

2003 Technical Panel on Assumptions and Methods



*Report to the
Social Security Advisory Board*

October 2003

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Charter ***2003 Technical Panel on*** ***Assumptions and Methods***

The Panel of expert actuaries, economists, and demographers appointed by the Social Security Advisory Board is charged with providing technical assistance to the Board by reviewing the assumptions specified by the Board of Trustees of the Old-Age and Survivors Insurance Trust Fund and the Disability Insurance Trust Fund and the methods used by the Social Security actuaries to project the future financial status of the funds. Specifically, the Panel is asked to:

- Review the assumptions regarding key demographic factors, including mortality, fertility, immigration, and disability incidence and termination.

- Review the assumptions regarding key economic factors, including productivity, real wage growth, real net rates of return and variations in net rates of return (including equity returns), consumer price increases, labor force participation, and rates of employment and unemployment.

- Review in particular the likely rate of labor force participation of older persons.

- Review and assess the projection methodology.

- Review and assess the status of the recommendations of the 1999 Technical Panel.

Acknowledgements

The Panel thanks the many people who assisted us in reviewing a vast amount of information on the wide variety of subjects that affect projections of the Social Security system.

We are appreciative of the enormous amount of work done by the Office of the Chief Actuary, which they performed in addition to their normal assignments. They provided a comprehensive review of their work and answered our numerous questions promptly and thoroughly, both in presentations and written responses. We would especially like to thank Stephen Goss, Alice Wade, Eli Donkar, Pat Skirvin, Karen Smith, Tony Cheng, and Seung An.

We would also like to express our appreciation for the assistance provided by the Division of Information Resources in the Office of Policy and, in particular, by Emil Loomis and Kathryn Winstead.

We thank representatives of the Bureau of Labor Statistics, Congressional Budget Office, Census Bureau, and the American Academy of Actuaries for their informative presentations.

To invite contributions and suggestions from researchers with a variety of backgrounds, the Panel held a series of open meetings at several locations. We thank those who participated in sessions at the National Academy of Social Insurance, the Population Association of America, and the Social Security Working Group at the National Bureau of Economic Research Summer Institute.

Immigration is a critical assumption to the future financial status of Social Security. However, it has received relatively little attention by past review panels. In an effort to obtain a comprehensive and current understanding of the field, several Panel members met with a group of leading immigration demographers. Douglas Massey organized the meeting. Other participants were Frank Bean, Jennifer Van Hook, Karen Woodrow-Lafield, Michael Teitelbaum, Jeffrey Passel, and Bob Warren. Charles Hirschman contributed written comments.

At the University of California at Berkley, Sarah Staveteig, Rachel Sullivan, and Sarah Walchuk assisted John Wilmoth with research on fertility and S. Megan Heller assisted him with research on migration.

We benefited not only from the work of the 1999 Technical Panel, but also from meeting with Eugene Steuerle, chair of that Panel.

We also thank the Social Security Advisory Board and the Board staff for their assistance.

I. Executive Summary

The 2003 Technical Panel on Assumptions and Methods, as charged by the Social Security Advisory Board, has carefully reviewed the assumptions and methods for projecting the future financial status of the Social Security trust funds.

An important attribute of the annual Report of the Trustees of the Social Security Trust Funds is its widespread acceptance as a professional, unbiased assessment of the financial status of the Old-Age, Survivors and Disability Insurance (OASDI) programs. The importance of the Report remaining an unbiased assessment cannot be overstated. Several persons have suggested to the Panel that the Trustees Report should err on the side of projecting a fiscal imbalance in the trust funds, or on the side of an accelerated projected date of negative cash flow or trust fund exhaustion. These individuals believe that legislated changes to the Social Security system are needed and that more pessimistic projections are required to stimulate political action. Others argue that forecasts should err on the side of optimism so that policymakers will not be rushed into making changes in an important social program. The Panel explicitly rejects such arguments and emphasizes the inherent value of forecasts that are free of political motivations or preconceived assumptions about the need (or lack thereof) for reforms to Social Security. The introduction of deliberate, systematic biases into the projections would fatally undermine the value of the annual Report and open the Trustees to well-justified criticism.

One of the reasons for public confidence in the objectivity of the annual Trustees Report has been the long tradition of professionalism of the career staff of the Office of the Chief Actuary and the insulation of that Office from political influence. In the future as in the past, the staff of the Office of the Chief Actuary must feel free to provide their best assessment concerning assumptions and models to the Trustees for their consideration, whether or not that assessment is comfortable for those holding policy positions. The continued insulation of this staff from political considerations is essential to the integrity—and thus to the value—of the projections contained in the Trustees Report.

The Panel has examined the assumptions adopted by the Trustees in the 2003 Trustees Report and the methods they used to project future revenues, expenditures and the long run actuarial balance of OASDI. The Panel also reexamined the 1999 Technical Panel's recommendations for changes in key assumptions and for the adoption of new methods of projecting future revenues and expenditures. The Panel then reviewed changes in assumptions and methods employed by the Trustees between 1999 and 2003.

In reviewing the assumptions and methods used to prepare the 2003 Trustees Report, the Panel has reached a consensus on a series of recommendations for improvement and has identified many areas that should remain unchanged. This Executive Summary highlights the Panel's recommendations.

Effect of Proposed Recommendations on Social Security Financial Status

The Office of the Chief Actuary has estimated the effects on the future revenues and expenditures of Social Security if the Trustees were to adopt our proposed recommendations for changes in the intermediate assumptions used in the Trustees Report. The recommendations that would directly affect the projected financial status of Social Security are:

1. Increase projected rate of immigration
2. Increase projected rate of mortality decline
3. Eliminate the projected rise in the labor force participation rate of older persons due to projected increase in life expectancy
4. Increase projected real wage growth
5. Decrease projected level of inflation

These recommendations are explained in this Executive Summary and in more detail in the body of the report.

The table below presents the effects of these changes, both separately and together, on several measures of the financial status of Social Security. If all of our recommendations were adopted, the present value of the 75-year unfunded obligation would increase by \$0.2 trillion. However taxable earnings would increase by a larger percentage. Therefore the 75-year actuarial balance would improve slightly from a projected deficit of -1.92 percent to -1.90 percent of taxable payroll. The single-year deficit in 2077 would decrease from -6.5 to -6.2 percent of taxable payroll.

	Change in 75-year actuarial balance (percentage points)	2077 deficit (percentage points)	Change in 75-year unfunded obligation (in trillions)	Exhaustion Year
Current	-1.92	-6.5	\$3.5	2042
Immigration	+0.25	-5.7	-\$0.4	2044
Mortality	-0.24	-7.3	+\$0.5	2041
Labor force	-0.08	-6.7	+\$0.1	2042
Wages	+0.20	-5.9	-\$0.3	2045
Inflation	-0.11	-6.7	+\$0.2	2041
All changes	+0.01	-6.2	+\$0.2	2043

The impact of adopting our individual recommendations is not insignificant. However, to some extent, these recommended changes tend to offset each other. Therefore, in total they do not alter the overall trends of the financial status of Social Security. Even adopting only those recommendations that have a favorable effect on the system would still leave substantial future deficits. The Panel strongly endorsed changes in the 2003 Trustees Report presenting the actuarial balance not only in terms of taxable payroll but also in 75-year and infinite-horizon present-value terms and in terms of the benefit level equivalent. Because of time considerations, the Office of the Chief Actuary was able to present the impact of the Panel's recommendations only in terms of taxable payroll rates and the 75-year unfunded obligation.

Recommendations on Key Demographic Assumptions Employed in the Trustees Report

Assumption Recommendation A-1. The Panel recommends that the Trustees retain their current assumption of 1.95 for the ultimate level of the total fertility rate (TFR), which implies a slight decline from the average value of 2.02 observed during 1990-2000. Despite much lower levels observed recently in both Europe and Japan, the Panel concluded that factors affecting fertility in the U.S. differ in certain fundamental respects, and thus that international comparisons do not justify lowering the assumed TFR.

Assumption Recommendation A-2. The Panel recommends that the Trustees increase significantly their assumptions regarding future levels of net international migration. Rather than decreasing or flat trends, the intermediate and low-cost scenarios should both include increasing annual levels of net migration; only the high-cost scenario should have a constant level. For the intermediate scenario, the annual number of net migrants should increase at half the rate of population growth, until the net migration rate (NMR) declines to its historical average value of 3.2 per 1000; thereafter, holding the NMR constant, the net annual inflow should grow at the same rate as the total population.

Assumption Recommendation A-3. For the intermediate scenario, the Panel recommends that assumed ultimate rates of mortality decline by age and sex be increased to levels that are broadly consistent with those observed during 1950-2000 for the total population, but with a continued deceleration for ages 0-14 comparable to the reduction in rates of decline that occurred between the first and second halves of the 20th century. Rates of mortality decline for the low- and high-cost scenarios should be raised by a similar amount. The Panel also recommends decreasing assumed rates of decline after 75 years, so that they equal zero beginning in 2200 (or some similar date) under all scenarios. The Panel proposes a simple projection method that observes these basic principles and leads to a projected life expectancy at birth of 84.4 in 2070, compared to the Trustees' current value of 82.9.

Assumption Recommendation A-4. The Panel recommends that the assumptions of disability incidence remain the same as in the 2003 Trustees Report. While it is likely that the incidence of health-related impairments at younger as well as at older ages will decline in the future there is no convincing evidence as yet that this has or will translate into reduced movement onto the disability rolls. Movement onto the rolls is also influenced by the social environment–labor market conditions, accommodation policies, OASDI policy, etc.–and these factors have to date offset any reductions in the rolls caused by improved health.

Assumption Recommendation A-5. The Panel recommends that the assumptions of disability termination remain the same as in the 2003 Trustees Report. The age that beneficiaries move onto the disability rolls has fallen and is likely to continue to do so, and the share of conditions with relatively longer life expectancy (mental illness, muscular skeletal, etc.) has increased and is likely to do so. These trends are likely to improve life expectancies of the average future beneficiary faster than that of the rest of the population, but more evidence of these forces is necessary before changes in the current assumptions can be made.

Recommendations on Key Labor Force Assumptions Employed in the Trustees Report

Assumption Recommendation A-6. The 2003 Trustees Report added an assumption that future labor force participation rates will rise due to increases in life expectancy. This adjustment

should be eliminated from the intermediate assumptions. Various factors, including changes in employer pensions, Social Security, and the general economic environment, may result in higher participation rates, but these should be considered explicitly. The Panel recommends that the assumption be retained in the low-cost alternative but also eliminated from the high-cost assumptions.

Assumption Recommendation A-7. The Panel recommends that the assumptions on unemployment remain the same as those in the 2003 Report. Given recent experience, a long-run unemployment rate of 5.5 percent is a reasonable assumption for future unemployment rates.

Recommendations on Key Economic Assumptions Employed in the Trustees Report

Assumption Recommendation A-8. The Panel recommends that the assumption on productivity growth be increased by 0.1 percentage point to 1.7 percent per year. This recommendation reflects the work of private and government forecasters for the next decade, assumptions about future demographic trends, and analysis of more recent productivity data.

Assumption Recommendation A-9. The share of labor compensation in GDP has historically been quite stable, and the Panel agrees with the current assumption of a constant ratio.

Assumption Recommendation A-10. The Panel recommends that the change in the earnings to compensation ratio be reduced in the intermediate assumption from a decline of 0.2 percent per year to a decline of 0.1 percent per year. In the low-cost assumption, the current ratio should be held constant, while in the high-cost assumption, the ratio should decline by 0.2 percent per year. In addition, in both the intermediate and high-cost projections, the earnings to compensation ratio should be held constant after it has declined from its current level of 0.86 to 0.75.

Assumption Recommendation A-11. The Panel recommends that the assumption of no change in average hours of work per week be retained in the intermediate assumption. This assumption seems reasonable in light of recent data. The current high-cost assumption of an annual 0.1 percent decline and the low-cost assumption of a 0.1 percent increase should also be retained.

Assumption Recommendation A-12. The differential growth rate between the GDP deflator and the Consumer Price Index (CPI-W) should be maintained at -0.3 percentage point, which is roughly equal to its value during the last two years and, adjusted for methodological changes, also equal to its average value over the last ten years.

Assumption Recommendation A-13. Together, Assumption Recommendations A-8 through A-12 result in a rate of real wage growth in the intermediate assumptions of 1.3 percent per year, slightly higher than the 1.1 percent assumed in the 2003 Trustees Report.

Assumption Recommendation A-14. The Panel recommends that the assumed rate of increase in the Consumer Price Index be reduced by 0.5 percentage point in the intermediate assumption, to 2.5 percent per year. The assumption of the future inflation rate in the GDP deflator should be reduced from the current 2.7 percent assumption to 2.2 percent.

Assumption Recommendation A-15. The Panel recommends that the assumption on the real interest rate be retained at the current 3.0 percent.

Recommendations on Methods Employed in the Trustees Report

Method Recommendation M-1. The Panel recommends that the Trustees make a fundamental change in their approach for deriving net migration assumptions. The Trustees' net migration assumptions should not be based on the provisions of current immigration law (which are consistent with widely varying levels of net migration, and which can reasonably be expected to change in the future) but rather on an analysis of historical trends. In addition, the Panel recommends that the Trustees should express their ultimate net migration assumption as a rate (annual number of net migrants divided by population size).

Method Recommendation M-2. The Panel recommends that the mortality projection model be simplified by dropping separate projections by cause of death and stating assumptions in terms of age-specific rates of decline for all-cause mortality.

Method Recommendation M-3. The Panel recommends that the models used to estimate movement into and out of the Disability Insurance program be better documented and especially that consideration be given to more formally showing how the mix of impairments and the changes in the mortality rates within these impairment groups are likely to affect future mortality rates by age and sex.

Method Recommendation M-4. The Panel recommends that the Trustees consider modifications of the model and assumptions used in the projections of labor force participation rates. This report provides details on how the existing model might be simplified to increase transparency and reduce the appearance of arbitrariness in its implementation.

Method Recommendation M-5. The Panel recommends that further consideration be given to how changes in the population and labor force might impact trends in hours of work, productivity, and annual earnings. Changing the growth rate assumption on one variable such as immigration should cause the Trustees to reassess their assumed rate of productivity growth, the change in weekly hours, and, therefore, the growth rate of real wages.

Assessment of Presentation and Other Issues

Method Recommendation M-6. The Panel believes that the 2003 Report made substantial improvements in the presentation of the financial status of the OASDI program compared to earlier reports. In particular, the Trustees are to be commended for including in the 2003 Report:

- a. the present value of the 75-year open group unfunded obligations,
- b. the present value of the closed group unfunded obligations, and
- c. the present value of the infinite time period open group unfunded obligations.

The Report also briefly mentions the infinite horizon actuarial deficit of 3.8 percent. This figure is more informative than the dollar value of the infinite horizon unfunded obligations, and should be presented more prominently.

Future reports should continue to report each of these measures of the unfunded obligations of OASDI and better integrate them into the overall discussion.

Method Recommendation M-7. The 2003 Report also presents a more comprehensive assessment of ways of viewing the actuarial deficit. The new illustrations indicating the

magnitude of benefit reductions needed to achieve actuarial balance are a useful and important counterpart to the illustrations of the increase in revenues needed to pay future benefits. This new emphasis provides balance to the report and allows the reader to directly observe the impact of adopting alternative methods of eliminating the actuarial deficit. Throughout the Trustees Report, the discussion of the actuarial balance should give equal emphasis to revenue increases needed to pay promised benefits and benefit reductions needed to maintain scheduled tax rates.

Method Recommendation M-8. The Panel believes that the Trustees Report should strive to improve the presentation of risk and uncertainty so that the public will recognize the possibility of outcomes other than the intermediate projections. Greater emphasis should also be placed on identifying those factors that are most likely to alter the future projections. The Trustees are to be commended for the inclusion of projections based on a stochastic model for the first time in the 2003 Report. The Panel recommends that the results from a stochastic approach be included in future reports. The Panel also believes that this model needs to be refined and evaluated in the future in accordance with best practice suggestions from the research community.

Method Recommendation M-9. The Trustees should place greater emphasis on communicating the importance of risk and uncertainty imbedded in the projections. The Panel also recommends that consideration be given to illustrating potential outcomes through the use of integrated scenarios based on internally consistent sets of assumptions.

The report currently presents uncertainty in three ways: sensitivity analysis, a stochastic model, and high and low-cost scenarios. A fourth method of illustrating a range of possible outcomes that should be considered is "integrated scenarios," which would apply the projection models using sets of assumptions that would have a positive or negative overall impact on the program but would also be consistent in the sense that the various assumptions could plausibly be expected to occur in combination. Presenting the results of several integrated scenarios that incorporate a more realistic set of assumptions might better communicate possible ranges of uncertainty to general audiences.

