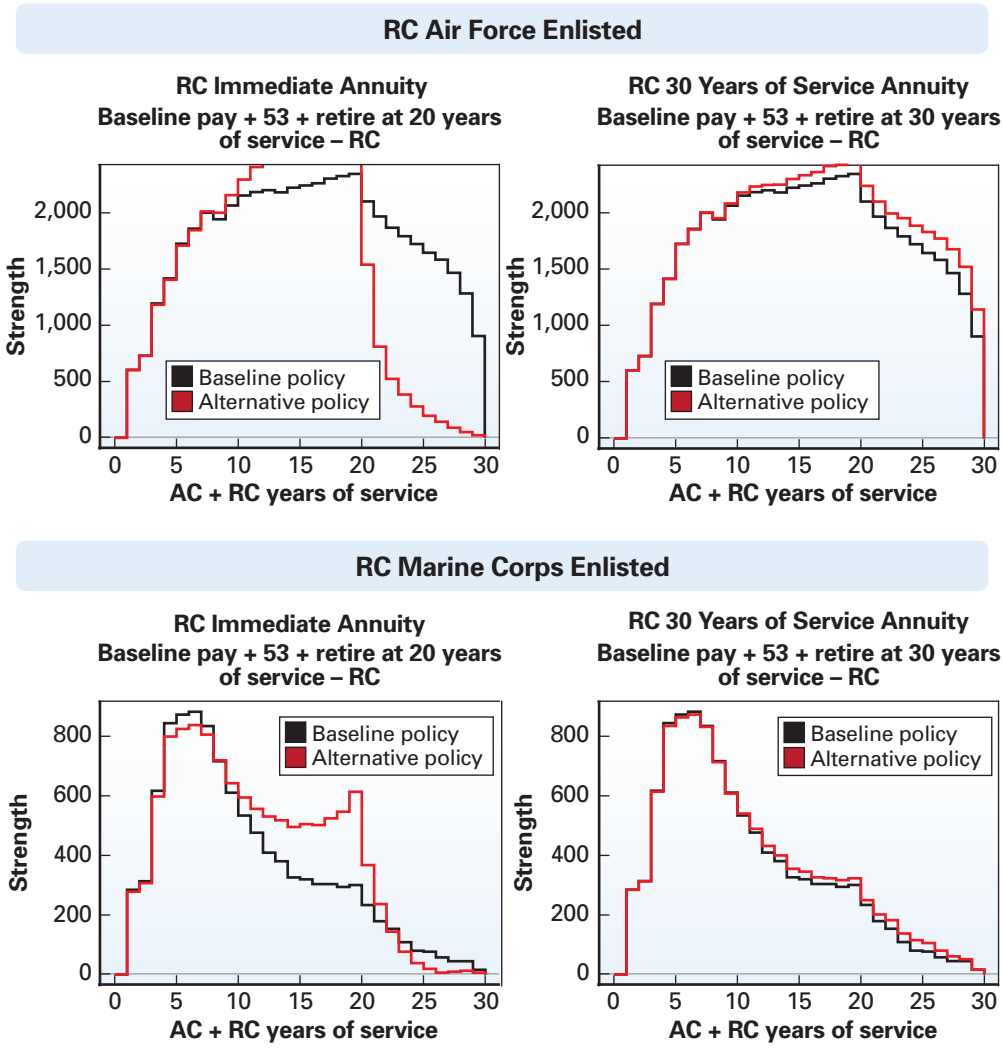


Figure B.10—Continued

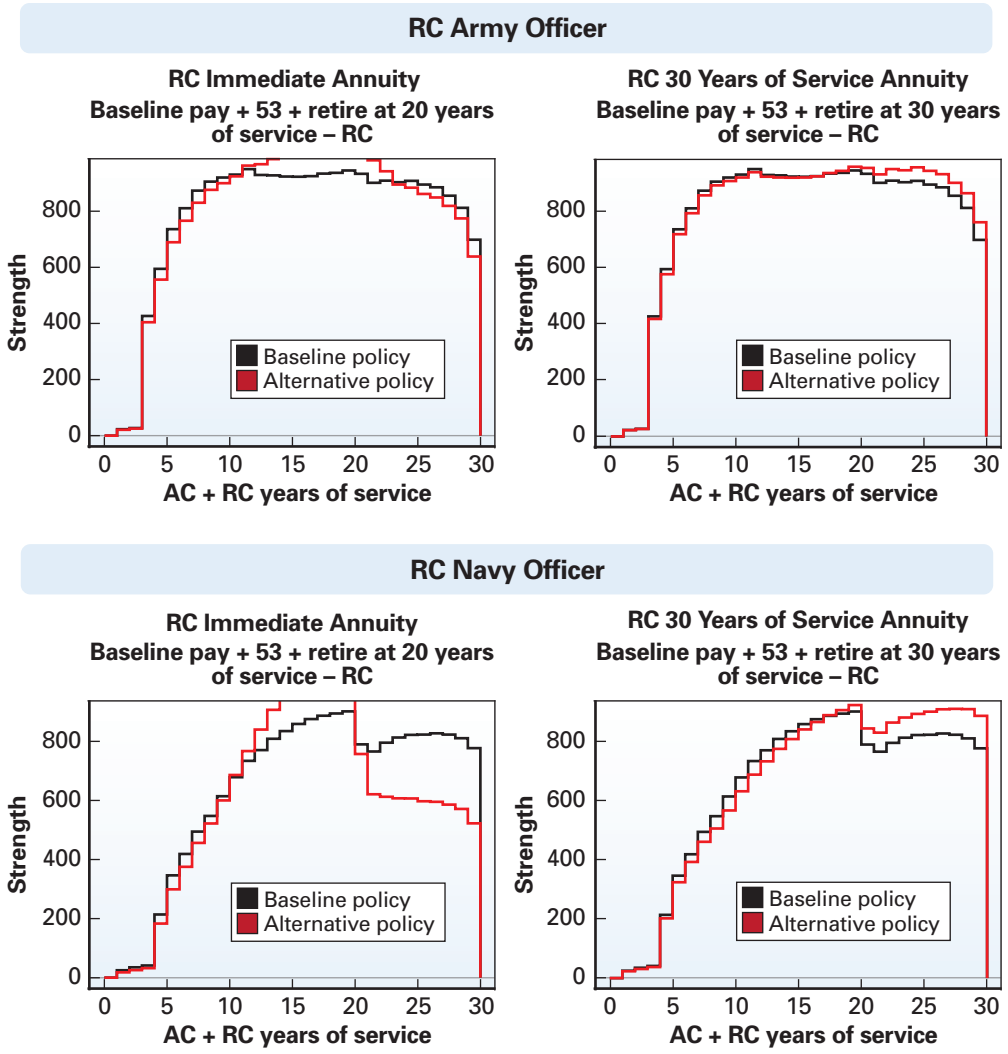


Figure B.11. Reserve Force Size Simulations for Officers by Service: Immediate Annuity for RC Members Versus 30-Year Retirement Eligibility