Method Recommendation M-10. Consideration should be given to the development of a separate chapter to unify the presentation on risk and uncertainty and to discuss the importance of risk and uncertainty in long-range projections.

Further Recommendations for the Trustees

Other Recommendation O-1. The projection process should be transparent and replicable. The Panel recommends that the Trustees require the Office of the Chief Actuary (OCACT) to prepare additional documentation of the projection models used in the Report. Adequate documentation is needed both by OCACT analysts, so that the methodology is generally understandable and reproducible, and by Technical Panels, so that they can properly review and evaluate that methodology. Current documentation is inadequate and should be improved. Available reports do not provide sufficient information for review and assessment of the models and methods used to generate the projections of expenditures and revenues. In addition, appropriate documentation would be useful to other interested scholars seeking to examine the Trustees Report and to those seeking to develop and evaluate reform proposals.

Other Recommendation O-2. The Panel recommends that the Trustees instruct OCACT to prepare a report listing the various assumptions that would be used to evaluate potential reform proposals. Understanding the decision rules and assumptions adopted by OCACT would facilitate the development of future reform proposals and permit a more uniform scoring of these

proposals. OCACT produces evaluations of numerous reform proposals. The Panel also notes that evaluations of major proposals are now available on the Office's website. However, these memos do not present results in a standardized fashion. The Panel endorses the recommendations of the 1999 Technical Panel and subsequent analysis that a clear statement by OCACT concerning how reform proposals will be evaluated is needed. The 1999 Panel's "Checklist for Comparisons of Reform Plans and Current Law" could serve as a basis for OCACT's report.

Recommendations to the Social Security Advisory Board, the Commissioner of Social Security, and the Board of Trustees for Additional Research

Other Recommendation O-3. The Panel recommends that additional research be undertaken to provide a stronger basis for projecting immigration. Such research should examine current gross and net flows of immigration, the major determinants of these flows, and possible future trends in immigration, including both immigration for permanent legal residence and other types of immigration.

Other Recommendation O-4. The Trustees should attempt to assess structural changes in the labor market and how these changes might influence future decisions to retire and decisions to claim retirement or disability benefits. Considerable research has been published on these issues. A careful review of the current debate on reasons for the ending of the trend toward early retirement among men would provide further guidance on how to incorporate such changes into the labor force models.

Other Recommendation O-5. The Panel endorses the approach begun in the 2003 Trustees Report of projecting the status of the trust funds into the infinite horizon in addition to the traditional short-range and 75-year projections. However, there is a need to examine more carefully the question of whether different methodologies and different approaches to developing ultimate assumptions, particularly those which are based on rates of change, may be appropriate for making projections that extend to infinity. The Panel recommends that research be undertaken with a view to better understanding how infinite horizon projections should be made.

Recommendation to Congress and the Commissioner of Social Security to Prepare an Annual Benefit Audit for OASDI

Other Recommendation O-6. The Panel recommends that Congress enact a statutory requirement that the Social Security Commissioner publish an annual Benefit Audit that provides a comprehensive assessment of taxes paid and benefits received by different types of households and different groups of people. The annual Trustees Report is primarily a report on the financial status of OASDI; it does not examine the distribution of lifetime taxes and benefits across different types of households and different groups of people, nor does it provide an assessment of the net value of Social Security coverage and how this varies by household and personal characteristics.

Report Highlights

- The Trustees should make a fundamental change in the approach for the immigration assumptions and no longer base net migration assumptions exclusively on current immigration law. In addition, the Trustees should express their ultimate net migration assumption as a rate. Specifically, annual net migration should grow half as fast as total population until the rate falls to 0.32 percent of total U.S. population. It should then grow at the same rate as total population.
- Further research on immigration is needed to examine current flows and their determinants, and possible future trends, including both immigration for permanent legal residence and other types of immigration.
- Assumed ultimate rates of mortality decline should be increased to be broadly consistent with those observed during 1950-2000 for the total population, but with a continued deceleration for younger ages. In combination with a simplified projection method, this assumption leads to a projected life expectancy at birth of 84.4 in 2070, compared to the Trustees' current value of 82.9.
- In 2003, the Trustees added an assumption that future labor force participation rates will rise due to increases in life expectancy. This adjustment should be eliminated, although the effect of other factors (including changes in employer pensions and Social Security) on labor-force participation may be considered explicitly.
- Assumed productivity growth should be increased from 1.6 to 1.7 percent per year. The change in the earnings to compensation ratio should be reduced from a decline of 0.2 percent per year to a decline of 0.1 percent per year. These two changes would increase the real wage growth assumption from 1.1 to 1.3 percent per year.
- The assumed rate of increase in the Consumer Price Index should be reduced by 0.5 percentage point, to 2.5 percent per year.
- In 2003, the Trustees Report was substantially improved by the addition of stochastic analysis, which aims to quantify the uncertainty of the projections. Presentation of risk and uncertainty should be further developed so that the range of possible outcomes is more clearly illustrated to non-technical readers, perhaps with the use of integrated scenarios.
- In 2003, the Trustees Report improved the presentation of the actuarial deficit by including the present value of unfunded obligations on a 75-year open-group basis, on a closed-group basis, and on an infinite-time-period open-group basis. It also included new illustrations indicating the magnitude of benefit reductions as well as the magnitude of revenue increases that would be needed to eliminate the deficit. Future reports should continue to include these measures and illustrations and should more fully integrate them into the overall report.
- Congress should enact a statutory requirement that the Social Security Commissioner publish an annual Benefit Audit that provides a comprehensive assessment of taxes paid and benefits received by different types of households and different groups of people.

Summary of Assumption Recommendations

		Low cost	Intermediate cost	High cost
Total fertility rate	TR	2.2	1.95	1.7
	Panel	No change	No change	No change
Immigration (millions)	TR	1.300	0.900	0.6725
	Panel	Grow with total population	Grow at ½ rate of total population growth	1.225
Mortality (rate of decline)*	TR	0.34	0.72	1.26
	Panel	0.63	0.96	1.48
Components of Net Real Wage Growth				
Productivity growth rate	TR	1.9	1.6	1.3
	Panel	2.0	1.7	1.4
Earnings/compensation ratio change (pct)	TR	-0.1	-0.2	-0.3
	Panel	0.0	-0.1 (limit of 0.75, reached in 2138)	-0.2 (limit of 0.75, reached in 2071)
Compensation/GDP ratio	TR	Constant	Constant	Constant
	Panel	No change	No change	No change
Hours worked change (pct)	TR	0.1	0.0	-0.1
	Panel	No change	No change	No change
GDP deflator less CPI (pct)	TR	-0.3	-0.3	-0.3
	Panel	No change	No change	No change
Net real wage growth (pct)	TR	1.6	1.1	0.6
	Panel	1.8	1.3	0.8
CPI growth	TR	2.0	3.0	4.0
	Panel	2.0	2.5	3.0
Real interest rate (nominal less CPI)	TR	3.7	3.0	2.5
	Panel	No change	No change	No change
Disability incidence rate (per thousand)	TR	4.5	5.6	6.7
	Panel	No change	No change	No change
(NOTE: recommend no change in termination rates)				
Unemployment rate	TR	4.5	5.5	6.5
	Panel	No change	No change	No change

TR: 2003 Trustees Report.

*Mortality “assumptions” presented here are, in fact, the outcomes of mortality projections involving more detailed assumptions. These values summarize the rate of mortality decline across all age groups during 2027-2077. See also Note 1 of Table 3.

II. Introduction

The 2003 Technical Panel on Assumptions and Methods began its deliberations in January 2003. Through a series of meetings, hearings and reports, the Panel has focused on improving the projections of revenues, expenditures, and the actuarial balance of OASDI. Our examination has produced the recommendations presented in this report. In considering the assumptions and methods used by the Trustees, we have also encountered a number of questions and issues that merit further discussion. In this introduction, we briefly describe the activities of the Panel and highlight some of the puzzling and important issues that we have faced.

How far out should the projections be made? In recent years, the Trustees have made 10-year short-range projections and 75-year long-range projections. The 2003 Trustees Report included projections for an infinite time horizon, which eliminate the problems associated with the arbitrary 75-year termination point. The infinite time horizon projections are a useful addition to the report and should be continued.

How should actuarial balance be measured? The actuarial deficit of the Social Security trust funds has traditionally been expressed as a percentage of taxable payroll, in other words, the number of percentage points by which the tax rate would have to be increased to bring the system back into balance. This continues to be a useful and important measure. The 2003 Trustees Report, however, enhanced the understanding of the magnitude of the deficit and the range of actions needed to address it by presenting additional perspectives in the form of expressing the deficit in present value terms over both the 75-year estimating period and over the infinite horizon, by giving present value estimates on both an open and closed group bases, and by illustrating the deficit also in terms of the benefit reductions that would be necessary to achieve balance in the absence of additional revenues. The Panel strongly believes that these additional methods of presentation greatly advance the objective of making the Trustees Report an unbiased and comprehensible presentation of the financial situation of the Social Security program. The Panel recommends that future Trustees Reports continue the use of these measures and illustrations and integrate them even more fully into the overall presentation of the report.

Are the ultimate levels of variables reasonable? Projections over an infinite period require a careful assessment of the reasonableness of the assumptions. In particular, assumptions about trends in ratios that are bounded by 0 and 1 should be closely monitored. Trends that may be justifiable over shorter periods may produce implausible results when continued over the infinite time horizon. Thus, consideration should be given to trending certain variables toward an ultimate value.

Why is America different, or is it? In general, the United States has a much higher total fertility rate than other developed countries and lower life expectancies. Recently, the United States has experienced stronger productivity growth. Other important differences are that Americans work more hours per week, take shorter vacations, tend to retire at older ages, and experience a much lower incidence of long-term unemployment. In making long-range projections, should the Trustees base their estimates on the history of the United States or should they anticipate that America will move in the direction of the other developed countries? While the Panel has reviewed developments in other countries, we have tended to endorse assumptions that are consistent with the historical experience of the United States.

When basing projections on past experience, how many years should be included in the analysis? Projections of the future are typically based on current levels and the range of historical experience. But how many years should be included in the experience base? Even if

appropriate data existed, should we base expectations for the 21st century on outcomes observed in the 19th (or even 18th) century? Perhaps more importantly, should the 1950s and 1960s be included in the range of historical experiences that are important for projecting the future? The issue of what is the appropriate historical period to consider has repeatedly faced the Panel as we have crafted our recommendations. Our best answer is that the length of the period depends on the topic being examined. Trends in mortality improvements over long periods may be important while a smaller number of years may be the relevant time period for changes in the consumer price index.

Projections are not reality. How can uncertainty be best communicated? Projections based on the intermediate assumptions seem to monopolize the attention in the popular press, in Congress, and, indeed, even in the researcher community. The Panel feels strongly that it is important to better inform the public concerning the uncertainty of these projections. The inclusion of the stochastic model in the 2003 Trustees Report is a positive step forward; however, the Panel believes that additional efforts should be made to highlight the range of possible outcomes concerning the financial status of OASDI.

III. Recommendations on Key Demographic Assumptions

In order to project future revenues and expenditures, the Trustees must develop a demographic model that provides estimates of the future population size and age structure. These estimates ultimately are used to determine the number of Social Security covered workers and the number of beneficiaries in each year. The estimates of future population growth are generated from the initial population and assumptions concerning the total fertility rate, legal and other-than-legal immigration, and trends in mortality improvement. The demographic assumptions and models are central to projecting future costs and revenues.

A. Fertility

Assumption Recommendation A-1. The Panel recommends that the Trustees retain their current assumption of 1.95 for the ultimate level of the total fertility rate (TFR), which implies a slight decline from the average value of 2.02 observed during 1990-2000. Despite much lower levels observed recently in both Europe and Japan, the Panel concluded that factors affecting fertility in the U.S. differ in certain fundamental respects, and thus that international comparisons do not justify lowering the assumed TFR.

Overview

The fertility assumption is usually expressed in terms of the total fertility rate (TFR), the average number of births per woman over her lifetime, assuming that she survives to the end of the reproductive age range and that her probability of giving birth at any age is the same as observed during the given year (or time period). For population projections, one needs not only the TFR but also the distribution of fertility by age for each year. Finally, one needs to choose a pattern of convergence between the current fertility level and the assumed ultimate one.

The Panel considered all three issues, although it focused primarily on the ultimate level of total fertility. The Trustees' current assumption of a TFR of 1.95 for the intermediate scenario lies below the replacement level of around 2.1 children per woman. This choice may seem to imply that population size will decline in the long run. However, in current projections, the shortfall of births is compensated for both by positive net migration and by an ongoing mortality decline, so population growth remains positive for more than 100 years in the intermediate scenario.

There are reasons for considering both a higher and a lower assumption for the TFR. On the one hand, an assumption of 1.95 lies below the level observed for the U.S. every year since 1989, perhaps suggesting the need for a higher value. On the other hand, the fertility of most European countries, as well as Japan, lies below the Trustees' current assumption (in several cases, it is below 1.5), suggesting the possibility of much lower fertility levels in the future. However, after reviewing the evidence, the Panel concluded that an assumption of 1.95 is plausible overall and that there is no compelling reason for pushing it higher or lower.

Historical Background

Since 1917, the TFR in the U.S. has fluctuated from a high of 3.68 in 1957 (during the Baby Boom) to a low of 1.74 in 1976 (during the Baby Bust). Figure 1 shows the historical trend for this period and the Trustees' current projections through 2080. Since 1972, the TFR has been relatively stable, falling between 1.74 and 2.06. Following the unusually low values of the mid 1970s and early 1980s, it increased rapidly during the late 1980s (from 1.79 in 1984 to 2.07 in 1990). Since 1990, the TFR has fallen slightly but has never again dropped below 1.97 (averaging 2.02 for 1990-2000).

Other highly industrialized nations have experienced lower rates. Only three out of 24 OECD countries had an average TFR above 2.0 during 1990-2000 (U.S., Iceland, New Zealand). Only five more had average levels between 1.75 and 2.0 over the same time period (Australia, Ireland, Norway, Sweden, Finland). Several had average TFRs between 1.5 and 1.75 during these years (Canada, U.K., France, Switzerland, Luxembourg, Belgium, Netherlands, Denmark, South Korea). However, the TFRs of seven OECD countries fell below 1.5 on average during 1990-2000 (Italy, Spain, Portugal, Greece, Austria, Germany, Japan). In the most extreme cases, Italy and Spain, the TFR averaged around 1.2 during the 1990s. Finally, although the situation is not strictly comparable for obvious reasons, it is worth noting that most countries of Eastern Europe also experienced average TFRs around or below 1.5 during the 1990s (U.S. Census Bureau 2003).

Current Trustees' Assumptions

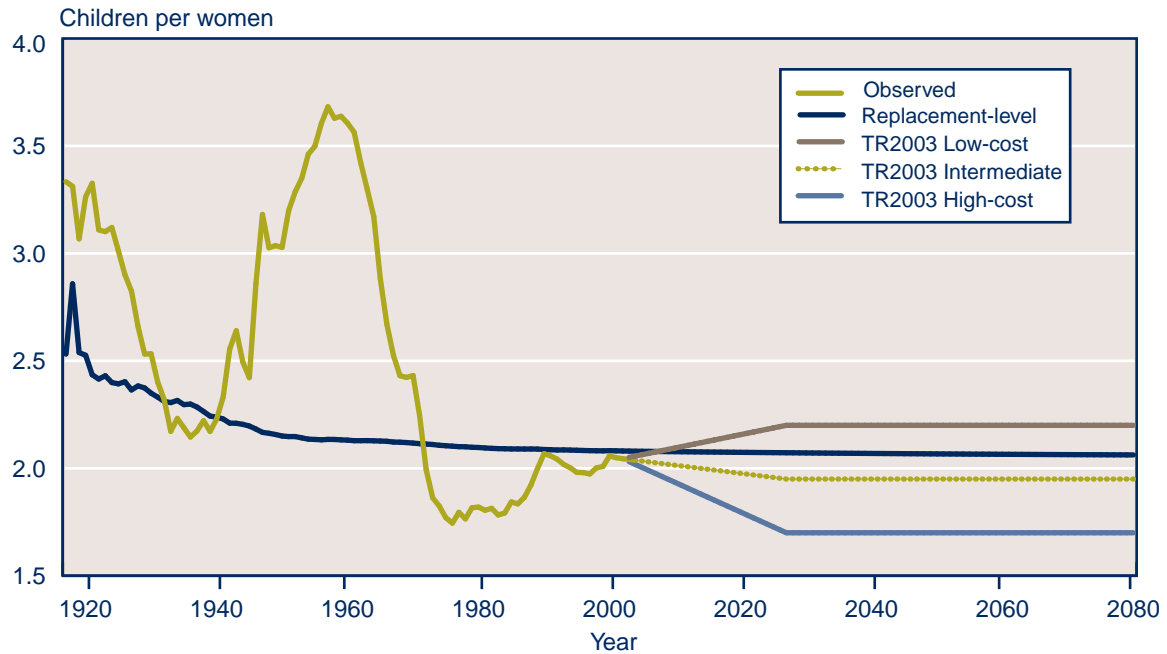
From 1981 to 1987, the Trustees assumed an ultimate TFR of 2.0 for their intermediate scenario. In recognition of the unusually low fertility of the 1970s and 1980s, this value was reduced to 1.9 in 1988. The 1995-96 Technical Panel recommended an increase to 1.95, but the Trustees did not immediately adopt this recommendation. In fact, the assumed ultimate TFR for the intermediate scenario was still 1.9 in 1999, and the last Technical Panel recommended no change from this level. Nevertheless, the assumption was increased to 1.95 in the 2000 Trustees Report, and the high-cost assumption was moved up from 1.6 to 1.7. The same three values (2.2, 1.95, and 1.7) have been used ever since for the ultimate TFR assumption. As seen in Figure 1, the assumed TFR converges linearly to these ultimate levels over a 25-year time period. This graph also illustrates that only the low-cost scenario includes an assumption that the TFR will stabilize at a level that assures long-term population replacement due to fertility alone (i.e., in the absence of positive net migration and/or an ongoing mortality decline).