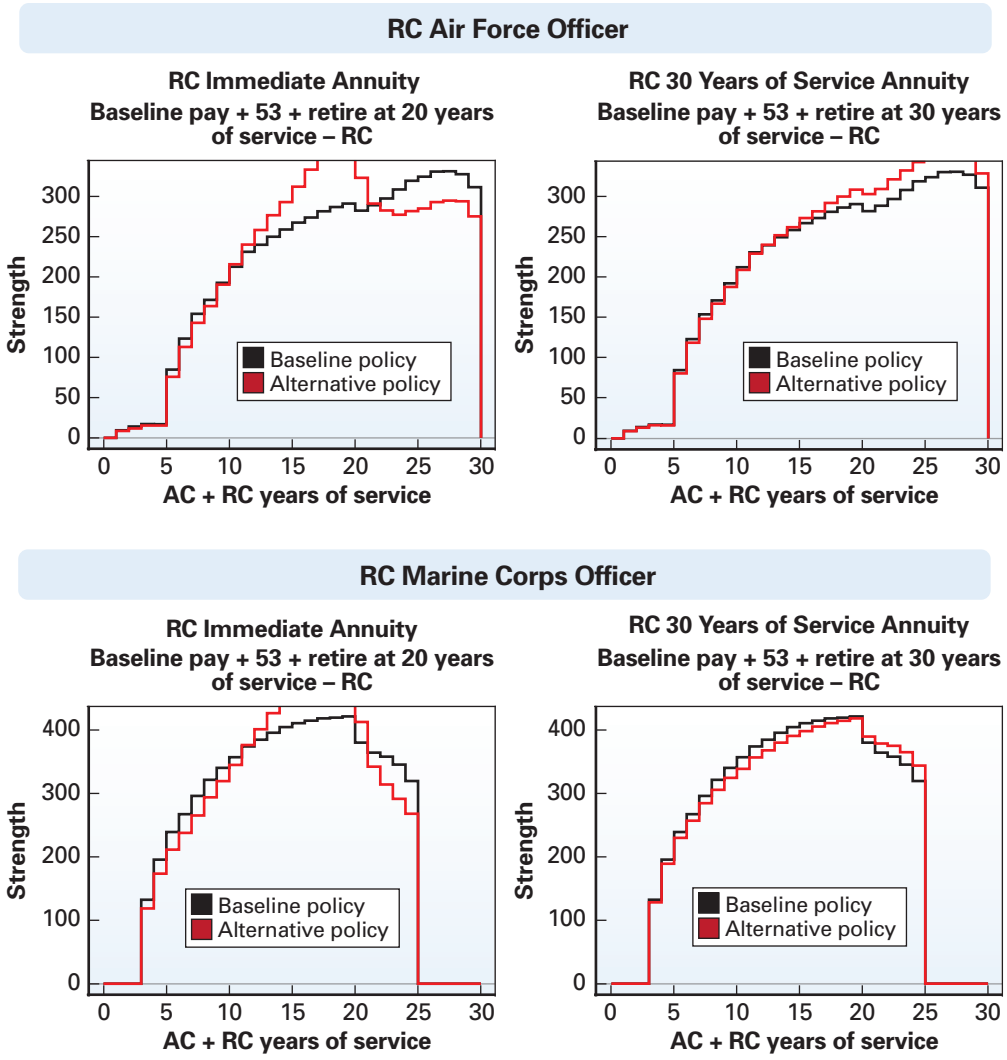


Figure B.11—Continued

Bibliography

Asch, Beth J., James Hosek, and David Loughran, *Reserve Retirement Reform: A Viewpoint on Recent Congressional Proposals*, Santa Monica, Calif.: RAND Corporation, TR-199-OSD. As of June 16, 2011: http://www.rand.org/pubs/technical_reports/TR199.html

Asch, Beth J., James Hosek, Michael Mattock, and Christina Panis, *Assessing Compensation Reform: Research in Support of the 10th Quadrennial Review of Military Compensation*, Santa Monica, Calif.: RAND Corporation, MG-764-OSD, 2008. As of May 5, 2011: http://www.rand.org/pubs/monographs/MG764.html

Berndt, E., B. Hall, R. Hall, and J. Hausman, "Estimation and Inference in Nonlinear Structural Models," *Annals of Economic and Social Measurement*, Vol. 3, 1974, pp. 653–665.

Buddin, Richard, Daniel S. Levy, Janet M. Hanley, and Donald M. Waldman, *Promotion Tempo and Enlisted Retention*, Santa Monica, Calif.: RAND Corporation, R-4135-FMP, 1992. As of August 18, 2011: http://www.rand.org/pubs/reports/R4135.html

Cawley, John, James Heckman, and Edward Vytlacil, "On Policies to Reward the Value Added by Educators," *The Review of Economics and Statistics*, Vol. 81, No. 4, November 1999, pp. 720–727.

Commission on the National Guard and Reserves, *Transforming the National Guard and Reserves into a 21st-Century Operational Force, Final Report, Executive Summary*, January 31, 2008. As of May 20, 2011: http://www.cngr.gov/resource-center.CNGR-reports.asp

Comprehensive Review of the Future Role and the Reserve Component, Volume I, Executive Summary, and Main Report, Office of the Vice Chairman of the Joint Chiefs of Staff and Office of the Assistant Secretary of Defense for Reserve Affairs Draft report, January 14, 2011.

Department of Defense, *Military Compensation Background Papers Sixth Edition*, Office of the Under Secretary of Defense for Personnel and Readiness, Directorate of Compensation, May 2005. As of June 16, 2011: http://www.loc.gov/rr/frd/mil-comp.html

CNGR—*See* Commission on the National Guard and Reserves.

Department of Defense, *Selected Military Compensation Tables: 1 April 2007, 40 Years of Service Pay Table ("Green Book")*, Office of the Under Secretary of Defense for Personnel and Readiness, Directorate of Compensation, 2007. As of May 5, 2011: http://militarypay.defense.gov/Reports/greenbooks.html

Frederick, Shane, George Loewenstein, and Ted O'Donoghue, "Time Discounting and Time Preference: A Critical Review," *Journal of Economic Literature*, Vol. 40, No. 2, June 2002, pp. 351–401.

Lazear, Edward, "Salaries and Piece Rates," *Journal of Business*, Vol. 59, No. 3, 1986, pp. 405–431.

Loughran, David, Jacob Klerman, and Craig Martin, *Activation and the Earnings of Reservists*, Santa Monica, Calif.: RAND Corporation, MG-474-OSD, 2006. As of June 21, 2011: http://www.rand.org/pubs/monographs/MG474.html

Office of the Assistant Secretary of Defense (Reserve Affairs), "Official Guard and Reserve Manpower Strengths and Statistics, Summary, End Fiscal Year 1990," undated. As of August 15, 2011: http://www.stormingmedia.us/00/0053/A005332.html

Office of the Assistant Secretary of Defense (Reserve Affairs), "Official Guard and Reserve Manpower Strengths and Statistics. FY 2000 Summary," 2000. As of August 15, 2011: http://dodreports.com/ada512359

Office of the Assistant Secretary of Defense (Reserve Affairs), "Official Guard and Reserve Manpower Strengths and Statistics. FY 2009 Summary," undated, accessed from Defense Manpower Data Center Information Delivery Service.

Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for 2007*, March 2006. As of August 15, 2011: http://comptroller.defense.gov/Docs/fy2007_greenbook.pdf

U.S. Census Bureau, *Current Population Reports*, series P60-235, August 2008. As of August 16, 2011: http://www.census.gov/hhes/www/macro/032008/perinc/new04_000.htm

CHAPTER 17

Overview of Reserve Component Compensation and Benefits

Like the active duty force, members of the reserve components are eligible for a rich array of compensation and benefits, many of which are the same benefits provided to the active component. Because most reserve component members perform duty less than full time, the pay and benefits they receive are often based on the level of participation and, for some benefits, the training category of the member. This chapter presents a comprehensive summary of reserve component compensation and benefits, compiled by the QRMC. The elements are divided into four categories: compensation, special and incentive pays, benefits, and protections. The tables below provide a description of the elements in each category as well as the duty conditions that determine reserve member eligibility.

Compensation

The elements of compensation include pays, allowances, and the tax benefit, as well as retired pay, disability compensation, and compensation paid to the survivors of fallen service members.

- **Pay and related compensation.** Members of the Selected Reserve generally serve a minimum of 38 days required training: one weekend a month, called inactive duty for training or "drills," and two weeks per year, called annual training. Pay is based on the same basic pay table used for their active duty counterparts—a table that is based on rank and years of service. But reservists and active duty personnel do not always accrue credit for a day of pay in the same manner. During annual training and when called to active duty, reservists receive one day of pay and allowances for each day of duty, as does a member of the active component. And as noted in chapter 7, there is a different level of pay depending on how long the member is on active duty because a housing allowance is paid for shorter periods of active duty. For inactive duty training, reservists receive one day of basic pay for each "drill" but no allowances, with each weekend comprising four drills (two per day). Reservists are also eligible for several savings programs under certain conditions.
- **Tax benefit.** When serving in a combat zone, members of the armed forces, both active and reserve component, can exclude certain pay from

their income when determining federal income taxes. Under current provisions, all enlisted pay can be excluded from federal income tax, including incentive pays and bonuses. For officers, the exclusion is limited to the basic pay level of senior enlisted advisors plus Hostile Fire Pay/ Imminent Danger Pay—currently just over $7,700 a month.

- **Allowances.** Members of the reserves are eligible for a variety of allowances including "living allowances" such as the Basic Allowance for Housing and Basic Allowance for Subsistence (components of regular military compensation), travel and transportation allowances, and a number of miscellaneous allowances. Eligibility for these allowances, or the amount of payment received, may differ depending on the type of duty in which the member is serving.
- **Retirement.** Members of the reserve component are eligible for retirement after 20 years of qualifying service, and can begin receiving retired pay at age 60, or earlier based on credit for serving under certain conditions. A year of qualifying service is a year in which a reservist has earned at least 50 retirement points. Points are accrued as follows: 15 points for being a member of a reserve component, one point for each drill or period of equivalent instruction, and one point for each day of active duty or full-time National Guard duty. Points can also be earned for other activities such as completing the course of study under the health professions scholarship and financial assistance program for active service, and performing funeral honors duty. Members of the reserve component may be eligible for active duty retirement if they have completed 20 years of active service.
- **Disability.** Military members who have service-connected disabilities are eligible for disability compensation. The type and amount of disability is based on the nature of the disability and retirement eligibility. Disabilities must be the result of an injury, illness, or disease that was incurred in or aggravated by military service. For reserves, this includes while traveling directly to and from their drill site, and while remaining overnight at or in the vicinity of the drill sight between successive drills. It also includes

when the member is performing funeral honors duty, traveling directly to and from the location where the funeral is held, and remaining overnight before the funeral if the location is not within a reasonable commuting distance of where the reservist resides. In all cases, the disability has to have been incurred or aggravated in the line of duty. This distinction is important for members of the reserve component who serve part-time and are not always on active duty as are members of the active component.

- **Survivors.** Survivors of fallen service members receive an array of compensation benefits including immediate and transitional assistance following the loss of their loved one, as well as long-term income support and reparation compensation that help replace the income lost as a result of the member's death. A number of these benefits have increased significantly since 2004, part of broader efforts to improve the financial well-being of service members injured in Iraq and Afghanistan, as well as their families.

Table 1 details the elements of compensation available to reserve component members, as well as compensation eligibility criteria.

Table 1. Compensation

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Basic Pay	37 USC 203, 204 FMR, Vol 7A, Ch 1 FMR, Vol 7A, Ch 57	Primary pay entitlement for members on active duty based on pay grade and length of service	No	Yes	Yes	Yes	Yes	Yes
Inactive Duty Compensation	37 USC 206 FMR, Vol 7A, Ch 58	When authorized, compensation at a rate of 1/30th of the monthly basic pay rate for reserve component members performing inactive duty	Yes	No	No	No	No	No
Income Replacement	37 USC 910 FMR, Vol 7A, Ch 55	Compensation for reserve component members when their total monthly military compensation is less than the average monthly civilian income. Eligibility requires the member to be under an involuntary mobilization order or retained on active duty because of an injury or illness and meets other length of service requirements	No	No	No	No	Yes, if meet eligibility criteria	No
Differential Pay (Reserve component members who are federal civilian employees)	5 USC 5538 OPM policy guidance Dec 8, 2009; revised Jan 8, 2010	Compensation paid by the federal agency employing a reserve component member ordered to active duty under certain provisions of law. Paid only when total monthly military compensation is less than the average monthly federal civilian income of the employee	No	No	No	No	Yes, if called or ordered to active duty under title 10 USC, section 688; 12301(a); 12302; 12304; 12304a; 12305; 12406; 331 – 333	No
Thrift Savings Plan	37 USC 211 FMR, Vol 7A, Ch 51	Allows members on active duty and Ready Reserve members in a pay status to participate in the federal government thrift savings plan (a 401K-type program)	Eligible to participate					Eligible to participate
Savings Deposit Program	10 USC 1035 FMR, Vol 7A, Ch 51	Program for members serving in combat zone, qualified hazardous duty area, or other designated areas outside the U.S. to deposit pay into an account that pays an interest rate of 10% annually on a balance of up to $10,000	No	No	No	No	Eligible to participate	Eligible to participate

Source: United States Code (USC), Joint Federal Travel Regulations (JFTR), DOD Financial Management Regulation (FMR) 7000.14-R, DoD Directive (DoDD), DoD Instruction (DoDI), Office of Personnel Management (OPM).

Note: Data are current as of May 2012. FTNGD – full-time National Guard duty.

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Tax Benefit								
Combat Zone Tax Exclusion	26 USC 112 DoDI 1215.06 FMR, Vol 7A, Ch 4	Exclusion of military pay earned while serving in a combat zone, designated direct support area, or qualified hazardous duty area from determining federal income tax liability	Yes, if meet eligibility criteria, but DOD policy prohibits performing inactive duty in a designated imminent danger area	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes	Yes
Living Allowances								
Basic Allowance for Housing (BAH)	37 USC 403 JFTR, Ch 10, pars U10004, U10006, and U10428 JFTR, Ch 10, Part E (RC)	Provide members equitable housing compensation based on housing costs in local civilian housing markets within the United States when government quarters are not provided	No	No	No	Yes, unless assigned government quarters at permanent duty station	Yes, unless assigned government quarters at permanent duty station	Yes, unless assigned government quarters at permanent duty station
Basic Allowance for Housing—Reserve Component (BAH-RC)	37 USC 403 JFTR, Ch 10, par U10014 JFTR, Ch 10, Part E (RC Housing Allowance)	Provide reserve component members on active duty fewer than 31 days a housing allowance that is not adjusted for the local civilian housing markets	No	Yes	Yes, unless assigned government quarters at permanent duty station	No	No	No
Overseas Housing Allowance	37 USC 403 JFTR, Ch 10, pars U10020 – U10032 and U10428	Partial offset of housing expenses at overseas duty locations for members living in privately leased housing on the local economy when government-leased or on-base housing is not available and movement of household goods is authorized	No	No	No	Yes, unless assigned government quarters at permanent duty station	Yes, unless assigned government quarters at permanent duty station	Yes, unless assigned government quarters at permanent duty station
Move-in Housing Allowance	JFTR, Ch 10, par U10026 JFTR, App N	Allowance to defray the move-in costs associated with private sector leased/owned housing when assigned overseas	No	No	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Family Separation Housing	37 USC 403 JFTR, Ch 10, pars U10016, U10414 and U10428	Allowance for members separated from dependents while assigned to a permanent duty station (PDS) outside the continental United States (OCONUS), or a PDS in the continental United States (CONUS) when dependent travel is delayed or restricted	No	No	No	Yes, if authorized permanent change of station allowances and dependent travel is denied	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Basic Allowance Subsistence	37 USC 402 FMR, Vol 7A, Ch 25 FMR, Vol 7A, Ch 57	Allowance to defray a portion of the cost of subsistence	No	Yes	Yes	Yes	Yes	Yes
Family Subsistence Supplemental Allowance	37 USC 402a DoDI 1341.11 FMR, Ch 25	Allowance for members receiving Basic Allowance for Subsistence whose gross household income would make them eligible for assistance under the U.S. Department of Agriculture Supplemental Nutrition Assistance Program	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Cost-of-Living Allowance (CONUS)	37 USC 403b JFTR, Ch 8	Allowance for members assigned to a CONUS high-cost area or assigned OCONUS and primary dependent resides in a CONUS high-cost area	No	No	No	Yes, if called/ ordered to active duty for a period of 140 days or more	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Cost-of-Living Allowance (OCONUS)	37 USC 475 JFTR, Ch 9, Part B	Allowance to assist members assigned to an OCONUS permanent duty station when needed to maintain the purchasing power of the discretionary portion of spendable income	No	Yes, if ordered to active duty from an OCONUS location and no per diem is authorized	Yes, if ordered to active duty from an OCONUS location and no per diem is authorized	Yes, if ordered to active duty from an OCONUS location	Yes, if ordered to active duty from an OCONUS location	Yes
Travel and Transportation Allowances								
Travel Outside Normal Commuting Distance for Inactive Duty	37 USC 478a JFTR, par. U7160 and APP O, par T4045-G (Reserve Component Travel)	Reimbursement for reserve component members who travel more than 150 miles one way from their permanent residence to their inactive duty training location	Yes, if authorized by the secretary concerned	No	No	No	No	No