In addition to the TFR, the Trustees specify an assumed age pattern of fertility (expressed in terms of age-specific fertility rates). Rather than simply holding the age pattern fixed, the Trustees allow for a temporary continuation of recent trends in the age pattern of fertility, as illustrated in Figure 2. Thus, the increase of fertility among women in their 30s, which has been the driving force behind the rising TFR since the mid 1970s, is assumed to continue over the next 25 years, despite the assumed decline in total fertility.

Explanation of Panel's Recommendation

The Panel considered several factors affecting fertility levels in the U.S. and other countries. A major concern was to understand those forces that have led to a fertility level in the U.S. that is substantially above the experience of most other high-income nations, and whether those forces are likely to endure in the future. One might argue that the U.S. simply trails behind Europe and Japan, and that the TFR in the U.S. will fall to historically low levels in future years, as occurred

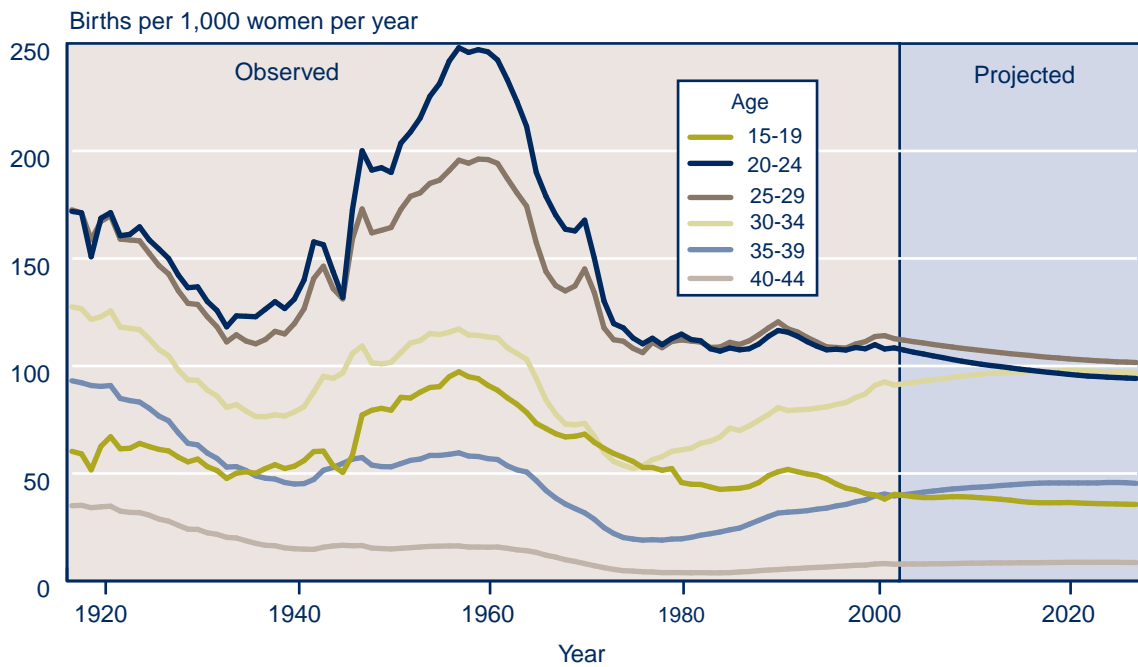
Figure 1
Total Fertility Rate, United States, 1917-2002 (observed)
and 2003-2080 (projected, TR2003)



Note: Replacement level line depicts the value of the TFR that would yield zero population growth in the long run, assuming zero net migration and constant mortality.

Source: Office of the Chief Actuary, Social Security Administration.

Figure 2
Fertility Rates by Age of Mother, United States
1917-2002 (observed) and 2003-2037 (projected, TR2003)



Source: Office of the Chief Actuary, Social Security Administration.

for so many wealthy countries in recent decades. However, the situation of the U.S. compared to most other high-income countries differs in at least two respects.

First, population composition favors a higher fertility level, since some of the largest immigrant and minority groups within the U.S. have fertility levels that lie above than the national average. For example, the TFR among Hispanics in the U.S. was 2.75 in 2001, 35 percent higher than the national average of 2.03. The TFR of 2.10 for non-Hispanic Blacks in the same year was slightly above the national value, while non-Hispanic Whites, Asians/Pacific Islanders, and American Indians had below-average fertility levels (Hamilton, Sutton, and Ventura 2003). Since Hispanics and non-Hispanic Blacks together comprise roughly a quarter of the U.S. population, their higher fertility levels are an important source of the nation's relatively high TFR. Second, fertility in the U.S. is relatively high for the population as a whole. Notably, the TFR of non-Hispanic White women, falling in a range from 1.77 to 1.87 during 1990-2001, exceeds the national average for most other high-income countries.

There may be many causes of the relatively high fertility of U.S. women, but it appears that an overriding factor is their greater ability to combine work and childbearing, thanks to a variety of institutional factors. In general, women (and couples) are deterred from having children when the economic cost—in the form of lower lifetime wages—is too high. Compared to other high-income countries, this cost is diminished by an American labor market that allows more flexible work hours and makes it easier to leave and then re-enter the labor force (Adsera, forthcoming). The importance of this situation is reflected in the positive relationship between measures of women's labor force activities and levels of fertility across wealthy countries in recent years (Brewster and Rindfuss 2000).

This result is puzzling at first glance, because the direction of the relationship is reversed compared both to historical patterns and to what occurs on an individual level. However, it appears that in high-income countries today, very low fertility (below 1.5 children per woman) occurs mostly in situations where a large fraction of women must choose, in effect, between work and having children, because the circumstances of formal employment and everyday life make combining these two activities rather difficult. Some countries of northwestern Europe (in particular, the Nordic countries) offer generous government programs that help women to be economically active while still having children. In the U.S., despite a lack of public financial support for families with children, it appears that the flexibility offered to individuals through the market—perhaps affecting consumption (e.g., more convenient store hours) as well as employment—facilitates integration of work and traditional family life.

In addition to these considerations, various forms of survey data offer insights into individual motivations and behaviors with regard to reproduction. Broadly speaking, such data record three distinct types of information: beliefs about "ideal family size," individual fertility intentions or expectations, and whether specific birth were unplanned or unintended. However, such information may have little relevance to our understanding of fertility trends for several reasons. According to some experts, behavioral variation over time has been driven mostly by changes in economic conditions and various institutional factors. Indeed, there is little evidence of major shifts in popular attitudes about reproduction over the past few decades. For example, the ideal family size envisioned by U.S. teens has been around 2.0 to 2.5 children since the early 1960s (Macunovich 2002).

Regarding fertility intentions or desires, a possible strategy would be to use recent survey data for the current population as an input to short-term projections. However, there is little evidence that fertility intentions reported in surveys predict reproductive outcomes any better than do the social and demographic characteristics (age, education, etc.) of the respondents (Rindfuss et al.

1988). Furthermore, there is no obvious value of such information for long-term projections, since all individuals who report their fertility intentions in surveys taken today will generally have completed their reproductive careers within 30 to 40 years.

Surveys suggest that over 30 percent of births in the U.S. are unplanned, and that this level is much higher among disadvantaged population groups (Henshaw 1998). The increased use of effective birth control in such situations—through either improved access and education, or better technology—would presumably reduce the number of unintended births. However, even if the availability and usage of effective birth control were improved, it is unclear how large a reduction in the TFR would follow. Indeed, a majority of unplanned births are described as "mistimed" but not "unwanted" (Frejka and Kingkade 2003). In these cases, better means of fertility control might shift the timing of births within individual lives without noticeably affecting overall fertility levels. Thus, it appears that even the potential reduction in U.S. fertility levels due to improved usage of birth control is probably no larger than 10-15 percent.

On the other hand, an increased use of assisted reproductive technologies (ART) could promote higher fertility levels, by helping infertile (or subfertile) couples to give birth. Figure 2 shows that the rise of the TFR in the U.S. after 1975 was driven entirely by increased fertility among women in their 30s and 40s. It appears unlikely that a large portion of this increase was due to ART, which accounted for a mere 0.9 percent of U.S. births in 2001 according to official registry data (CDC 2002). However, this figure understates the total contribution of new reproductive technologies to current fertility levels, due both to underreporting of births by ART clinics and (more importantly) to a narrow definition of ART that includes only treatments in which both egg and sperm are handled outside the body (excluding, for example, births made possible by fertility-stimulating drugs alone without further clinical intervention). Nevertheless, even by a more expansive definition, it appears unlikely that these new technologies could account for more than a quarter of the recent increase of fertility among women above age 30. Furthermore, their potential contribution to future trends, as well as their relative importance to fertility in the U.S. compare to other countries, is largely unknown.

In conclusion, the stability and relatively high level of the TFR in the U.S. during the last two decades (especially the 1990s) appear to reflect a context of reproduction that differs in important respects from the situation in other high-income countries, especially with regard to women's ability to combine formal employment with having children. Two groups of technologies, birth control and infertility treatments, could be an important aspect of future changes; however, their potential effects on fertility levels point in opposite directions, and their likely contributions are difficult to assess. Based on this analysis, the Panel recommends no change from the current assumption of 1.95 for the intermediate scenario. In addition, although future trends are surrounded by a great deal of uncertainty, the Panel concludes that the Trustees' current high- and low-cost assumptions are reasonable as well.

Some demographers suggested to the Panel that the high-cost assumption be set as low as 1.5, similar to the TFR experienced in recent years by many other industrialized countries. However, the current value of 1.7 is already below the historical minimum of 1.74 for the U.S. (in 1976). Thus, there is simply no historical precedent from the U.S. experience itself to suggest a lower assumption than the one currently employed for the high-cost scenario. Furthermore, there is no historical precedent from other countries for a TFR in such a low range for more than a few decades. Even the high- and low-cost scenarios are supposed to depict extreme levels that could plausibly be experienced on average after 2027. The Panel concluded that it would not be reasonable to base a long-term fertility projection—even the high-cost scenario—on the relatively short-term experience of other countries.

The current assumption of 2.2 for the TFR of the low-cost scenario seems reasonable as well, despite uncertainties about future immigration levels and other factors. Although some large immigrant groups (in particular, Hispanics) have higher fertility than native-born women, this differential tends to diminish among subsequent generations (Bean et al. 2000). In addition, it seems unlikely that the fertility of native-born women will increase much above 2.0 in the future, even for relatively short periods of time. In all likelihood, the Baby Boom was a unique historical event, driven by the unusual social and economic circumstances of the early postwar period. Although some aspects of this experience could plausibly be replicated in the future, the context of reproduction in the 1950s seems unlikely to return. Most importantly, a major reversal of trends in women's education and labor force participation—which were driven in part by increased access to modern contraceptives—is now very difficult to imagine.

B. Net Migration

Assumption Recommendation A-2. The Panel recommends that the Trustees increase significantly their assumptions regarding future levels of net international migration. Rather than decreasing or flat trends, the intermediate and low-cost scenarios should both include increasing annual levels of net migration; only the high-cost scenario should have a constant level. For the intermediate scenario, the annual number of net migrants should increase at half the rate of population growth, until the net migration rate (NMR) declines to its historical average value of 3.2 per 1000; thereafter, holding the NMR constant, the net annual inflow should grow at the same rate as the total population.

Method Recommendation M-1. The Panel recommends that the Trustees make a fundamental change in their approach for deriving net migration assumptions. The Trustees' net migration assumptions should not be based on the provisions of current immigration law (which are consistent with widely varying levels of net migration, and which can reasonably be expected to change in the future) but rather on an analysis of historical trends. In addition, the Panel recommends that the Trustees should express their ultimate net migration assumption as a rate (annual number of net migrants divided by population size).

Overview

The Panel attaches a special importance to the topic of international migration for several reasons. The annual number of net migrants has grown at an average rate of around 4 percent per year since 1950. This pace is much faster than the increase of total population over this interval (1.4 percent annually). The growth of net migration reflects both the steady increase of legal immigration (just under 3 percent per year since 1950) and an upswing in illegal immigration since around 1970 (especially during the 1990s).

These trends stand in stark contrast to the assumptions adopted by the Trustees for projecting the OASDI trust fund, which call for decreasing and then constant levels of net migration in future years. For example, in their intermediate scenario, the Trustees assume a decline from 1.2 million net migrants in 2003 to an annual total of 900,000 in 2023 and thereafter. In light of the sustained, rapid increase of net migration over more than five decades, the Panel finds this assumption to be highly implausible. Since immigration results in a larger and younger population, the effect of a mistaken migration assumption on projected trust fund balances should be a major cause of concern.

The Panel's recommendations are informed by more precise and detailed estimates of such flows that became available in recent years. Legal immigration has been well documented for more than a century, but estimates of the magnitude of illegal migration were very limited prior to the last two decades. Knowledge has improved thanks to demographic analysis of 2000 Census data and information about annual flows of migrants during the 1990s.

The Panel recommends increasing the entire range of the assumptions used for projecting the OASDI trust funds. The Panel arrived at this conclusion only after agreeing on two fundamental changes in the way such assumptions are derived. First, current immigration law does not provide a sound basis for deriving plausible net migration assumptions, especially over the long-term horizon required for trust fund projections. Second, the most plausible, yet simple, manner of specifying an ultimate net migration assumption is in terms of the net migration rate (relative to the size of the U.S. population), rather than as a fixed number of migrants per year.

Historical Background

Legal immigration to the United States declined from the historically high levels observed during the first years of the 20th century (before 1915), reaching a low point during the 1930s and early 1940s. Since World War II, there has been a steady increase in the level of legal immigration, as seen in Figure 3. This increase took place even during periods when legislated limits, which apply only to certain categories of immigrants, were constant.

In projecting the OASDI trust funds, the Trustees take into account entry into the United States by three categories of "aliens":

1. Legal immigrants;
2. Illegal immigrants (i.e., unauthorized and undocumented);
3. Certain legal non-immigrants (i.e., temporary legal residents).

Data on legal immigrants enumerate individuals at the time they are formally granted "legal permanent residence" (LPR), which sometimes occurs years after their actual date of entry into the U.S. Therefore, Figure 3 offers merely an approximate view of the number of immigrants who entered the country legally in a given year. Despite this imprecision, legal immigration is by far the best documented component of total net migration.

Although illegal immigrants are unauthorized and undocumented by definition, many eventually manage to gain LPR or other legal designation. In 1986, the Immigration Reform and Control Act (IRCA) granted amnesty to many long-time illegal residents. In Figures 3 and 4, and throughout this discussion, such persons are not included in data concerning legal immigration, but rather are counted as illegal immigrants at their time of entry into the country.