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Dislocation Allowance	37 USC 477 JFTR, Ch 5, part G	Allowance to partially reimburse expenses incurred in relocating during a permanent change of station, or during a housing move ordered for the convenience of the government or incident to an evacuation	No	No	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Temporary Lodging Expense	37 USC 747a JFTR, Ch 5, Part H	Reimbursement to partially pay for lodging/meal expenses when a member/dependent(s) occupy temporary quarters in CONUS due to a permanent change in station	No	No	No (unless issued permanent change of station orders)	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Temporary Lodging Allowance	37 USC 475 JFTR, Ch 9, Part C	Partial reimbursement for the more than normal expenses incurred while occupying temporary lodgings at an OCONUS permanent duty station	No	No	No	Yes, if ordered to active duty for training for greater than 140 days or more, or active duty other than for training for 180 days or more, and authorized to move household goods with a permanent change of station	Yes, if ordered to active duty other than for training for 180 days or more and authorized to move household goods with a permanent change of station	Yes
Miscellaneous Allowances								
Yellow Ribbon Program Allowance	37 USC 481l DoDI 1342.28 JFTR Ch 5, par U5255	Allowance for designated individuals to attend a Yellow Ribbon event	Eligible					Eligible
Family Separation Allowance	37 USC 427 DoDI 1340.24 FMR, Vol 7A, Ch 27 FMR, Vol 7A, Ch 57	Allowance for members with dependents when movement of the dependents to a permanent duty station is not authorized or the member is away from the permanent duty station/home port for more than 30 days	No	No	No	Eligible	Eligible	Eligible

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Servicemembers' Group Life Insurance (SGLI) Premium Allowance	37 USC 437	Allowance to reimburse members covered under SGLI and serving in the theater of operations for Operation Enduring Freedom or Operation Iraqi Freedom at any time during a month for the member's SGLI premium payment	No, DOD policy prohibits performance of inactive duty training in an imminent danger area	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Muster Duty Allowance	37 USC 433 DoDI 1215.06 FMR 7A, Ch 58, par 580105	Allowance for members participating for a minimum of two hours in the annual muster of the reserves	Eligible if participating in screening					No
Electronic Screening Allowance	37 USC 433a FMR 7A, Ch 58, par 580106	Stipend for reserve members participating in screening of the reserves by electronic means in lieu of mustering	Eligible if participating in electronic screening					No
Funeral Honors Duty Allowance	37 USC 495 FMR 7A, Dh 58, par 580107	Allowance for reserve performing funeral honors functions	Yes	No	No	No	No	No
Uniform Allowance: Enlisted Members	37 USC 418 FMR 7A, Ch 29 FMR 7A, Ch 57, par 570505 FMR 7A, Ch 58, par 580401	Allowance when military clothing is not furnished: • Initial clothing allowance • Maternity clothing allowance • Replacement clothing allowance (must be on active duty for more than 6 months to be eligible)	Initial and maternity allowance only	Initial and maternity allowance only	Initial and maternity allowance only	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes
Uniform Allowance: Officers	37 USC 415 37 USC 416 37 USC 417 FMR 7A, Ch 30 FMR 7A, Ch 57, par 570506 FMR 7A, Ch 58, par 580402	Allowance to reimburse for purchase of required uniforms • Initial allowance • Additional allowance if on active duty greater than 90 days but not within 2 years of last allowance	Yes, if meet eligibility criteria					Yes
Civilian Clothing Allowance	37 USC 419 FMR 7A, Ch 29 FMR 7A, Ch 30 FMR 7A, Ch 57	Allowance for members required to dress in civilian clothing more than half the time to perform their military duties • For officers, only if permanent duty station is outside the United States	No	No	No	May be authorized when period of active duty is 6 months or more	May be authorized when period of active duty is 6 months or more	Yes

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Disability								
Special Compensation for Assistance with Activities of Daily Living (SCAALD)	37 USC 439 DoDI 1341.12	Compensation for a member with a permanent catastrophic injury or illness who requires assistance with the activities of daily living	Eligible					Eligible
Incapacitation Pay	10 USC 204 DoDI 1241.01 DoDI 1241.2	Provide pay and allowances to reserve component members while being treated for or recovering from a service-connected injury, illness, or disease, or who demonstrate a loss of earned income as a result of an injury, illness, or disease incurred or aggravated in the line of duty. • Members unable to perform military duty receive full pay and allowances less any earned income • Members able to perform military duty but demonstrates a loss of earned income due to service-connected injury, illness or disease receive pay and allowances equal to the loss of earned income but not to exceed full pay and allowances	Eligible					No
Separation for Physical Disability	10 USC 1203 10 USC 1206 10 USC 1209 10 USC 1212 DoDI 1332.38	Separation pay when a member is found no longer fit for duty because of an injury, illness, or disease that was incurred or aggravated in the line of duty and the disability is rated at less than 30%	Yes (a member with 20 or more qualifying years of service may transfer to the Standby Reserve inactive status list rather than be separated)	Yes	Yes	Yes	Yes	Yes
Retirement for Physical Disability	10 USC 1201-1202 10 USC 1204-1205 DoDI 1332.38	Retired pay when a member is found no longer fit for duty because of an injury, illness, or disease that was incurred or aggravated in the line of duty and the disability is rated at 30% or greater	Yes					Yes

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Concurrent Retirement and Disability Payment	10 USC 1414 FMR, Vol 7B, Ch 64	Eligible retirees receive military retired pay without offset for Department of Veterans Affairs (VA) disability compensation if the combined VA disability rating is 50% or greater. Members retired for disability must have at least 20 years of qualifying service	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Combat-Related Special Compensation	10 USC 1413a FMR, Vol 7B, Ch 63	Special monthly payment equal to the offset to military retired pay due to receipt of VA disability compensation determined to be combat related. Reserve component members retired early because of a disability not incurred in the line of duty are not eligible	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Retirement								
Active Duty Retirement	10 USC, Ch 367 (Army) 10 USC, Ch 571/573 (Navy/Marine Corps) 10 USC, Ch 867 (Air Force)	Immediate annuity for members who complete the minimum number of years of active duty	Yes, if completed the required years of active service					Yes, if completed the required years of active duty
Reserve Retirement	10 USC, Ch 1223 DoDI 1215.07	Annuity for members who have 20 qualifying years of service	Yes, if completed the required years of qualifying service					No
Service Credit Toward Reduced Retirement Age	10 USC 12731 DoDI 1215.07	Reduces age for receipt of reserve retired pay: Three months for each aggregate of 90 days in a fiscal year of qualifying active duty or full-time National Guard duty performed in support of a national emergency (but not below age 50)	No	Qualifying service only if ordered to annual training under 10 USC 12301(d)	Qualifying service only if ordered to duty under 10 USC 12301(d), or 32 USC 502(f) in support of a national emergency	Qualifying service only if ordered to duty under 10 USC 12301(d), or 32 USC 502(f) in support of a national emergency	Yes	No