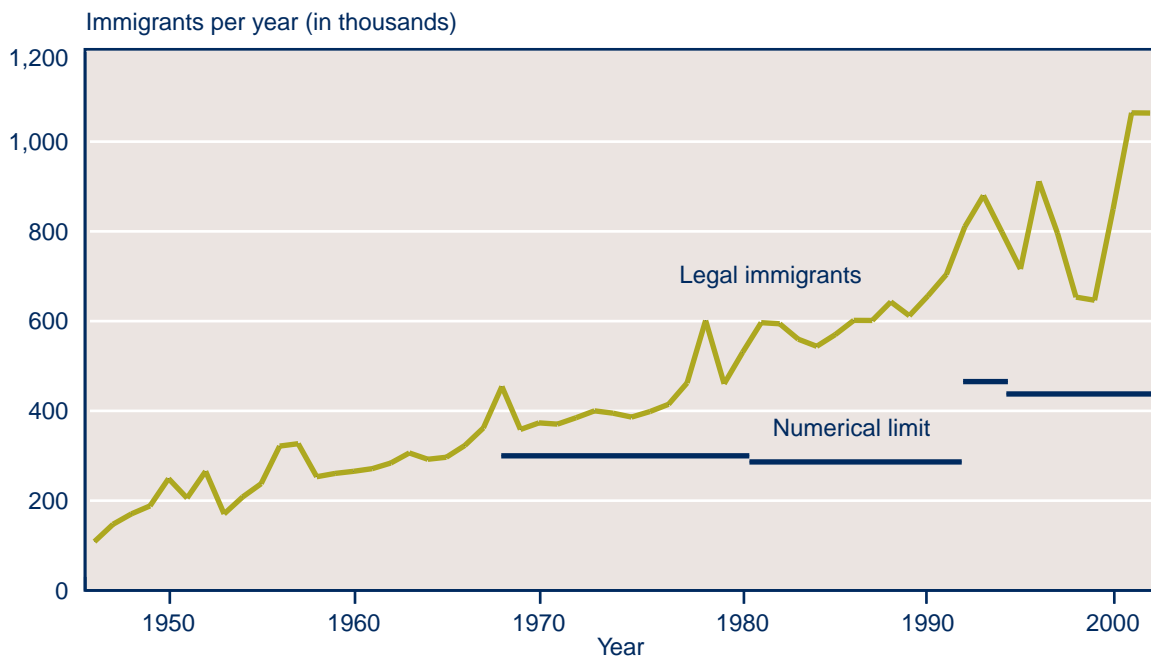
Legal non-immigrants are authorized to enter temporarily. They include tourists and other visitors, some of whom live and work legally in the U.S. and pay Social Security taxes on their earnings. However, only the fraction of legal non-immigrants who reside in the U.S. long enough to pay Social Security taxes and could eventually collect benefits are relevant to our discussion. In recent years, there has been a steady increase in the number of such persons resident in the U.S. at a given moment.

Complete and reliable data are lacking for many of these components of net migration, so the Panel combined available estimates with some plausible assumptions to construct an historical series by decade beginning in the 1820s (see Wilmoth 2003a). Figure 4A depicts the levels of both legal immigration and total net migration in numbers. In contrast, Figure 4B presents net

migration as a rate (relative to population size). Historically, net migration was substantially less than legal immigration as a result of return migration. However, this situation reversed in the 1980s due mostly to increased levels of illegal entry into the U.S. Although Figures 4A and 4B both display wide historical variation, the net migration rate offers a hint of stability over the long run. This rate was around 4-6 per 1000 from 1840 to 1910, before falling to very low levels during the next few decades. Thanks to very rapid growth during the latter half of the 20th century, net migration has now returned to its earlier high range, with a rate of around 4 per 1000 in recent years. Over the long term, however, the average value was lower, at 3.2 per 1000 for the period from 1821 to 2002.

Turning to more recent trends, there was an average of around 780,000 legal admissions per year during 1991-2000. This number rose to 1.06 million during 2001-2002, but part of this increase could have been due to the delayed processing of admissions from previous years. In addition, available estimates suggest that net illegal migration to the U.S. during the 1990s totaled around 350,000 to 500,000 persons (INS 2003a; Passel 2002). Taking the value of 400,000 from this range, and assuming 200,000 legal emigrants plus a net inflow of 100,000 temporary legal residents per year, we estimate annual net migration at slightly less than 1.1 million persons during 1991-2000. A similar calculation for 2001-2002 yields a somewhat higher total—nearly 1.4 million per year—due entirely to increased legal immigration. Census Bureau estimates of net international migration from mid-2000 to mid-2002 are higher still—around 1.45 million annually—based on data from the American Community Survey (U.S. Census Bureau 2002). In light of this information, the Trustees' assumption of 1.2 million net migrants in 2003 appears somewhat too low. However, given the inherent uncertainty of estimates for 2001-2002, the Trustees' value still falls within a plausible range.

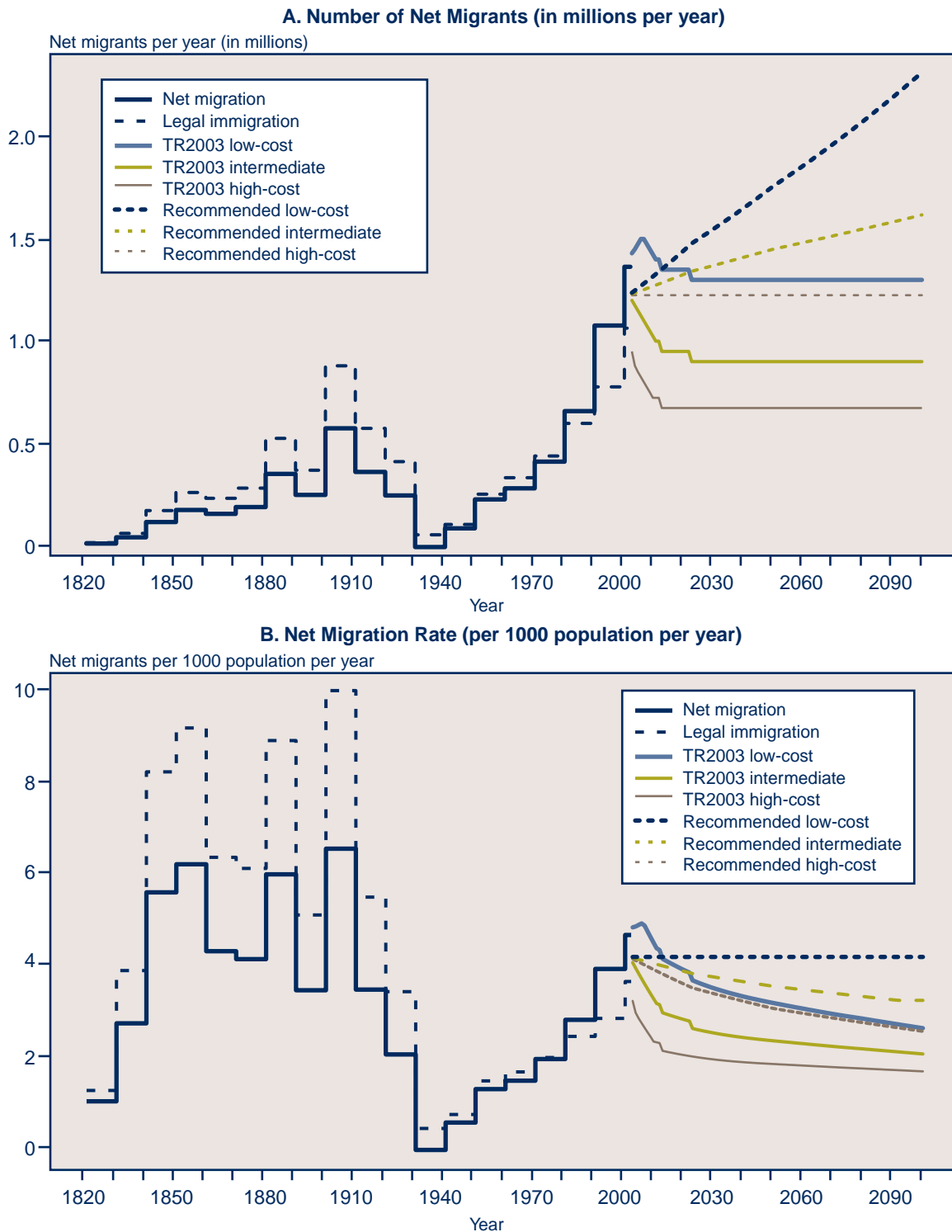
Figure 3
Number of Persons Admitted for Legal Permanent Residence, United States, 1946-2002, with Worldwide Numerical Limits since 1968



Notes: 1) Legal immigration shown here excludes adjustments of status (i.e., legalizations) under the IRCA legislation of 1986; 2) Numerical limits prior to 1968 applied only to residents of the Eastern hemisphere.

Sources: Office of Immigration Statistics, *2002 Yearbook of Immigration Statistics* (annual data); *Statistical Yearbook of the Immigration and Naturalization Service*, various years (historical limits).

Figure 4
Net Migration and Legal Immigration to the United States, with Projections of Net Migration according to 2003 Trustees Report and Panel's Recommendations, 1821-2002 (Observed, by Decade) and 2003-2100 (Projected, by Year)



Sources: Office of Immigration Statistics, *2002 Yearbook of Immigration Statistics* (legal immigration); Wilmoth 2003a (net migration estimates); Office of the Chief Actuary, Social Security Administration (TR2003 projections).

Current Trustees' Assumptions

The Trustees Report abstracts from the detail given above and considers three sets of flows:

1. Legal immigration;
2. Legal emigration; and
3. Net "other-than-legal" migration.¹

As summarized in Table 1, the assumptions used since 1981 to define the level of net international migration have been straightforward. Prior to 1988, the Trustees Reports did not include an allowance for illegal migration (citing lack of data on which to base such an assumption). Since 1995, the Trustees' intermediate scenario has included an ultimate annual inflow of 900,000 persons per year. This number consists of 800,000 legal immigrants per year, minus 200,000 legal emigrants, plus 300,000 net other-than-legal immigrants. Before 2003, the Trustees assumed that immigration levels would converge to these levels quickly, usually within three years. The 2003 Report adopts the same ultimate assumptions, but the level converges slowly, falling from 1.2 million in 2003 to 900,000 in 2023.

The ultimate assumption of 900,000 net migrants per year was derived, in part, based on the provisions of current immigration law. By the Immigration Act of 1990, the "worldwide cap"

Table 1
Assumed Ultimate Levels of Net Migration for 3 Scenarios,
by Entry Status (Legal vs. Other-than-legal), Trustees Reports, 1981-2003

Years of Trustees Reports	Ultimate assumptions for net migration (1000s of persons per year, average across annual reports)									Effective date
	Total			Legal			Other-than-legal			
	Low-cost	Inter-mediate	High-cost	Low-cost	Inter-mediate	High-cost	Low-cost	Inter-mediate	High-cost	
1981-1984	438	400	363	438	400	363	0	0	0	Year 1
1985-1987	667	467	267	667	467	267	0	0	0	Year 1
1988-1990	750	600	450	450	400	350	300	200	100	Year 1
1991-1994	1,050	800	650	700	600	550	350	200	100	Year 1-8
1995-1999	1,150	900	750	710	610	560	440	290	190	Year 2-8
2000-2002	1,210	900	655	760	600	455	450	300	200	Year 2-3
2003	1,300	900	673	850	600	473	450	300	200	Year 21

Notes: 1) Trustees Reports have been grouped with those of neighboring years having similar sets of net migration assumptions; 2) The "effective date" is defined here as the first year of the projection period for which the ultimate assumption was used for all scenarios. Thus, for the projection beginning in 2003, the complete set of ultimate assumptions was used from 2023 onward, corresponding to Year 21 of the projection period. In some cases, the speed of convergence to ultimate values varied across Trustees Reports for neighboring years.

¹ "Other-than-legal" includes both illegal aliens and aliens admitted lawfully under temporary work visas. It does not include tourists.

for legal admissions has been fixed at 675,000 persons per year since 1995. Adding an allowance of 125,000 for refugee and asylee admissions (which are not included in the worldwide cap) yields the assumption of 800,000 legal immigrants per year. During 1995-2002, the average number of legal admissions was around 840,000, but with much higher levels for 2001-2002 (around 1.06 million in both years). The Trustees' assumption of 200,000 emigrants annually is broadly consistent with current estimates. Their ultimate assumption of 300,000 net other-than-legal immigrants lies below estimates of recent levels.

Thus, only one component of the Trustees' net migration—the largest one, consisting of all legal admissions other than refugees and asylees—can be justified by reference to current law. However, the "worldwide cap" of recent years is not a strict limit, but rather a target. Most significantly, the cap includes an annual allowance for immediate relatives of U.S. citizens, even though in reality there is no numerical restriction on this form of entry, which was the largest single category of legal immigration every year since 1986 (INS 2003b:12). The rapid growth in admissions of immediate relatives is a major part of the wide variability in legal immigration levels during periods with a constant "numerical limit" (i.e., the number of legally permissible admissions within categories that are truly restricted by an annual quota). Since 1995, this legally designated "numerical limit" has equaled 421,000², or less than half of the Trustees' ultimate net migration assumption of 900,000.

Thus, even assuming that current immigration laws do not change, it does not follow necessarily that future net migration trends will be flat. Furthermore, there is no need to freeze assumptions about immigration law. Immigration law is logically distinct from Social Security law, which is assumed constant by definition when projecting the financial status of the trust funds. The Panel believes that the Trustees should present policy makers with the most likely picture of the future, and that it is unrealistic to assume that there will be no changes in immigration law over the next 75 years and beyond. Therefore, the Panel recommends assuming that legislative limits regarding legal immigration, and their associated enforcement policies, are endogenous to broader social and economic processes, and thus may change in future years.

Explanation of Panel's Recommendation

Rather than an approach based on current law, the Panel recommends that the Trustees derive their net migration assumption from an analysis of historical trends. Over the next few decades, there are a number of factors that could affect the volume of immigration to the United States. Some of these could lead to stagnating growth or diminished levels of net international migration in future years and decades. For example:

- The recent economic slowdown could lower the demand for immigrant labor.
- Heightened security concerns may result in more limited refugee admissions and stricter border enforcement.
- In the 1990s, many immigrants who were legalized under the IRCA legislation of 1986 brought their families to the U.S., but that source of inflow has nearly disappeared.
- Fertility rates began to fall in Mexico around 1970, and this trend is expected to continue. The number of Mexicans at ages 15-19 is projected to start

² In fact, the value of 421,000 represents a lower bound for the numerical limit in a given year and can be supplemented by unused allocations from preceding years for immediate relatives and other (much smaller) categories of entry that have no numerical limitation.

declining soon after 2010, which may reduce the supply of potential immigrants to the U.S. (CELADE 2003). This shift could have important implications for legal immigration, since Mexico accounts for around 20 percent of such flows in recent years, but it is especially relevant for illegal immigration, which historically has come primarily from Mexico and Central America.

- As Europe and Japan age rapidly, they may demand more foreign labor and compete with the U.S. for potential immigrants.

On the other hand, some factors point toward continued high levels or a sustained growth of net migration to the U.S. For example:

- The demand for immigrant labor seems likely to grow with the U.S. population and economy simply as a matter of scale. This demand may be reinforced by population aging and growth of the health and service sectors.
- The increasing share of the U.S. population that is foreign-born continues to enlarge the network of individuals who can assist new immigrants. Therefore, the mere momentum of past migration may help to sustain and reinforce future inflows.
- Large untapped pools of potential immigrants exist in many parts of the world, especially Asia. With affordable transoceanic transport, immigration (authorized or not) from distant countries could increase, especially if foreign governments (e.g., China) relax their limits on emigration.
- Attempts to set legal caps on immigration seem likely to fail. In the past, such legislation has often produced unintended consequences, many involving sharp increases in net immigration levels (Briggs 1996). For example, more tightly guarded borders during the 1990s apparently led to reduced emigration, as foreign-born residents (especially unauthorized ones) anticipated greater difficulty returning to the U.S. (Massey et al. 2002).

Faced with these varied arguments, the Panel concluded that there is no strong reason to anticipate a sharp break with past trends in the near future. The steady growth of the annual net inflow since 1950 (around 4 percent per year on average) has accelerated over the last several decades due to the rapid rise of illegal immigration. On the other hand, the Trustees' assumptions imply a sharp disruption in a trend that has endured for more than five decades. We consider such a large historical discontinuity to be highly unlikely. In the absence of a strong argument about why the pool of potential immigrants is going to shrink in the foreseeable future, or about how the government will successfully cap the inflow at a prescribed level, we find it more reasonable to anticipate that future migration trends will resemble past ones. Although this resemblance could take many forms, the Panel suggests that the most reasonable approach overall is to link assumed migratory flows over the long run to the size of the U.S. population.

Obviously, the assumed net migration trend should begin around the level estimated for recent years. However, as noted earlier, this level is uncertain in light of available data, and thus the Panel does not endorse any particular value. Rather, in order to focus attention on its recommendation concerning the long-term trend, the Panel decided to adopt the Trustees' estimate of 1.225 million net migrants in 2002 as a base level for its recommendations. Nevertheless, we urge the Trustees to review carefully all available information regarding the

components of international migration during recent years and to consider whether 1.225 million is the most appropriate starting point for assumptions about future trends.

The Panel recommends that the ultimate migration assumption for the Trustees' intermediate scenario be derived from the long-run historical average of the net migration rate (NMR), estimated at 3.2 per 1000 for 1821-2002. The NMR should be assumed to return to this level eventually. However, in light of recent historical trends, the Panel believes that the assumed number of net migrants for the intermediate scenario should continue to grow during the first decades of the projection interval. To achieve these objectives, the Panel recommends assuming that net migration will grow at half the rate of population growth until the NMR falls to a level of 3.2 per 1000. After that point, holding the NMR constant, the net annual inflow should grow at the same rate as the total population. Throughout the projection interval, the Panel recommends maintaining the percentage shares used currently for the three main components of net migration (legal immigration, legal emigration, and net other-than-legal migration).