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Survivors								
Death Gratuity	10 USC 1475	Immediate cash payment to assist survivors of deceased members to meet their financial needs during the period immediately following a member's death	If death occurs while performing inactive duty training (IDT), traveling directly to or from IDT, or between successive periods of IDT	If death occurs while on active duty or traveling to or from active duty	If death occurs while on active duty or traveling to or from active duty	If death occurs while on active duty or traveling to or from active duty	If death occurs while on active duty or traveling to or from active duty	If death occurs while on active duty or traveling to or from active duty
Survivor Benefit Plan (SBP)	10 USC, Ch 73, Subchapter II DoDI 1332.42	Benefit that allows the surviving spouse and/or children to receive a portion of the deceased's retired pay. To qualify the member must have either died while on active duty/FTNGD, or retired and elected to participate	No	Yes, if death occurs while on active duty/ FTNGD Yes, for death after retirement, but only if member elected to participate in SBP	Yes, if death occurs while on active duty/ FTNGD Yes, for death after retirement, but only if member elected to participate in SBP	Yes, if death occurs while on active duty/ FTNGD Yes, for death after retirement, but only if member elected to participate in SBP	Yes, if death occurs while on active duty Yes, for death after retirement, but only if member elected to participate in SBP	Yes, if death occurs while on active duty Yes, for death after retirement, but only if member elected to participate in SBP
Reserve Component Survivor Benefit Plan (RC-SBP)	10 USC, Ch 73, Subchapter II DoDI 1332.42	Benefit that allows the surviving spouse and/or children to receive a portion of the retired pay a reserve component member would receive upon reaching the age of retirement. To qualify, the member must have died while performing inactive duty, or received a notice of eligibility for retired pay and elected to participate in the program	Yes, if death occurred while on IDT or member received notice of eligibility for retired pay and elected to participate in RC-SBP	No, if death occurred while on annual training (would be covered under SBP) Yes, for members who received notice of eligibility for retired pay, but only if member elected to participate in RC-SBP	No, if death occurred while on active duty/ FTNGD (would be covered under SBP) Yes, for members who received notice of eligibility for retired pay, but only if member elected to participate in RC-SBP	No, if death occurred while on active duty/ FTNGD (would be covered under SBP) Yes, for members who received notice of eligibility for retired pay, but only if member elected to participate in RC-SBP	No, if death occurred while on active duty (would be covered under SBP) Yes, for members who received notice of eligibility for retired pay, but only if member elected to participate in RC-SBP	No

Table 1. Compensation (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Dependency and Indemnity Compensation (DIC)	38 USC, Ch 13, Subchapter II	Monthly payment to survivors of a member who died while on active duty or performing inactive duty, and survivors of veterans whose death resulted from a service-related injury or disease and certain other situations	Yes					Yes
Special Survivor Indemnity Allowance	10 USC 1450(m)	Allowance paid to survivors whose SPB payments are offset by DIC	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria

Special and Incentive Pays

Special and incentive (S&I) pays, which include monthly pays and bonuses, are targeted compensation that the military services use to address staffing shortfalls in specific career fields, ensure comparability with high-wage civilian sector occupations, compensate members for onerous assignments, and reward members who train for and remain current in a critical skill. Some S&I pays are stable pays used to supplement military earnings on an ongoing basis; others compensate for onerous or hazardous careers or assignments, such as duty involving demolition of explosives, parachute jumping, or working on the flight deck of an aircraft carrier. Whether personnel receive S&I pays depends on a member's occupation, assignment, and service—and the amount awarded can vary considerably.

Eligibility for members of the reserve component can differ from that of their active component counterparts. In particular, in some cases special and incentive pays are prorated based on the number of days served, frequently referred to as the 1/30th rule. Under this construct, the applicable monthly pay or allowance is divided by 30 to produce the daily rate paid to reserve component members—for each day of active duty and each period of inactive duty. This is different from members of the active component who are always "on duty." (The efficacy of the 1/30th rule is discussed in more detail in Chapter 7 of the 11th QRMC, Main Report.)

The consolidation of more than 60 special and incentive pay authorities into eight broad categories has made the incentives available to manage the active and reserve components much more consistent, while still recognizing the difference between a member who serves full time and one who serves less than full time. Table 2 lists the S&I pays applicable to reserve component members and the relevant eligibility criteria.

Table 2. Special and Incentive Pays

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
General Bonus Authority for Enlisted Members								
Enlistment in the Armed Forces	37 USC 331(a)(1) *Legacy provision:* *37 USC 309*	Maximum bonus: $50K for a 2-year service obligation	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Enlistment in or Affiliation with a Reserve Component	37 USC 331(a)(2) *Legacy provisions:* *37 USC 308c* *37 USC 308g*	Maximum bonus: $50K for a 2-year service obligation	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Reenlistment or Extension of Enlistment in a Designated Career Field or Unit	37 USC 331(a)(3) Legacy *provisions:* *37 USC 308* *37 USC 308b* *37 USC 308h* *37 USC 326*	Maximum bonus: • $30K for each year of obligated service in a regular component • $15K for each year of obligated service in a reserve component	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Transfers between a Regular and Reserve Component in the Same Service	37 USC 331(a)(4)	Maximum bonus: $10K	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Transfers to a Regular or Reserve Component in Another Service	37 USC 331(a)(5) *Legacy provision:* *37 USC 327*	Maximum bonus: $10K	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
General Bonus Authority for Officers								
Accession into the Armed Forces	37 USC 332(a)(1) *Legacy provisions:* *37 USC 324* *37 USC 330* *37 USC 308j(b)*	Maximum bonus: $60K for a 3-year service obligation	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria

Source: United States Code (USC), Joint Federal Travel Regulations (JFTR), DOD Financial Management Regulation (FMR) 7000.14-R, DoD Directive (DoDD), DoD Instruction (DoDI).

Note: Data are current as of May 2012. FTNGD – full-time National Guard duty.

Table 2. Special and Incentive Pays (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Affiliation with a Reserve Component	37 USC 332(a)(2) *Legacy provision: 37 USC 308j(a)*	Maximum bonus: $12K for a 3-year service obligation	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Remain on Active Duty or Serve in an Active Status	37 USC 332(a)(3) *Legacy provisions:* *37 USC 318* *37 USC 319* *37 USC 321* *37 USC 315*	Maximum bonus: • $50K for each year of obligated service in a regular component • $12K for each year of obligated service in a reserve component	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Transfers between a Regular and Reserve Component in the Same Service	37 USC 332(a)(4) *Legacy provision: 37 USC 327*	Maximum bonus: $10K	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Transfers to a Regular or Reserve Component in Another Service	37 USC 332(a)(5) *Legacy provision: 37 USC 327*	Maximum bonus: $10K	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Nuclear Officer Bonus and Incentive Pay								
Bonus	37 USC 333(a)(1) *Legacy provisions: 37 USC 312b*	Bonus for agreeing to serve on active duty Maximum bonus: $35K for each 12-month period	No	No	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
	37 USC 333(a)(2) *Legacy provisions: 37 USC 312*	Bonus for agreeing to remain on active duty Maximum bonus: $35K for each 12-month period	No	No	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Incentive Pay	37 USC 333(b) Legacy provisions: 37 USC 312c	Incentive pay for agreeing to remain on active duty Maximum incentive pay: $25K for each 12-month period of active duty	No	No	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria

Table 2. Special and Incentive Pays (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Aviation Officer Incentive Pay and Bonus								
Incentive Pay	37 USC 334(a) *Legacy provision:* *37 USC 301a*	Incentive pay for engaging/ remaining in aviation service Maximum incentive pay: $850 per month	Yes, if meet eligibility criteria; pay is prorated for each IDT period	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Bonus	37 USC 334(b) *Legacy provision:* *37 USC 301b*	Bonus for agreeing to remain on active duty in a regular component or serve in an active status in a reserve component for at least one year Maximum bonus: $25K for each 12-month period	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Health Professions Officers Bonus and Incentive Pay								
Accession Bonuses	37 USC 335(a)(1) *Legacy provisions:* *37 USC 302h* *37 USC 302j* *37 USC 302d*	Agrees to serve on active duty or in an active status Maximum bonus: $30K for each 12-month period	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Critical Skill Accession Bonus	37 USC 335(a)(2) *Legacy provisions:* *37 USC 302k* *37 USC 302l*	Accepts a commission/appointment and whose specialty is designated as a critically short wartime specialty; Maximum bonus: $100K for each 12-month period	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Retention Bonus	37 USC 335(a)(3) *Legacy provisions:* *37 USC 301d* *37 USC 301e* *37 USC 302a(b)* *37 USC 302i*	Agrees to remain on active duty or serve in an active status Maximum bonus: $75K for each 12-month period	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria

Table 2. Special and Incentive Pays (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Incentive Pays	37 USC 335(b) *Legacy provisions:* *37 USC 302(a)(2)* *37 USC 302(a)(3)* *37 USC 302(h)* *37 USC 302b(a)(2)* *37 USC 302b(a)(3)* *37 USC 302f* *37 USC 302a(a)(2)* *37 USC 303(a)* *37 USC 302(a)(4)* *37 USC 302(b)* *37 USC 302b(a)(4)* *37 USC 302b(a)(6)* *37 USC 302b(g)* *37 USC 302e* *37 USC 302g(a)*	Serving on active duty or serving in an active status; Maximum annual incentive pay: • medical/dental officers: $100K • other health professions: $15K	Yes, if meet eligibility criteria; pay is prorated for each IDT period	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria
Board Certified Pay	37 USC 335(c) *Legacy provisions:* *37 USC 302(a)(5)* *37 USC 302b(a)(5)* *37 USC 302c* *37 USC 303(b)*	Pay for health providers who are board certified in a designated health profession specialty or skill Maximum pay: $6K for each 12-month period	Yes, if meet eligibility criteria; pay is prorated for each IDT period	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria
Hazardous Duty Pay								
Hostile Fire	37 USC 351(a)(1) *Legacy provisions:* *37 USC 310(a)(2)(A)* *37 USC 310(a)(2)(B)* *37 USC 310(a)(2)(C)*	Performs duty in a hostile fire area or is exposed to a hostile fire event or explosion Maximum pay: $450/month	DOD policy guidance prohibits performance of IDT in a hostile fire area	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria

Table 2. Special and Incentive Pays (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Hazardous Duty	37 USC 351(a)(2) *Legacy provisions:* *37 USC 301(a)(1)* *37 USC 301(a)(2)* *37 USC 301(a)(3)* *37 USC 301(a)(4)* *37 USC 301(a)(5)* *37 USC 301(a)(6)* *37 USC 301(a)(7)* *37 USC 301(a)(8)* *37 USC 301(a)(9)* *37 USC 301(a)(10)* *37 USC 301(a)(11)* *37 USC 301(a)(12)* *37 USC 301(a)(13)* *37 USC 301(e)* *37 USC 305(b)*	Performs duty designated as hazardous Maximum pay: $250/month	Yes, if meet eligibility criteria; pay may be prorated for each IDT period	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty (may be paid the full monthly rate if exposed to hostile fire or explosion of a hostile explosive device during the month)	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty (may be paid the full monthly rate if exposed to hostile fire or explosion of a hostile explosive device during the month)	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty (may be paid the full monthly rate if exposed to hostile fire or explosion of a hostile explosive device during the month)	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty (may be paid the full monthly rate if exposed to hostile fire or explosion of a hostile explosive device during the month)	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty (may be paid the full monthly rate if exposed to hostile fire or explosion of a hostile explosive device during the month)
Imminent Danger	37 USC 351(a)(3) *Legacy provision:* *37 USC 310(a)(2)(D)*	Performs duty in a foreign area determined to expose the member to imminent danger of physical injury Maximum pay: $250/month	DOD policy guidance prohibits performance of IDT in an imminent danger area	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria; pay is prorated for the number of days on active duty	Yes, if meet eligibility criteria
Assignment Pay or Hazardous Duty Pay	37 USC 352 DoDI 1215.06 *Legacy provisions:* *37 USC 301c* *37 USC 305* *37 USC 305a(a)* *37 USC 305a(c)* *37 USC 306* *37 USC 307* *37 USC 307a* *37 USC 308d* *37 USC 314*	Performs duties in a designated assignment, location, or unit Maximum pay: $5K/month	Yes, if meet eligibility criteria; pay is prorated for each IDT period	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria

Table 2. Special and Incentive Pays (Continued)

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Skill Incentive Pay or Proficiency Bonus								
Incentive Pay	37 USC 353(a) *Legacy provisions:* *37 USC 304* *37 USC 320*	Serves in a career field or skill designated as critical by the secretary concerned Maximum incentive pay: $1K/month	Yes, if meet eligibility criteria; pay is prorated for each IDT period	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Proficiency Bonus	37 USC 353(b) *Legacy provision:* *37 USC 316*	Has/maintains certified proficiency in a skill designated as critical by the secretary concerned Maximum bonus: $12K for each 12-month period	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Miscellaneous Incentive Pays								
15-Year Career Status Bonus	37 USC 354 FMR, Vol 7A, Ch 66 *Legacy provision:* *37 USC 322*	Completed 15 years of active duty; agrees to remain on active duty until completing 20 years of active duty service, and agrees to the retired pay option known as "REDUX" Bonus amount: $30K	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Option only available to members who entered service on or after August 1, 1986
Members qualified in critical military skills or assigned to high priority units—retention incentive	37 USC 355 FMR, Vol 7A, Ch 3 *Legacy provision:* *37 USC 323*	Officer or enlisted member who is qualified in a critical military skill designated by the secretary of defense (or secretary of homeland security in the case of the Coast Guard) and agrees to remain on active duty or in an active status in a reserve component for at least one year Maximum total bonus for all agreements: $200K for active duty; $100K for reserve component member	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria
Continuation of pays during hospitalization and rehabilitation resulting from wounds, injury, or illness incurred while on duty in a hostile fire area or exposed to an event of hostile fire or other hostile action	37 USC 372	While hospitalized for treatment of the wound, injury, or illness, continue to pay all pay/allowances that were being paid to the member at the time the member incurred a wound, injury, or illness while serving in a combat operation or a combat zone, hostile fire area, or exposed to a hostile fire	Yes, if meet eligibility criteria					Yes, if meet eligibility criteria

Benefits

Generally, benefits fall into six broad categories:

- **Health care** benefits include comprehensive health care at no cost to the member and various health insurance programs available to service members and their dependents through TRICARE, as well as the provision of in-kind health care through military treatment facilities on a space available basis.
- **Education** benefits support voluntary education and training. Principal programs in this category include tuition assistance for off-duty education, the pre-discharge education program, and educational assistance programs administered by the Department of Veterans Affairs, and which—with the exception of the Montgomery GI Bill–Selected Reserve—are principally designed for veterans. But recent program changes have made these benefits available to dependents if the member has completed six years of service and agrees to remain in the military for an additional period of time.
- **Morale, welfare, and recreation** (MWR) benefits are designed to "promote esprit de corps and provide for the physical, cultural, and social needs; general well-being; quality of life; and hometown community support of service members and their families."[1] Programs such as physical fitness centers and services, libraries and information services, community and recreation centers, golf courses and bowling centers, and sports and athletics programs are examples of the many MWR programs and activities available to military personnel and their families.
- **Family programs** are a component of MWR benefits that cater especially to children and spouses of service members. These programs include family support services such as relocation assistance, personal financial management, crisis assistance, career resources, and individual and family counseling programs. Family programs also include childcare and youth programs. Childcare programs help members locate affordable options for quality childcare both on and off DOD installations. School-age care programs provide safe, supervised, healthy, accountable, and age-appropriate environments. Youth programs include planned

1. DOD Instruction 1015.10, Military Morale, Welfare, and Recreation (MWR) Programs, July 6, 2009 (Incorporating Change 1, May 6, 2011).

and self-directed activities and events responding to the recreational, developmental, social, physiological, psychological, cultural, and educational needs of youth.