The Panel considered several alternative specifications of the migration assumption, and these are described fully in a working paper (Wilmoth 2003a). Here, we consider only two of these alternatives. First, one might assume that net migration will always grow at the same rate as total population. In that case, the NMR would be frozen at its current value (4.15 per 1000 in 2002, according to the Trustees' latest estimates). The Panel recommends this specification of the migration assumption for the low-cost scenario. Second, one might instead follow the Trustees' past and current practice of assuming a constant number of net migrants per year. Given this assumption, the NMR would decline for as long as population growth is positive. The Panel recommends assuming a constant number of net migrants only for the high-cost scenario. In other words, for the high- and low-cost scenarios, respectively, the Panel recommends assuming that net migration will grow at zero and 100 percent of the population growth rate. For the intermediate scenario, our proposed growth rate of net migration lies halfway between these two extremes during the transition to the ultimate assumption (NMR of 3.2 per 1000).

Figures 4A and 4B illustrate the future trends of net international migration implied by the Panel's recommendations, in terms of both numbers and rates. For each scenario, levels of net migration are substantially higher than what is implied by the Trustees' assumptions. The differences would have a quite significant effect on projections of total population size, as shown in Table 2.

Related Topics

Given any level of migration, OCACT must make assumptions about the age-sex pattern of migration. Currently, this distribution differs for the three broad categories of migrants. The projection model also includes assumptions about how immigrants interact with the labor force and the Social Security system. Currently, legal immigrants are assumed to have the same demographic and economic characteristics as the population as a whole, as are half of other-than-legal immigrants. One-quarter of other-than-legal immigrants are assumed to pay Social Security taxes but to receive no benefits, and one-quarter are assumed neither to pay taxes nor to receive benefits.

Given limited time and resources, the Panel chose to focus its analysis of international migration on the crucial question of how to specify the annual trend. However, the other assumptions mentioned here merit a more detailed review as well. Specific recommendations for additional research are discussed later in this report.

Table 2
Population in 2003 (observed) and 2023, 2050, and 2080 (projected), and Implied Population Growth Rates, according to 2003 Trustees Report and Panel's Recommendations

	Total Social Security area population (January 1, in millions)				Population growth rate (in percent)		
	2003	2023	2050	2080	2003-2023	2023-2050	2050-2080
2003 Trustees Report							
High-cost	298	341	372	394	0.68	0.32	0.19
Intermediate scenario	298	348	389	421	0.78	0.41	0.27
Low-cost	298	357	414	465	0.91	0.54	0.39
Recommendations							
High-cost	298	353	405	452	0.84	0.51	0.36
Intermediate scenario	298	354	413	471	0.87	0.57	0.44
Low-cost	298	356	423	499	0.89	0.64	0.55

Note: High- and low-cost scenarios vary only the net migration assumption (relative to the intermediate scenario).

Comment on Categories and Terminology

In Social Security analysis, immigrants are described either as legal or other-than-legal. The second term may be misinterpreted as a polite euphemism for undocumented migration, even though it also tracks some persons who enter the U.S. as legal non-immigrants (for example, temporary workers who participate lawfully in Social Security). For purposes of projecting the OASDI trust funds, this grouping makes sense for various reasons (see Wilmoth 2003a). However, to avoid misunderstanding, the Panel recommends simply relabeling the other-than-legal category as other migration.

C. Mortality

Assumption Recommendation A-3. For the intermediate scenario, the Panel recommends that assumed ultimate rates of mortality decline by age and sex be increased to levels that are broadly consistent with those observed during 1950-2000 for the total population, but with a continued deceleration for ages 0-14 comparable to the reduction in rates of decline that occurred between the first and second halves of the 20th century. Rates of mortality decline for the low- and high-cost scenarios should be raised by a similar amount. The Panel also recommends decreasing assumed rates of decline after 75 years, so that they equal zero beginning in 2200 (or some similar date) under all scenarios. The Panel proposes a simple projection method that observes these basic principles and leads to a projected life expectancy at birth of 84.4 in 2070, compared to the Trustees' current value of 82.9.

Methods Recommendation M-2. The Panel recommends that the mortality projection model be simplified by dropping separate projections by cause of death and stating assumptions in terms of age-specific rates of decline for all-cause mortality.

Overview

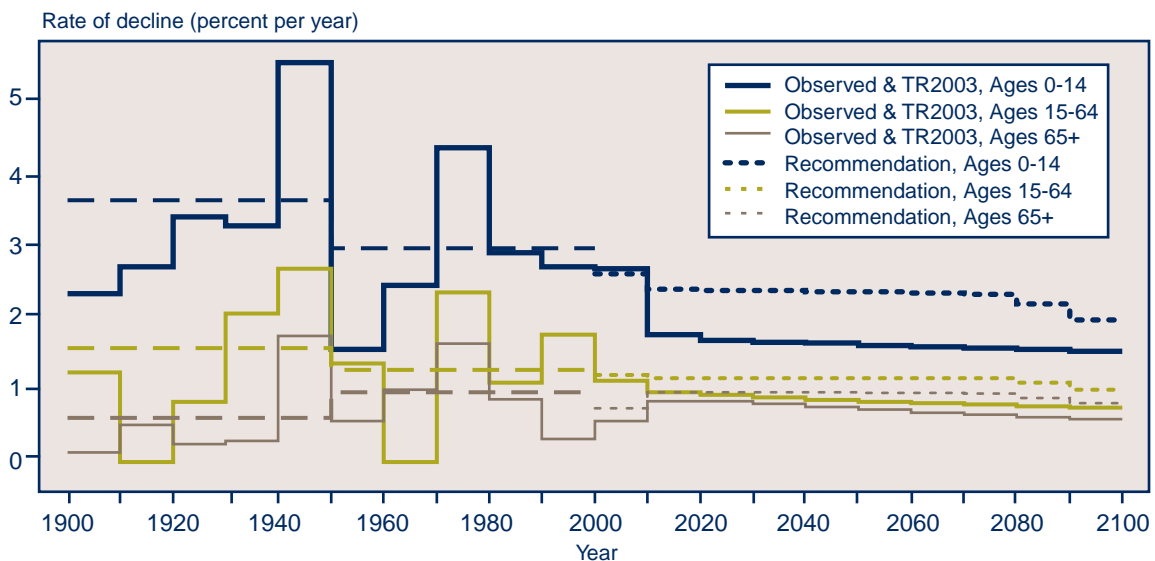
The Panel recommends that the Trustees increase assumed rates of mortality decline, while also simplifying the projection model by eliminating the breakdown by causes of death. Increasing the assumed rates of decline can be justified by an analysis of historical trends for the United States alone, but it is supported as well by a review of the recent mortality experience of other high-income countries. The Trustees currently project rates of mortality decline separately for each cause of death. Such detail should be dropped from the projection process; it is unlikely to produce more accurate results, and there is little empirical basis for current assumptions.

The Panel recommends that the Trustees increase assumed rates of mortality decline by a significant amount, resulting in higher projected levels of life expectancy at birth. However, compared to the 1999 Technical Panel, we recommend slower rates of mortality decline at older ages and thus lower projected values of life expectancy at birth. In 1998 (the point of departure for the 1999 Panel), the Trustees' assumptions implied a life expectancy in 2070 of 81.5, compared to 82.9 in 2003. By comparison, the 1999 Panel's recommendations yield a life expectancy in 2070 of 85.2, compared to our suggested value of 84.4.

Historical Background

Mortality risks across the age range fell dramatically during the 20th century, leading to a large rise in life expectancy at birth (and at all ages) for both men and women in the United States. For the total population, life expectancy at birth rose from 47.7 years in 1900 to 76.6 in 2000, a 60 percent increase over the century. However, most of this change (72 percent) occurred before 1950. Life expectancy at older ages presents a similar story overall, but there is one key difference. At age 65, for example, life expectancy rose from 11.7 years in 1900 to 21.2 in 2000, an 81 percent increase. However, most of this change (75 percent) occurred after 1950.

Figure 5
Rates of Decline in Age-sex-adjusted Death Rates by Age, for Decades and Selected 50-year Periods, U.S. Total Population, 1900-2000 (Observed) and 2001-2100 (Projected, TR2003 and Panel's Recommendation, Intermediate Scenario)



Source: Calculations by Panel, using data from the Office of the Chief Actuary, Social Security Administration.

Note: Dashed lines depict average rates of decline within 50-year intervals (1900-1950 and 1950-2000).

Part of the slowdown in the rise of life expectancy at birth occurred mechanically, due to the disproportionate influence of infant and child survival on this measure of average lifespan. Once childhood mortality became rare, there were few deaths left to eliminate in early life, making it more difficult to raise life expectancy at birth (Keyfitz 1985; Wilmoth 1998). In addition, there was a substantial reduction between the first and second halves of the 20th century in rates of mortality decline among both children (ages 0-14) and adults of working age (15-64), as shown in Figure 5. On the other hand, at ages 65 and above, the pace of mortality decline generally accelerated over the century, thanks to an unprecedented reduction in certain forms of old-age mortality (especially cardiovascular disease) beginning in the late 1960s.

Nevertheless, Figure 5 demonstrates clearly that rates of mortality decline varied considerably from decade to decade. The 1940s and 1970s stand out as periods of very rapid improvement, while the last 20 years have been less favorable. The arrested decline above age 80 beginning in the 1980s—as well as increasing mortality above age 85 during the 1990s—must be considered when making decisions about how to project such trends into the future. The 1999 Panel suggested that the unfavorable trends in old-age mortality during the 1980s and 1990s may reflect the delayed effects of increased levels of smoking among women, and a more recent article offers important empirical support for this explanation (Pampel 2002).

Current Trustees' Assumptions

For several years, the Trustees have specified their mortality assumptions in terms of rates of mortality decline by age, sex, and cause of death. In their 2003 Report, the complete set of assumptions consists of 70 numbers (5 age groups x 2 sexes x 7 cause categories). Technically, these are the underlying assumptions of the model, and all other summary statistics are results of the projection exercise. For example, OCACT often summarizes these assumptions with the implied ultimate rates of decline (i.e., during the last 50 years of the 75-year projection horizon) for all-cause mortality and for a limited number of broad age groups (e.g., 0-14, 15-64, and over 65), adjusted to remove the effects of changes in the distribution of the population by age and sex.

As shown in Figure 5, these assumptions imply a gradual deceleration in the pace of mortality decline throughout the projection interval. During the ultimate period and beyond, this deceleration is driven by the cause-of-death methodology: over time, categories that are assumed to decline the most slowly account for an increasing portion of deaths (Wilmoth 1995). In addition to this built-in deceleration, there is also an explicit assumption of a pronounced slowdown in mortality decline below age 65 during the first 25 years of the projection period. As seen in Figure 5 (also Table 3), below age 15 this deceleration is roughly twice as large as the historical slowdown that occurred between the first and second halves of the 20th century; for ages 15-64 it is about 1.5 times as large. For ages 65 and above, the Trustees' assumptions imply rates of mortality decline throughout the projection interval that lie below the historical average for 1950-2000. Furthermore, the implied rate of mortality decline above age 65 during 2027-2077 (0.68 percent per year, as seen in Table 3) is below the historical average even for the 20th century as a whole (0.78 percent).

Table 3
Rates of Mortality Decline in Age-Sex-Adjusted Death Rates, U.S., 1900-2000
(Observed) and 2000-2077 (Projected, TR2003, 2003 and 1999 Technical Panels,
Intermediate Scenario)

Age group	Observed			2003 Trustees		2003 Panel		1999 Panel	
	1900-1950	1950-2000	1900-2000	2000-2027	2027-2077	2000-2027	2027-2077	1996-2023	2023-2073
0-14	3.56	2.90	3.26	1.97	1.57	2.40	2.29	3.15	2.23
15-64	1.52	1.22	1.44	0.96	0.80	1.12	1.11	1.47	1.13
65+	0.55	0.91	0.78	0.70	0.68	0.84	0.90	0.75	0.99
All ages	1.13	1.05	1.14	0.78	0.72	0.93	0.96	0.94	1.03

Notes: 1) Rates of mortality decline shown here equal the average of values found by the slope and endpoint methods; 2) Age-sex adjustment was based on the 1990 Census Population; 3) Comparable time periods for 1999 Panel were 4 years earlier than for TR2003 and 2003 Panel; 4) Values for 1999 Panel only are an average of male and female rates of decline in age-adjusted death rates, rather than rates of decline in age-sex-adjusted death rates.

Source: Calculations by Panel, using data from the Office of the Chief Actuary, Social Security Administration.

Explanation of Panel's Recommendation

Mortality projection involves a series of choices about how to extrapolate historical trends in death rates by age. Five of the most important choices concern the following:

1. Method(s) for computing historical rates of change in age-specific death rates;
2. Whether to consider various components of mortality separately (i.e., causes of death);
3. Whether to perform separate projections for subpopulations (by sex, race, etc.);
4. Historical period(s) from which assumed rates of future mortality decline are derived;
5. Whether to accelerate or decelerate rates of decline compared to the historical baseline.

More detail about various aspects of these topics is contained in a separate working paper (Wilmoth 2003b).

The first issue is methodological, concerning the formulas used to compute rates of mortality decline by age. The Panel considered two methods, which can be referred to as the "slope" and "endpoint" methods. Briefly, the slope method consists of using a simple statistical technique to find the line that best fits the historical mortality trend for a given age group.³ On the other hand, the endpoint method considers only the decline between the beginning and the end of the time period, ignoring intermediate data.⁴ Differences between the two methods can be quite significant in certain cases, affecting assumed rates of mortality decline that are derived from historical experience. Nevertheless, each method possesses certain advantages from a methodological point of view (see Wilmoth 2003b). Therefore, we use an average value based on both methods for analyzing historical trends and setting assumptions.

³ Technically, a least-squares regression line is fit to the logarithm of death rates over time, and then the negative slope of the fitted line is used to estimate the rate of mortality decline.

⁴ Technically, one computes the negative logarithm of the ratio of ending to starting values, divided by the length of the time period.

The second and third issues are examples of the need to balance simplicity and complexity. In both cases, the Panel decided in favor of simplicity. However, this principle of simplicity should apply only to methods of projection, not to the analysis of historical trends. Thus, the Panel applauds the Trustees and OCACT for investigating past mortality trends separately by cause of death and for men and women. (Other breakdowns could be useful as well, for example, by race, ethnicity, income class, or nativity.) However, making separate assumptions about future rates of mortality decline by cause of death or for subpopulations adds complexity to the projection model without evidence of improved accuracy in forecasting.

A model based on separate projections by cause of death over a long time horizon is both implausible and inconsistent with historical experience. Historically, rates of decline for specific causes of death (or broad categories of causes) have tended to vary much more than for all-cause mortality, as populations often focus on combating those causes of death that dominate mortality patterns at a given moment. In the most successful cases, breakthroughs against specific diseases lead to rapid reductions in deaths from that cause. For example, antibiotic therapies sharply reduced infectious disease in the 1940s, and various factors decreased cardiovascular disease in the 1970s.

Furthermore, the empirical basis for the Trustees' current cause-specific assumptions seems to be weak. In general, it is very difficult to construct consistent time series of mortality data by cause of death over long historical periods (for any country, not just the U.S.), due both to a lack of data for earlier periods and to changes in coding practices over time. The Trustees' current projections are based on mortality data by cause for the U.S. that begin only in 1979. On the basis of trends over little more than two decades, they derive rates of mortality decline for seven cause-of-death categories over what is now an infinite time horizon. However, the connection between data and assumptions is not always clear. For example, the assumed ultimate rate of decline for cancer mortality in the 65-84 age range is 0.5 percent per year for both sexes, although observed values were -0.06 for men and -1.13 for women during 1979-1999 (OCACT 2002: Table 3). There is little written explanation of how these assumptions were developed, and the Panel recommends that this information be made more readily available if the current method is retained.

Regarding subpopulations, separate mortality projections based on different historical rates of decline lead either to continual divergence between groups, or to convergence and eventual crossover (i.e., where groups change their relative positions). Both situations seem rather unlikely, at least for long-term projections. Although recent differential trends by sex could plausibly continue for another 10 to 20 years, the Panel recommends that ultimate rates of mortality decline be equal for men and women, derived from trends for the total population.

Similarly, international comparisons can be helpful as a guide to future mortality trends despite differences in levels. The U.S. differs from other wealthy countries in ways that affect the overall level of mortality (e.g., more inequality, a less extensive social safety net), and the current gap in levels could remain for many years. However, it seems much less likely that the pace of mortality decline will be vastly different over the long term amongst this close-knit group of nations. The post-1980 slowdown in mortality reduction for the U.S. was not typical; most high-income countries have enjoyed an accelerated mortality decline at older ages during the last two decades, sometimes starting from lower levels than the U.S. in 1980 (Wilmoth 2003b). These experiences support the Panel's recommendation for a projected recovery from the recent period of slow mortality decline in the U.S.

The last two items in the list concern the subjective application of historical experience to choices about assumed rates of future mortality decline. The Panel recommends using 1950-

2000 as the historical baseline. Using the full 20th century for this purpose is another possibility, but then the assumed pace of mortality decline at older ages would be slightly slower (see either Figure 5 or Table 3). In contrast, mortality decline at younger ages was much slower on average during the second half of the century; therefore, assumed rates of decline would be much higher with a baseline of 1900-2000 instead of 1950-2000. Perhaps the main reason to prefer a baseline of 1950-2000 over 1900-2000 is that the second half of the century was characterized by a more even pace of mortality decline across the age range, and this pattern seems likely to prevail in the future as well.

Although long-term mortality projections should not be based on short historical intervals, half a century seems long enough to avoid giving undue weight to atypical, short-term trends. Furthermore, it is prudent to be skeptical about the quality of mortality data from the first half of the 20th century, especially at older ages, since assumptions about the pace of mortality reduction at older ages are the most critical component of a mortality projection for the U.S. today (or for any low-mortality population). Finally, the range of forces that may plausibly contribute to future mortality reductions seems to be best represented by a baseline that goes back 50 to 70 years. During this period, the medical treatment of sick persons became, for the first time in history, one of the major forces propelling mortality downward. This trend began only in the 1930s, with the introduction of an early generation of anti-bacterial drugs (McKeown 1979). Other factors, broadly characterized as improvements in living standards and public health, drove earlier mortality declines. Probably all of these factors played a role in the mortality reductions observed since 1950 in the U.S., and all of them seem likely to influence future trends as well.

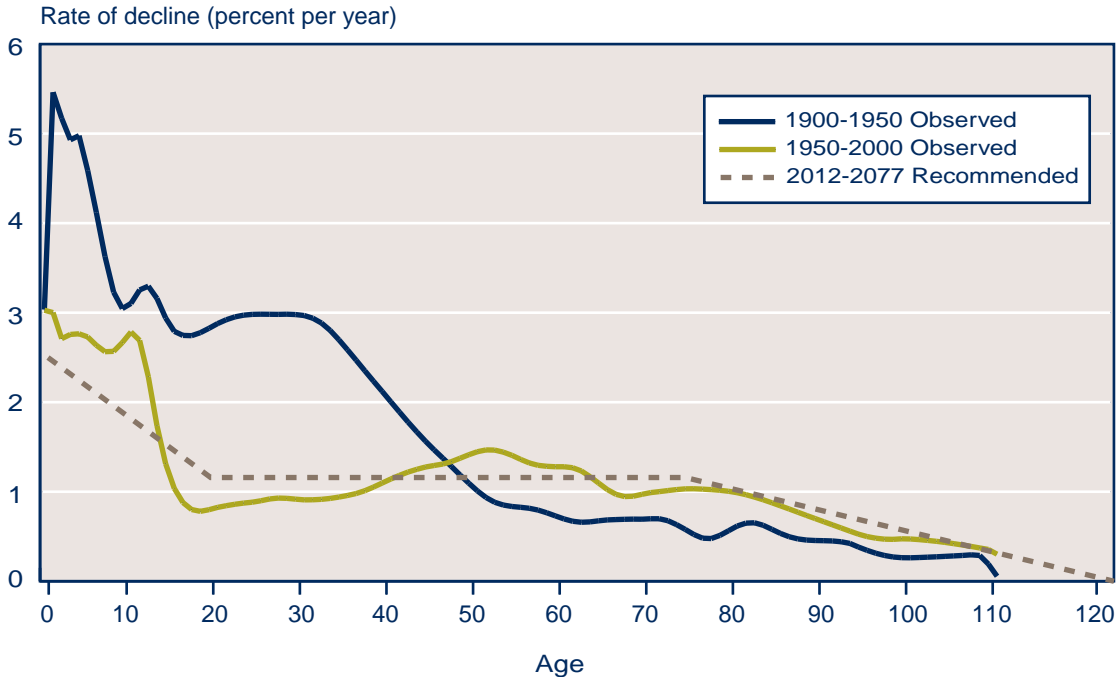
Even if 1950-2000 is chosen to serve as the historical baseline for mortality projection, a comparison of 20th-century trends before and after 1950 is still informative. Although the trend in rates of mortality decline at younger ages was quite variable from decade to decade (see Figure 5), there was a pronounced deceleration overall between 1900-1950 and 1950-2000. Therefore, the Panel recommends assuming a continued reduction in rates of mortality decline below age 15, similar in magnitude to the deceleration that occurred from the first to the second half of the 20th century.

On the other hand, Figure 5 also shows that the average rate of mortality decline above age 65 increased from the first to the second half of the 20th century. This change might be taken to suggest that the historical peak rate of mortality decline at older ages has not yet arrived. Indeed, the possibility of major breakthroughs in biology and biomedicine could be used to justify an assumption of a continued acceleration of mortality decline at older ages. However, this argument seems too speculative to serve as the basis for an intermediate assumption. Thus, the Panel recommends that assumed ultimate rates of mortality decline at older ages be based directly on the experience of 1950-2000, without the slowdown implied by the Trustees' current assumptions.

The choices outlined above form the basis for the mortality projections proposed by the Panel. These projections refer to an initial period of 2000-2002 and an ultimate period of 2012-2077. Initial rates of mortality decline, derived from historical average values for 1980-2000, are assumed to converge linearly over just 10 years to the ultimate rates. For the intermediate scenario, the ultimate rates are based primarily on trends during 1950-2000 (the deceleration at younger ages is based on trends for the whole century), as illustrated in Figure 6. The constant level for ages 20-74 was derived from the average value across this age range for 1950-2000.

Assumed ultimate rates of mortality decline for the low- and high-cost assumptions were also derived based on historical experience (Wilmoth 2003b). Generally, the low-cost scenario has slower rates of decline (and a shorter life expectancy), and the high-cost scenario has a faster

Figure 6
Rates of Mortality Decline by Age, U.S. Total Population, 1900-1950 and 1950-2000
(observed), and 2012-2077 (projected, Panel's Recommendation, Intermediate Scenario)



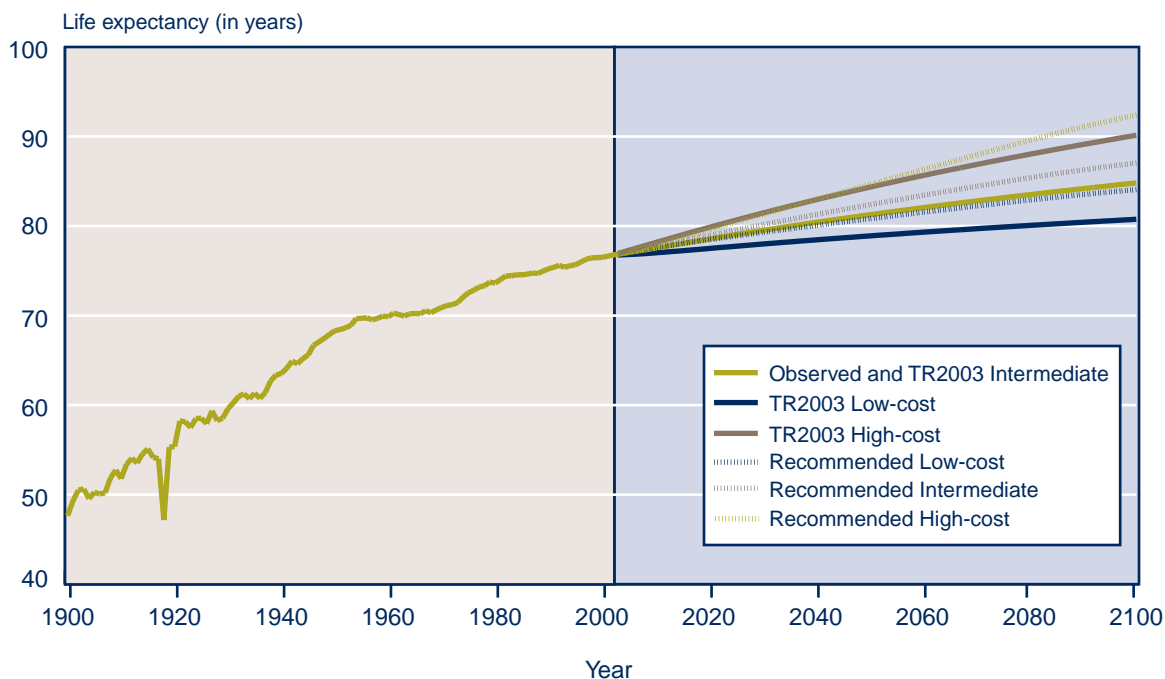
decline (and longer life expectancy). However, this situation is reversed for younger ages, since more rapid mortality decline at younger ages leads, like increased fertility, to a younger population age structure and thus to higher trust fund balances, and vice versa.

The Panel recommends assuming a cessation of mortality decline at all ages beginning in 2200, following a linear reduction in rates of decline (toward zero) beginning at the end of the ultimate period (i.e., 2077). The exact choice of the starting point for the infinite assumption is probably not important (though further analysis is needed), and any date around 200-300 years from now would have been just as appropriate. In general, this assumption can be justified by the argument that one should not assume positive rates of mortality decline farther into the future than has been observed in the past. Since most of the mortality decline in human history has occurred during the past 200-300 years, forcing rates of decline to zero within a similar future time horizon seems reasonable.

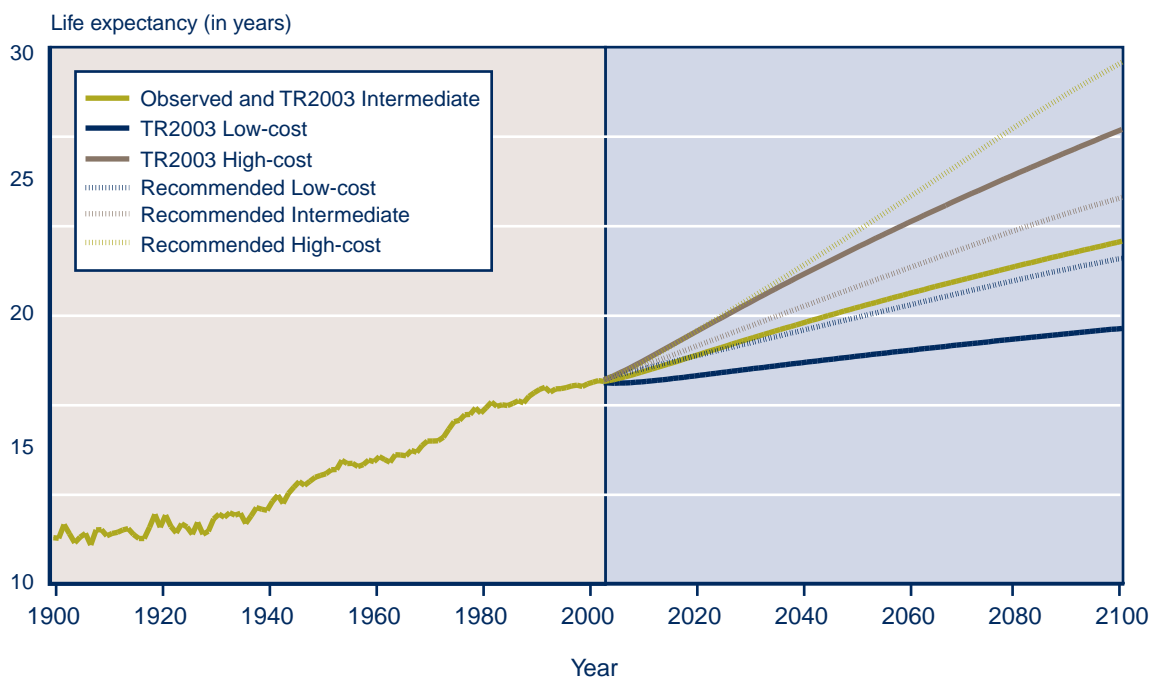
Figures 5 and 7 illustrate the results of these various assumptions. Figure 6 compares historical rates of mortality decline to those implied by the Panel's intermediate scenario. This graph also illustrates three key features that distinguish the Panel's projection from the Trustees': 1) stable rates of mortality decline during the ultimate period, 2) no slowdown of mortality decline at older ages vis-à-vis a baseline of 1950-2000 until after 2077, and 3) a more modest deceleration at younger ages. The divergent implications of the two projection methods are visible as well in Figure 7, which shows historical and projected values of life expectancy at birth and age 65.

Figure 7
Life Expectancy at Birth and Age 65, United States, Total Population, 1900-2000 (Observed)
and 2001-2100 (Projected, TR2003 and Panel's Recommendation, Intermediate Scenario)

A) At Birth



B) At Age 65



D. Disability Incidence and Termination

Assumption Recommendation A-4. The Panel recommends that the assumptions of disability incidence remain the same as in the 2003 Trustees Report. While it is likely that the incidence of health related impairments at younger as well as at older ages will decline in the future there is no convincing evidence as yet that this has or will translate into reduced movement onto the disability rolls. Movement onto the rolls is also influenced by the social environment—labor market conditions, accommodation policies, OASDI policy, etc.—and these factors have to date offset any reductions in the rolls caused by improved health.

Assumption Recommendation A-5. The Panel recommends that the assumptions of disability termination remain the same as in the 2003 Trustees Report. The age that beneficiaries move onto the disability rolls has fallen and is likely to continue to do so and the share of conditions with relatively longer life expectancy (mental illness, muscular skeletal, etc.) has increased and is likely to do so. These trends are likely to improve life expectancies of the average future beneficiary faster than that of the rest of the population but more evidence of these forces is necessary before changes in the current assumptions can be made.

Method Recommendation M-3. The Panel recommends that the models used to estimate movement into and out of the Disability Insurance program be better documented and especially that consideration be given to more formally showing how the mix of impairments and the changes in the mortality rates within these impairment groups are likely to affect future mortality rates by age and sex.

Disability Insurance (DI) beneficiary projections are sensitive primarily to estimates of the disability incidence rate, that is, the percentage of workers insured under the DI program (but not receiving benefits) who become entitled to benefits in a given year. The projections are affected to a lesser degree by assumptions of the percentage of DI beneficiaries who leave the program due to death or recovery.

While the DI and Old-Age and Survivors Insurance (OASI) programs have separate funds, analysts and policymakers should understand that these separate calculations are nevertheless intertwined, and the assumptions for each fund must be consistent. In fact, after a DI beneficiary reaches the Normal Retirement Age, his or her benefits are paid from the OASI fund.

Current Trustees Assumptions

The assumptions and methods used by OCACT to project DI program costs and revenues are well documented in three relatively recent reports: the 2003 Annual Report of the Trustees (2003), Social Security Disability Insurance Program Workers Experience: Actuarial Study Number 114 (1999), and Short-Range Actuarial Projections of the OASDI Program: Actuarial Study Number 115 (2001). The actuaries have also met with the Panel to explain their methods and the Trustees' assumptions.

However, the long-range assumptions and methods are not documented in sufficient detail to allow interested analysts to understand fully and evaluate the projections. Therefore, OCACT should document the assumptions and methods behind the long-range actuarial projections of the DI program in a study written at the same level of sophistication and detail as Actuarial Study Number 115. In addition, the report should discuss how the Trustees and actuaries integrate

historical data and short-range projections with key assumptions in the long-range projections. While the Trustees Report contains some of this information, a full actuarial study would allow the actuaries to present a detailed account of their methods.

Explanation of Panel's Recommendation

Disability Incidence Rates. In some sense, it is best to think of DI as nothing more than a case of "early-early" retirement. Hence, assumptions of future disability incidence rates by age and sex affect both DI and OASI costs and revenues. More generally, assumptions made with respect to DI beneficiary incidence rates should be consistent with those made about age-based labor force participation rates and other key factors used to determine OAI incidence rates, costs and revenues.

Projecting DI beneficiary incidence rates is more complex than is the projection of other program rates. To do so requires estimation of two distinct groups of factors: those that impact the incidence of impairments and their seriousness (i.e., medical based trends) and those that impact the social environment of those with such impairments, including program effects. This point is nicely discussed in Actuarial Report 114.