- **Commissary and exchange** privileges, a component of MWR benefits, have a long history in the military. Their purpose is to allow items of "convenience and necessity" to be purchased by military personnel and their dependents at convenient locations and reasonable prices. The discounted prices offered in these facilities provide an income benefit to members and their families. Commissaries, usually located on military installations, are supermarkets that sell food, sundry, and cleaning products; exchanges serve as military department and drug stores.
- **Miscellaneous** benefits include programs such as life, traumatic injury, and long-term care insurance; leave and liberty; space available travel; and legal assistance. Insurance policies provide active and reserve members with access to affordable insurance options. All members on active duty or full-time National Guard duty for more than 30 days accrue leave. A recent change now allows reserve component members to carry unused leave forward, subject to the maximum leave balance a member is allowed to maintain, rather than taking the leave or selling it back upon completion of duty. Space-available travel is a privilege extended to military members as an avenue of respite from the rigors of duty in a uniformed service. Legal services, subject to availability of legal staff, assist members in preparing legal documents such as a will, power of attorney, advanced medical directive, and other documents to help the member and family with estate planning.

Table 3 contains details on the benefits and eligibility in each of these areas.

Table 3. Benefits

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Health Care								
Medical and Dental Benefits: Member	10 USC 1074	Comprehensive care for members on active duty for more than 30 days	Not eligible	Not eligible	Not eligible	Yes	Yes	Yes
Medical and Dental Treatment: Member	10 USC 1074a	Treatment for injury, illness or disease incurred or aggravated in line of duty for members on active duty for 30 days or fewer or performing inactive duty	Yes	Yes	Yes	No	No	No
Medical Care (delayed-effective-date active-duty order)	10 USC 1074	Medical and dental care for reserve component members and dependents up to 180 days before commencement of active duty when the member is covered by an order to active duty in support of a contingency operation	No	No	No	No	Yes	No
Transitional Health Care	10 USC 1145	Medical and dental care for 180 days following release from active duty, or for 180 days following the diagnosis of the condition that was identified during the member's 180-day transition period (but only for the post-release condition)	No	No	No	Yes, if: • involuntarily separated from active duty • discharged because of sole survivorship • a member of the Individual Ready Reserve and agrees to serve in the Selected Reserve	Yes, if period of active duty is greater than 30 days	Yes, if: • involuntarily separated • separated and agrees to serve in the Selected Reserve • discharged because of sole survivorship
TRICARE Reserve Select (TRS)	10 USC 1076d	TRICARE for Selected Reserve members and their eligible dependents. Must not be eligible for, or enrolled in, the Federal Employees Health Benefits Program	Eligible	Eligible	Eligible	No (covered under comprehensive active duty health care)	No (covered under comprehensive active duty health care)	No

Source: United States Code (USC), Joint Federal Travel Regulations (JFTR), DOD Financial Management Regulation (FMR) 7000.14-R, DoD Directives (DoDD), DoD Instructions (DoDI).

Note: Current as of May 2012; FTNGD – full-time National Guard duty.

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
TRICARE Dental Program: Member	10 USC 1076a	Premium-sharing, cost-sharing dental insurance program for reserve component members not on active duty for greater than 30 days	Eligible	Eligible	Eligible	No (covered under comprehensive active duty health care)	No (covered under comprehensive active duty health care)	No
Medical Care: Dependents	10 USC 1076	TRICARE and space available care at a military treatment facility	No	No	No	Yes	Yes	Yes
TRICARE Dental Program: Dependents	10 USC 1076a	Premium-sharing, cost-sharing dental insurance program for dependents of active duty and reserve component members	Eligible					Eligible
TRICARE For Retirees	10 USC 1097	TRICARE plan options for retired members and their eligible dependents	Eligible, if receiving retired pay and under age 65					Eligible, if receiving retired pay and under age 65
TRICARE Retired Reserve (TRR)	10 USC 1076e DoDI 1241.03	A premium-based health plan under TRICARE for retired reserve component members under age 60 and their eligible dependents. Must not be eligible for, or enrolled in, the Federal Employees Health Benefits Program	Eligible	Eligible	Eligible	Eligible, but would have comprehensive health coverage while on active duty and TRR would be suspended	Eligible, but would have comprehensive health coverage while on active duty and TRR would be suspended	No
TRICARE For Life	10 USC 1086	TRICARE (as a second payer) for retirees who have both Medicare Parts A and B	Eligible, if enrolled in Medicare Parts A and B					Eligible, if enrolled in Medicare Parts A and B
Educational Assistance								
Montgomery GI Bill—Selected Reserve	10 USC, Ch 1606 DoDI 1322.17	Education financial support for members who agree to serve six years in the Selected Reserve	Eligible	Eligible	Eligible	Eligible, but if enrolled, entitlement would be suspended while on active duty	Eligible, but if enrolled, entitlement would be suspended while on active duty	Not eligible
Reserve Educational Assistance Program	10 USC, Ch 1607 DTM-08-040	Education financial support for Ready Reserve members called or ordered to active duty in response to a war or national emergency (contingency operation)	Not qualifying service	Not qualifying service	Not qualifying service	Not qualifying service	Yes	No

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Montgomery GI Bill—Active Duty	38 USC, Ch 30 DoDI 1322.16	Education financial support for members who did not decline Montgomery GI Bill and who fulfill the required number of months on active duty	Not qualifying service	Not qualifying service	Not qualifying service	May qualify if orders specify a minimum active duty service obligation of at least 24 months	May qualify if orders specify a minimum active duty service obligation of at least 24 months	May qualify for benefits
Post-9/11 GI Bill	38 USC, Ch 33 DTM-09-003	Education financial support and housing financial support for members with at least 90 days of aggregate service after September 10, 2001, or members discharged with a service-connected disability who served at least 30 days	Not qualifying service	Qualifying service only if ordered to active duty under 10 USC 12301(d)	Qualifying service only if ordered to active duty under 10 USC 12301(d) or full-time National Guard duty under 32 USC 502(f) as an Active Guard Reserve or for the purpose of responding to a national emergency	Qualifying service only if ordered to active duty under 10 USC 12301(d) or full-time National Guard duty under 32 USC 502(f) as an Active Guard Reserve or for the purpose of responding to a national emergency	Qualifying service	Qualifying service
Frye Scholarship	38 USC 3311	Post-9/11 GI Bill benefits for the children of members who died while serving on active duty	No	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria	Yes, if meet eligibility criteria
Tuition Assistance	10 USC 2007 DoDD 1322.08E	Financial assistance for voluntary off-duty civilian education programs in support of a soldier's professional and personal self-development goals	Eligibility subject to availability of funding and service policy restrictions					Eligibility subject to availability of funding and service policy restrictions

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Morale, Welfare, and Recreation (MWR)								
Morale, Welfare, and Recreation Services	10 USC 1065 DoDI 1015.10	**Category A – Mission-Sustaining Programs:** Programs that promote physical and mental well-being such as physical fitness centers, aquatic training, libraries, recreational programs, quality-of-life programs, etc.	Eligible					Eligible
	DoDI 1015.10 DoDI 6060.2 DoDI 6060.3 DoDI 6060.4	**Category B – Basic Community Support Programs:** Programs that provide for the basic physiological and psychological needs of service members and their families with childcare and youth programs, community programs, outdoor recreation programs, recreational skill programs, bowling, intramural sports programs, etc.	Eligible, but availability may be limited for child care services					Eligible, but availability may be limited for child care services
	DoDI 1015.10 DoDI 1015.11 DTM-07-023 (lodging)	**Category C – Revenue-Generating Programs:** Programs that provide recreational activities such as lodging and hospitality, and special interest programs such as flying, rod and gun, scuba diving, bowling, golf, base theater, etc.	Eligible					Eligible
Commissary and Exchange								
Commissary Privileges	10 USC 1063 10 USC 1064 DoDI 1330.17 DoDI 1330.21	A worldwide system of stores that sells food and other merchandise at reduced prices to eligible patrons	Unlimited					Unlimited
Military Exchange Privileges	DoDI 1330.9	A worldwide system of stores that sells merchandise at reduced prices to eligible patrons	Unlimited					Unlimited