Medical effects are exogenous to the DI system, and understanding how overall morbidity rates have changed and are likely to change would be a valuable part of the process of projecting DI take-up rates. The dominant view in the demography literature is that morbidity rates for those aged 50 and above have improved over time. Manton et al. (1997) report declines in the trends in self-reported chronic disabilities among those over age 65 between 1982 and 1994. Crimmins et al. (1999) report significant improvements in the ability of older working age men and women to work between 1982 and 1993, again based on self-report. But critics of these studies and others using self-reported information on impairments or ability to work is that such data are subject to substantial reporting error. They further argue that no consistently collected objective information exists on impairments and work disabilities. See National Research Council (2002) and Stapleton and Burkhauser (2003) for reviews of this literature and discussions of the limitations of current self-reported impairment data in measuring both levels and trends in the prevalence of disability and the employment of those with disabilities.

The Panel also talked with David Skwire, Chair of the 2000 Society of Actuaries Task Force Subcommittee on the Proposed 2000 Group Long-Term Disability Basic Experience Table. Skwire reported that the actuarial community generally believes that morbidity rates of working age people have fallen over time and will continue to do so. Based on the evidence, we believe that morbidity has fallen over time and that it is likely to continue to do so in the future.

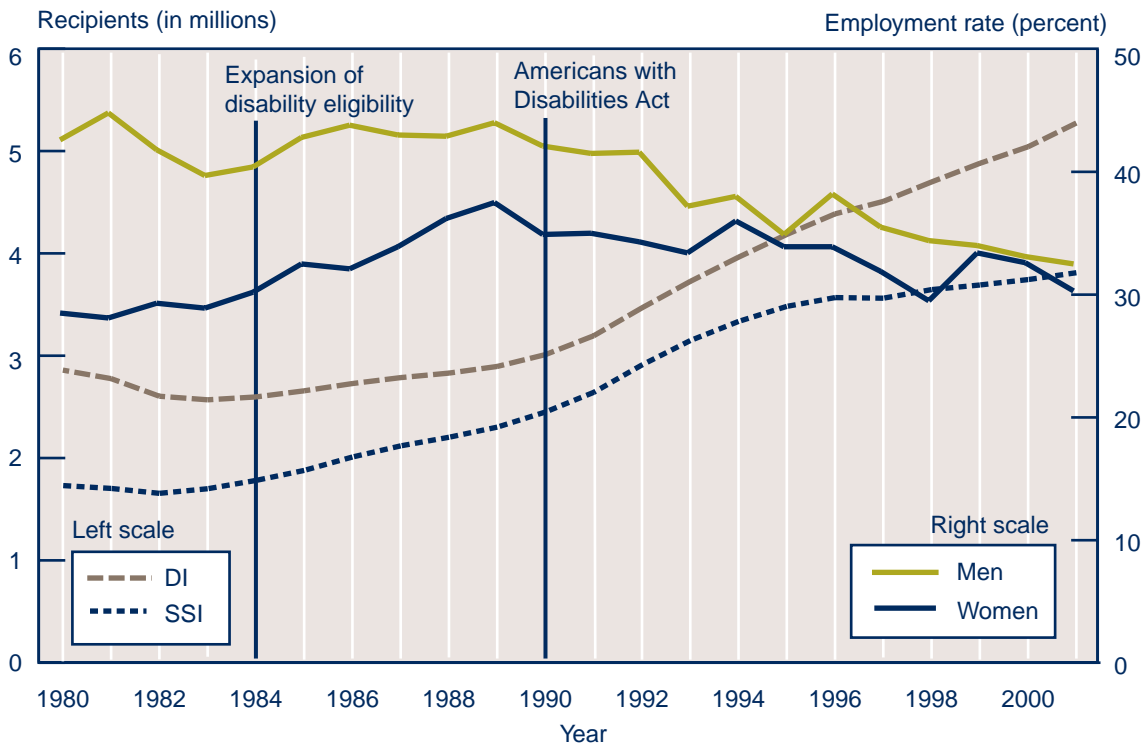
Even if improvements in morbidity (as measured in absolute terms, such as the ability to perform narrowly defined activities of daily living) fall over time, its resulting decline in the movement onto the DI rolls can be offset by changes in the social environment, (e.g., changes in labor market conditions or easing of disability program standards). Figure 8, updated from Burkhauser and Daly (2002), offers some evidence that this has been the case over the last decade of the 20th century. The employment of working-age men and women with disabilities followed the business cycle in the 1980s, falling during recession years (1979-1982) and rising as the economy grew over the rest of the decade (1983-1989). But during the 1990s, the employment rates of this population fell over the entire business cycle, including the long economic growth period from 1993-1999.

The exact reasons for the unprecedented decline in the employment of working age men and women with disabilities are still disputed (see Stapleton and Burkhauser 2003), but one factor that

has been alleged to have caused the decline is the increase in the share of the working age population with disabilities on the DI and SSI rolls (Figure 8), an increase that is inconsistent with improvements in morbidity and may have been caused by changes in Social Security disability policies. The decline in the employment of working age men and women with disabilities has continued since 1999 as the economy has once more moved into recession and general unemployment rates have increased.

Social environmental factors appear to be more important than changes in underlying health conditions in explaining the change in Social Security prevalence rates (and incidence rates) in the 1990s and make projections of future prevalence rates (and incidence rates) difficult to determine. Figure 9 shows the historic and projected age-adjusted award rates assumed in the 2003 Trustees Report. Table 4 shows the ultimate age-sex-adjusted disability incidence rates assumed in the 2003 Trustees Report. The Panel finds the projections reasonable given current information. We expect past trends to continue: measures of absolute impairment incidence will continue to fall. But social environmental factors, including changes in program standards, have offset this decline in the past, and, based on the last decade of unprecedented declines in the employment of those with disabilities, are likely to do so in the future. The result would be relatively stable DI incidence rates.

Figure 8
Disability Benefits Rolls and Employment Rates among Working-Age Men and Women with Disabilities



Source: Updated from Burkhauser and Daly (2002)

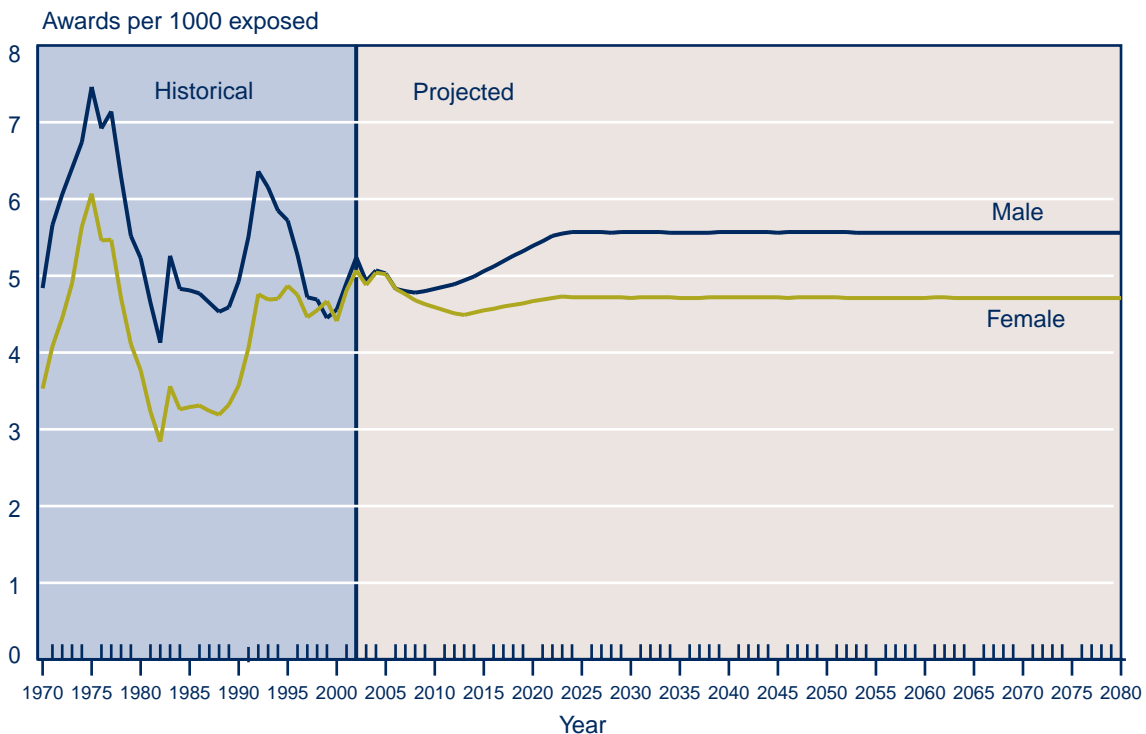
Table 4
Ultimate Age-Sex Adjusted Disability Incidence Rates (per thousand exposed)

	Low-cost	Intermediate	High-cost
2001	4.5	5.6	6.7
2002	4.4	5.5	6.6
2003	4.5	5.6	6.7

However, while we recommend that no change be made in current assumptions with respect to the disability incidence rate (more appropriately called the DI beneficiary incidence rate), we are concerned with the methods used to choose these assumptions. The process of projecting the DI incidence rate should be made more explicit, and the connection between short-range experience and future assumptions should be more fully explained. The projection process should consider both changes in underlying health factors and in the social environment that result in changes in DI beneficiary incidence rates. In projecting changes in the social environment, OCACT should especially recognize how ongoing policies and trends—such as the increase in the Normal Retirement Age (NRA) and the increasing incidence of awards on the basis of mental disorders—will affect workers with disability when they decide between continued efforts to remain in the work force and program application.

Disability Termination Rates. As discussed above with respect to morbidity assumptions for OASI and DI, mortality projections for each program are also interrelated. As in OASI, mortality

Figure 9
Age Adjusted Disability Award Rates
 (Age Adjusted to the January 1, 1996 Exposed Population)



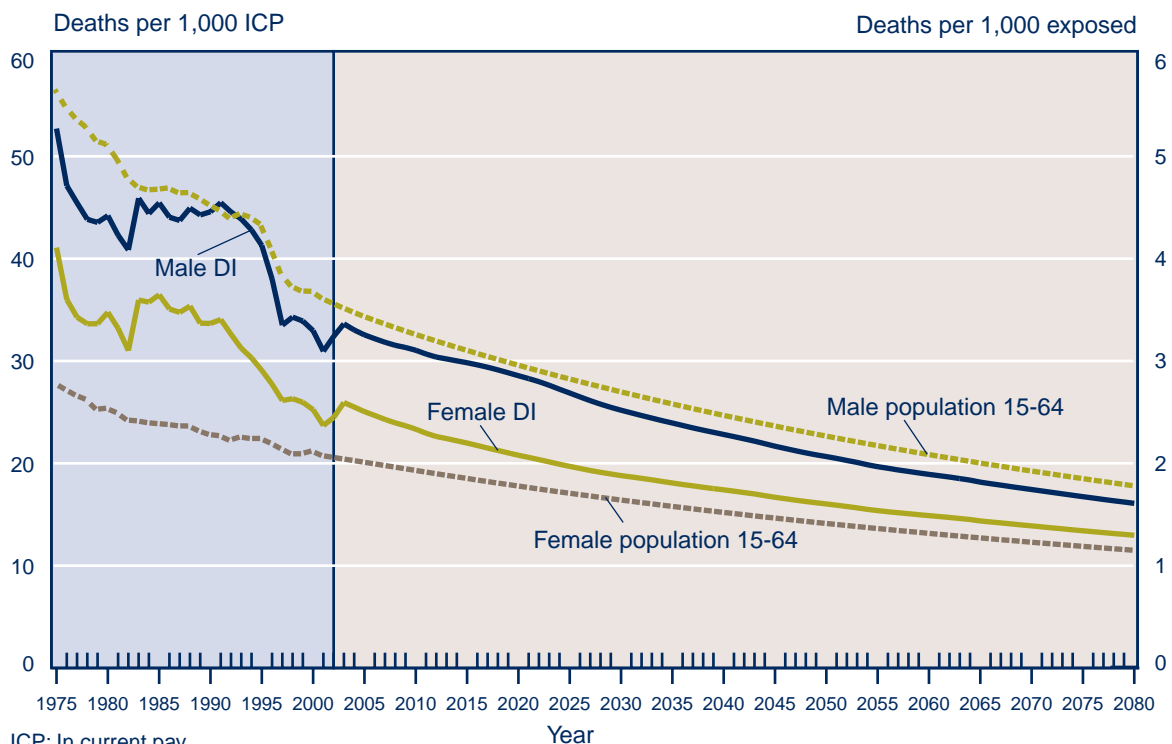
Note: Projected values are based on no increase in the NRA.

assumptions importantly affect duration in the DI program. In 1998, 39 percent of DI terminations were due to the death of the beneficiary. The vast majority of other terminations were due to reaching age 65 and automatically being placed in OASI beneficiary status (1998 data from Actuarial Study 114). The Trustees Report projects that the future mortality trend for the disabled population generally will track that for the overall population (see Figure 10), though at a much higher level. However this need not be a constant relationship over time.

In the early 1990s, age-adjusted mortality rates of the DI population improved much faster than for the population as a whole. The Trustees projected that the strong rate of improvement would slow dramatically, to a rate closer to that of the overall population. The 1999 Technical Panel questioned the projection of "a large and immediate reduction in the rate of improvement in mortality rates of DI beneficiaries, relative to the unusually rapid improvement in mortality rates in recent years" and recommended further study of the determinants of mortality improvement among DI beneficiaries. Data from the last few years have supported the Trustees' assumptions; age-adjusted DI mortality improvements have slowed dramatically, as shown in Figure 10. However, the underlying mechanisms behind these trends are not well understood.

To project future DI beneficiary age-adjusted mortality rates, the actuaries should consider more formally how the mix of impairments and the changes in the mortality rates within these impairment groups are likely to affect future mortality rates by age and sex. For instance, the significant changes in the primary impairment types of new DI beneficiaries has surely increased the share of new beneficiaries with lower age-adjusted mortality (e.g., mental illness, back

Figure 10
Age Adjusted Death Rates of Disabled Workers and SSA Population
 (DI: Age adjusted to the January 1, 1996 in current pay (ICP))
 (SSA population: Age adjusted to the 1990 Census)



ICP: In current pay.

Note: The rates for the general population and disabled population are on different scales.

problems), and it is likely that some primary impairment types have and will continue to improve relative to the average (e.g., AIDS, traumatic brain damage). It would be useful to see more formally how these changes can be related to past changes in the age-sex adjusted mortality experience of beneficiaries, and if a reasonable relationship is found, how well it can be used to forecast out of sample values.

IV. Recommendations on Key Labor Force Assumptions and Models

The labor force model converts estimates of the population into estimates of Social Security taxpayers by age and sex. Together with assumptions defining the growth in real wages, the labor force model produces estimates of annual revenues to Social Security. The Charter of the 2003 Technical Panel included a special charge to review and evaluate the assumptions concerning labor force participation and the model used to estimate changes in future participation rates. The Panel has specific recommendations for improving the labor force model and for altering the assumption for future increases in the age-specific labor force participation rates of older persons.

A. Labor Force Model

Method Recommendation M-4. The Panel recommends that the Trustees consider modifications of the model and assumptions used in the projections of labor force participation rates. This report provides details on how the existing model might be simplified to increase transparency and reduce the appearance of arbitrariness in its implementation.

Current Trustees' Methods

The current labor force participation model is quite complex. The base methodology involves three steps:

- Estimate the historical link between the age-specific labor force participation rates (LFPR) and economic, demographic, and policy variables (e.g., business cycle, disability rates, etc.) for various groups (classified by age, sex, marital status, and child presence).
- Subjectively adjust some estimated coefficients based on economic theory, prior beliefs, and the “full mosaic” of all estimated coefficients.
- Estimate fitted values of the LFPRs of each group based on projections of explanatory variables and these estimated/imposed coefficients.

For example, for ages 61 and younger, the basic estimation equation for each group is:

$$(1) \text{ LFPR}_{i,t} = \beta_i \cdot X_{i,t} + \varepsilon_{i,t}$$

where i represents a specific group, t indicates an annual observation, and $X_{i,t}$ are some subset of economic, demographic, and policy variables.

Equation (1) is estimated independently for each of 63 age-sex-marital status-children groups. Moreover, the set of explanatory variables in $X_{i,t}$ varies across regressions and includes some combination of ratio of real to potential GDP; the percentage of the population that is in the military, in school, never married, and disabled; spouse LFPR; and special event dummy variables. Finally, the estimation time period varies, beginning at dates from 1968 to 1978 and ending at dates from 1996 to 1998.

The 63 regressions described above give 63 sets of parameters, some of which seemed sensible to OCACT and some of which did not. The OCACT approach is to subjectively assign values to some parameters—based either on the estimated coefficients from all regressions or prior beliefs—and then reestimate the regression with the imposed coefficients. For example, the coefficient on the disability ratio is presumed to be close to -1.0 (if you are disabled, you are typically out of the labor force) and OCACT sets it to this value in all regressions. This essentially moves one of the explanatory variables to the left-hand side of the regression with some imposed coefficient and results in a restricted regression.