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Miscellaneous								
Insurance								
Servicemembers' Group Life Insurance (SGLI)	38 USC 1965 et seq. FMR, Vol 7A, Ch 47 DVA SGLI Handbook H-29-98-1	Term life insurance policy available to military members	Eligible for full-time coverage if assigned to a unit/position which requires active duty or active duty for training and each year will be scheduled to perform at least 12 periods of inactive duty training	Eligible for full-time coverage if assigned to a unit/position which requires active duty or active duty for training and each year will be scheduled to perform at least 12 periods of inactive duty training	Eligible for full-time coverage if assigned to a unit/position which requires active duty or active duty for training and each year will be scheduled to perform at least 12 periods of inactive duty training	Eligible for full-time coverage	Eligible for full-time coverage	Eligible for full-time coverage
Traumatic Servicemembers' Group Life Insurance (TSGLI)	38 USC 1980A FMR, Vol 7A, Ch 47 DVA SGLI Handbook H-29-98-1	Insurance benefit payment for severely injured members	Automatically covered while in service if member has SGLI					Automatically covered while in service if member has SGLI
Family Servicemembers' Group Life Insurance	38 USC 1965 et seq. FMR, Vol 7A, Ch 47 DVA SGLI Handbook H-29-98-1	Term life insurance for the spouse and unmarried dependent children of members insured under SGLI	Eligible, if member has SGLI					Eligible, if member has SGLI
Long-term Care Insurance	5 USC, Ch 90	Insurance to help pay for the cost of long-term care services at home, in a nursing home, or at a long-term care facility	Eligible, if a member of the Selected Reserve	Eligible, if a member of the Selected Reserve	Eligible, if a member of the Selected Reserve	Eligible	Eligible, if on active duty for more than 30 days, otherwise eligible if a member of the Selected Reserve	Eligible

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Leave and Liberty								
Leave; Chargeable	DoDI 1327.06	Leave accrued at a rate of 2 ½ days per month	No leave is accrued	No leave is accrued	No leave is accrued	Yes, may carry any accumulated leave to the next period of active service subject to leave accrual limit	Yes, may carry any accumulated leave to the next period of active service subject to leave accrual limit	Yes
Leave; Non-Chargeable	DoDI 1327.06	Leave that is not charged to the leave balance includes convalescent, maternity, recruiting assistance program, adoption, paternity, graduation, and excess leave	No	Possibly for certain types of leave	Possibly for certain types of leave	Yes	Yes	Yes
Payment for Unused Leave	37 USC 501 FMR, Vol 7A, Ch 35	Paid at the daily basic pay rate for each day of leave	No	No, unless selling leave accrued during a previous period of active service	No, unless selling leave accrued during a previous period of active service	Yes	Yes	Yes
Liberty (pass)	DoDI 1327.06	Authorized absence, not chargeable as leave, granted for short periods, not to exceed three days unless the president authorized four days	No	Yes	Yes	Yes	Yes	Yes
Administrative Absence	DoDI 1327.06	A period of absence not charged as leave for events such as professional development, legal witness, house hunting, competing in sporting events, etc.	No	Possibly for some purposes	Possibly for some purposes	Yes	Yes	Yes

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Post-Deployment Mobilization Respite Absence (PDMRA)	DoDI 1327.06	Days of administrative absence awarded to members who are deployed or mobilized beyond established DOD rotation frequency thresholds	No	No	No	No	Yes, under certain circumstances, a reserve component member may be paid for each PDMRA day a rate of $200/day in lieu of administrative absence days	Yes
Travel and Legal Assistance								
Space-Available Travel	DoD 4515.13-R	Travel on DOD aircraft, at no cost to the traveler, after all space-required passengers have been accommodated	Member only (only in the continental United States and territories)	Eligible, except for members of the Standby Reserve in an inactive status	Eligible, except for members of the Standby Reserve in an inactive status	Eligible	Eligible	Eligible
Space-Required Travel	10 USC 8505 DoD 4515.13-R	Mission essential travel on DOD aircraft	Yes, when traveling to inactive duty training	Yes, when traveling to active duty for training	Yes, when traveling to active duty for training or under official PCS, TDY, or TAD orders	Yes, when traveling to active duty for training or under official PCS, TDY, or TAD orders	Yes, when traveling under official PCS, TDY, or TAD orders	Yes, when traveling under official PCS, TDY, or TAD orders
City Pair Travel Program	10 USC 12603 DoDI 4515.16	Selected Reserve members may use the General Services Administration City Pair Program to obtain commercial air transportation at the government rate for travel to the inactive duty training sites	Yes	No	No	No	No	No

Table 3. Benefits (Continued)

Benefit	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Legal Assistance	10 USC 1044 DoDD 1350.4	Assistance in preparing legal documents in connection with the member's personal civil legal affairs	Yes, subject to availability of legal staff	Yes, subject to availability of legal staff	Yes, subject to availability of legal staff	Yes, subject to availability of legal staff	Yes, subject to availability of legal staff; if ordered to active duty for more than 30 days under a mobilization authority, eligible for legal assistance for not less than twice the length of active duty following release	Yes, subject to availability of legal staff

Protections

Most members of the reserve components have full-time civilian jobs while serving part time in the reserves. Certain protections exist to enable members to serve in this capacity without fear of losing their employment or being subject to legal actions when performing military service. The Uniformed Services Employment and Reemployment Rights Act (USERRA) protects service members' reemployment rights when returning from a period of military service, and prohibits employers from discriminating based on military service or obligation. The Servicemembers' Civil Relief Act (SCRA) was signed into law in December 2003, replacing the Soldiers' and Sailors' Civil Relief Act of 1940. SCRA provides a number of civil protections to members of the armed forces. Examples include staying court hearings; reducing interest rates on mortgages and credit card debt; eviction protections; delay of civil court actions, such as bankruptcy, foreclosure, and divorce proceedings; and provisions for property and automobile lease termination. Table 4 contains further detail on eligibility.

Table 4. Legal Protections

Pay/Benefits	References	Description	National Guard and Reserve					Active
			Inactive Duty	Annual Training	Active Duty/ FTNGD 30 days or fewer	Active Duty/ FTNGD 31 days or more	Contingency Operation	Extended Active Duty
Uniformed Services Employment and Reemployment Rights Act (USERRA)	38 USC Chap 43 DoDI 1205.12 Department of Labor non-technical guide to USERRA	Employment/reemployment rights and protections for members whose cumulative length of absence from a civilian employer for military service (excluding certain periods of service) does not exceed five years	Yes					Yes
Servicemembers' Civil Relief Act (SCRA)[a]	50 USC App. §§ 501–596	Provides members important legal protections and temporary suspension of judicial and administrative proceedings and transactions that may adversely affect the civil rights of a member during military service. Examples of these protections: • delay of court/administrative proceedings • termination of leases • eviction for nonpayment of rent • default judgments • residency for tax purposes	Not covered	Covered	Covered	Covered	Covered	Covered

a. Members on active duty under a provision of title 10, United States Code (USC) and members of the National Guard when under an order to full-time National Guard duty (section 502(f) of title 32, USC) when authorized by the President or Secretary of Defense for a period of more than 30 days to respond to a national emergency declared by the President and funded by the Federal government.

Source: United States Code (USC), Joint Federal Travel Regulations (JFTR), DOD Financial Management Regulation (FMR) 7000.14-R, DoD Directive (DoDD), DoD Instruction (DoDI).

Note: Data are current as of May 2012. FTNGD – full-time National Guard duty.

Department of Defense
Office of the Under Secretary of Defense
for Personnel and Readiness
Washington, D.C.