The LFPR projections for each group, $LFPR_{i,t+1}$, are then computed from projected values of the right-hand side variables, $X_{i,t+1}$, and the set of estimated/imposed coefficients, (β_i) as

$$(2) LFPR_{i,t+1} = \beta_i \cdot X_{i,t+1} + \varepsilon_{i,t}$$

Finally, OCACT projects aggregate LFPR from the projected group-specific LFPRs and projections of population shares.

The models for older ages are conceptually similar, but estimate retirement hazard rates (the percent of workers in the labor force who retire). These retirement rates are applied to the participation rates for younger workers to obtain the remaining participation rates. This section of the model uses another 44 equations.

There is very little documentation concerning the labor market model used by OCACT. However, the lack of clearly specified reasoning for the assumptions and methods used in this model give the process the appearance of being rather arbitrary. OCACT needs to improve the methods by which the data are examined and presented.

Explanation of Panel's Recommendation

As described above, the basic approach to projecting labor force participation is to estimate econometrically the link between LFPRs and demographic or economic variables for various groups, impose some additional structure on the pattern of coefficients, calculate fitted values based on projections of explanatory variables, and then aggregate to form the economy-wide LFPR estimate.

It is the Panel's assessment that this mix of estimation and adjustment lacks a strong theoretical and empirical basis. The Panel recommends that the OCACT alter the econometric analysis to eliminate the process of imposing values for certain coefficients that do not fit the priors of the analysts. This can be done by

1. limiting the number of groups for which individual regressions are run (currently 107), or
2. by imposing some cross-equation restrictions on the estimated parameters between groups and estimating a pooled regression.

If the analysts have specific priors about how certain coefficients vary across groups, this can be modeled in a pooled regression through the use of interaction terms. A more rigorous estimation framework would strengthen the analysis and enhance the interpretation of the labor force projections.

Whatever the structure of the labor force model used by OCACT, it should be well documented. The lack of clearly specified reasoning for the assumptions and methods used in the existing model undoubtedly contributes to its seeming arbitrariness. Independent of whatever decisions are made about changes to the model, the Panel recommends that OCACT provide more documentation on the following: the estimation model, statistical tests of the imposed coefficients, sensitivity tests to examine how any restrictions imposed affect the bottom line LFPR estimates, and details on any differences in methodology, specification, or sample period across groups.

In developing its understanding of the current model, the Panel benefited greatly from memos and presentations prepared by OCACT staff. Materials of this sort would provide a strong base for more formal documentation of the labor force model. Ideally, such material would be presented as an Actuarial Study. Formal documentation would contribute to better understanding of the labor force model within OCACT and help to ensure that the model results are reproducible by analysts other than those currently responsible for this work. In addition, formal documentation would be valuable for presentation to the Trustees and their staffs and to other outside analysts interested in evaluating the projections methodology, including the next Technical Panel.

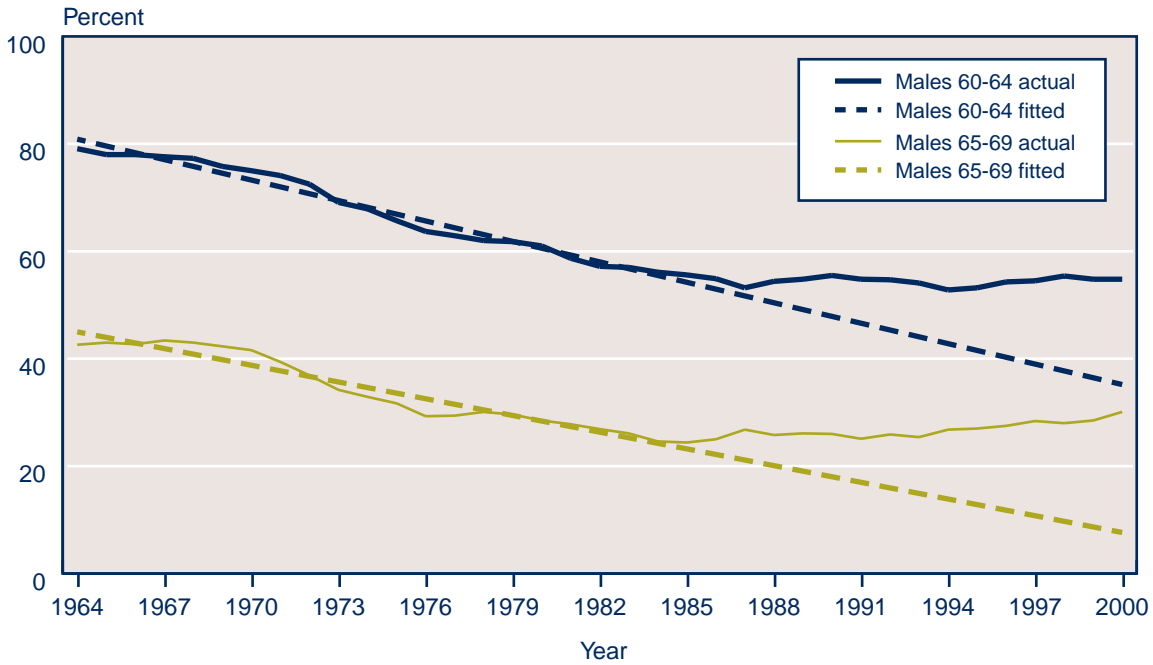
B. Assumptions on Labor Force Participation Rates

Assumption Recommendation A-6. The 2003 Trustees Report added an assumption that future labor force participation rates will rise due to increases in life expectancy. This adjustment should be eliminated from the intermediate assumptions. Various factors, including changes in employer pensions, Social Security, and the general economic environment, may result in higher participation rates, but these should be considered explicitly. The Panel recommends that the assumption be retained in the low-cost alternative but also eliminated from the high-cost assumptions.

Method Recommendation M-5. The Panel recommends that further consideration be given to how changes in the population and labor force might impact trends in hours of work, productivity, and annual earnings. Changing the growth rate assumption on one variable such as immigration should cause the Trustees to reassess their assumed rate of productivity growth, the change in weekly hours, and, therefore, the growth rate of real wages.

Labor force participation rates have changed dramatically over the past half-century. The two sweeping trends were the movement of large numbers of women, even those with young children, into the labor force, and the move towards earlier retirement for many men. In recent decades, these changes have slowed. While the cohorts of women now entering the labor force may participate at a higher level than those born 5 or 10 years earlier, the difference is minor compared to the rapid increase in participation rates observed during the 1970s and 1980s. The trend towards earlier retirement seems to have stopped or at least temporarily paused. The participation rates for older men have been relatively stable over the past 20 years and are now slightly higher than those of the mid-1980s, as shown in Figure 11.

Figure 11
Labor Force Participation Rates



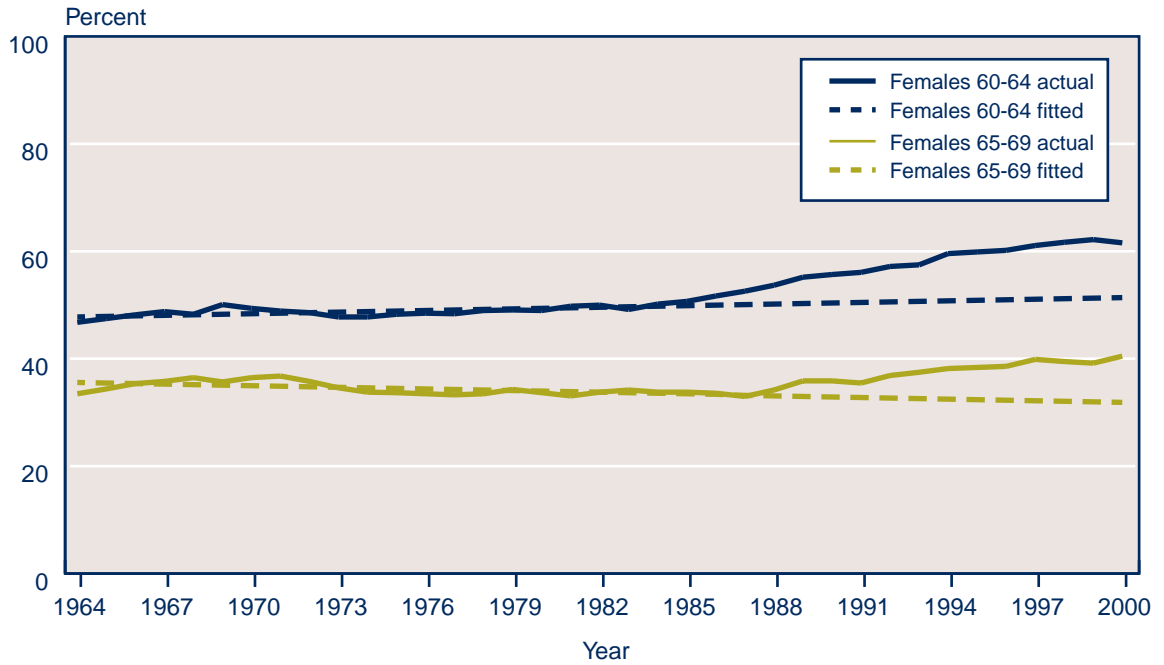
Source: Joseph Quinn, Boston College, from Current Population Survey data.

Until about 1985, the trend toward earlier retirement was offset for women by the trend towards higher labor force participation in general, resulting in rather flat participation rates for older women. In recent years, the trend has shifted to increasing participation at older ages, as shown in Figure 12.

In its base projections, OCACT recognizes that these trends are nearly mature. Although the methodology is quite complex, the resulting projections are that participation rates will remain nearly flat throughout the projection period, as shown in Figure 13. Reflecting the trend towards earlier retirement, participation for men age 50 to 66 is projected to fall by about 5 percent, but due to the increase in the normal retirement age, participation for older men is projected to rise slightly. Similar trends are seen for women. In addition, the trend towards higher participation rates for women at child-rearing ages is projected to continue, but the net change is expected to be small. For example, the rate for 25-29 year old women is projected to increase from 76.3 percent in 2002 to 79.3 percent in 2030 and then remain constant.

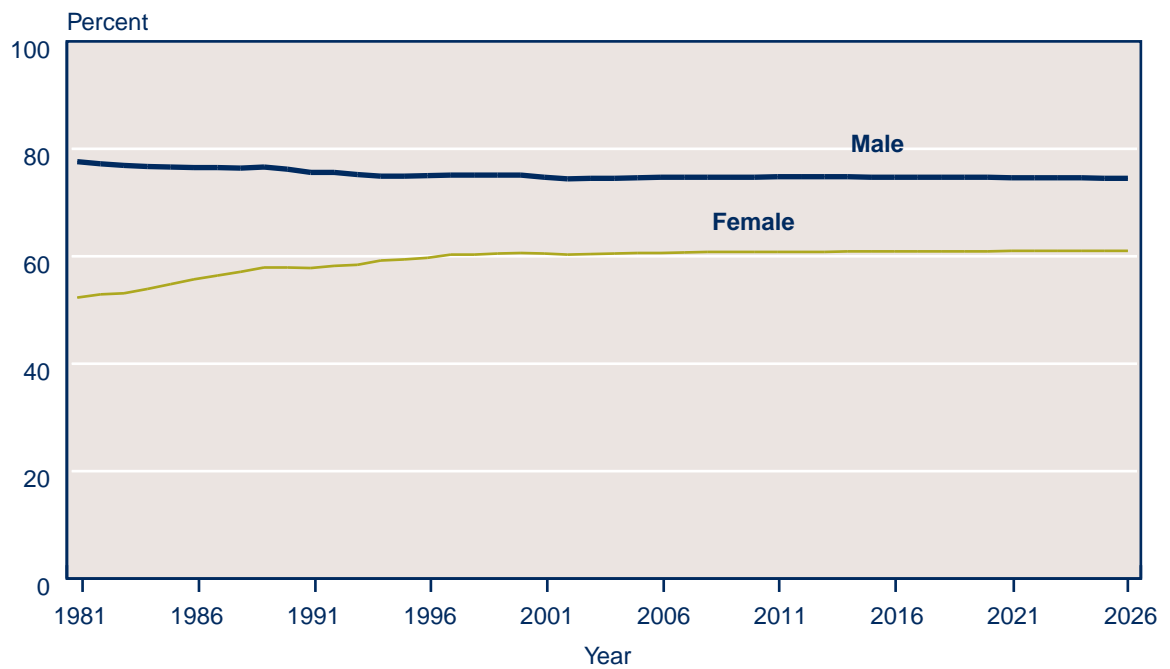
Given the stability in participation rates over the last few decades, the base methodology yields results that seem sensible. It is especially difficult to project whether the long-term trend towards earlier retirement will return, the consistent pattern of retirement seen over the past 20 years will continue, or other factors will result in a reversal of the long-term trend. The base projections effectively take a middle ground between the long-term and short-term historical trends, projecting a slight trend towards earlier retirement.

Figure 12
Labor Force Participation Rates



Source: Joseph Quinn, Boston College, from Current Population Survey Data.

Figure 13
Total Age-Adjusted Labor-Force Participation



Source: Office of the Chief Actuary, Social Security Administration.

C. Adjustment for Life Expectancy in 2003 Trustees Report

The base labor force participation model includes necessary and reasonable adjustments to account for the effects of already-enacted changes in Social Security law on LFPRs. Labor force participation rates for the population age 62 and older are modestly higher as a result of the elimination of the earnings test for beneficiaries age 65 and older in 2000. The model also anticipates future increases in labor force participation at older ages attributable to phased increases in the normal retirement age, which will reduce benefit replacement rates for affected individuals, and to increases in the size of the delayed retirement credit for older workers who wait to claim benefits until past the normal retirement age. But in the 2003 Report, the Trustees added an additional adjustment, changing projected participation rates to account for increasing life expectancy. Under the old LFPR methodology, participation rates stay essentially constant even as life expectancies grow. Over an extremely long time horizon, these two assumptions would lead to larger and larger elderly dependency ratios. In 2003, the Trustees decided for the first time to include an ad hoc increase in the LFPR of older persons based on increasing life expectancy. The adjustment was based on examining participation rates that were experienced by prior generations with the same number of years of life expectancy. For example, if life expectancy increases by 3 years, one could assume that 58 year olds would behave like 55 year olds did.

The Trustees modified this approach by assuming that participation rates increased by only one quarter of this amount. Thus, if 58 year olds had a participation rate of 60 percent and 55 year olds had a participation rate of 64 percent, or 4 percentage points higher, the rate for 58 year olds would be increased by

0.25 (4 percentage points) = 1 percentage point.

Explanation of Panel's Recommendation

Life expectancy increased throughout the 20th century. Despite substantial increases in the number of years of expected life, retirement ages declined for most of this period. The number of years in retirement enjoyed by today's elderly might very well have seemed unreasonable to analysts 50 years ago. There is no historical evidence to support an assumption that just because people are living longer they will work until later ages.

Instead, work and retirement decisions are determined by the economic environment, the growth in real income, and retirement incentives imbedded in public and private pension systems. Increases in real income have allowed workers to purchase more lifetime leisure through earlier retirement ages. The development of retirement programs provided the means for workers to retire, and these programs often explicitly discouraged continued employment.

The Trustees' assumption of a 1.1 percent annual wage growth implies a 127 percent increase in annual earnings by the end of the 75-year projection period. Future workers are likely to resemble their 20th century counterparts and desire to use some of this growth in real income to purchase more leisure and some of the growth in income to purchase consumption goods like health care, education, or entertainment.

Leisure may be taken in the form of fewer annual hours, mid-career breaks from the labor force, or early retirement. The 2003 Trustees Report increased the assumption for future annual hours worked; instead of the 0.1 percent annual decline used in the 2002 Report, in 2003 the Trustees assumed no change in hours of work. (This assumption applies only to paid hours. Workers and employers could agree to more paid vacation, but any significant increase in paid

leave would result in lower productivity growth.) Historically, mid-career breaks in labor force participation have been taken by women. In 2003, the Trustees assumed that participation for prime-age women will increase slightly. So consistency with these assumptions requires that any increased leisure stemming from higher lifetime income be taken in the form of longer retirement.

Over the projection period, life expectancy at age 65 is projected to increase about 25 percent, from 18.1 years in 2002 to 22.5 in 2080. Given the projection of a 127 percent increase in income, it seems inadvisable to assume increases in labor force participation rates for older persons. Such a reversal in the trend toward earlier retirement has never been seen in the historical record of any country.

Other economic factors may encourage longer participation in the labor force. The labor force model used in the Trustees Report accounts for changes in Social Security law already adopted by Congress: the scheduled increases in the normal retirement age and the delayed retirement credit and the recent elimination of the earnings test for those 65 and over.

Other structural changes in employer pensions, the demand for workers, and the changing nature of work will alter the desire of older persons to remain in the labor force and the demand for their services. First, the structure of many defined benefit pensions results in sharp reductions in the net wage at prescribed ages. Therefore, these pension plans provide strong incentives for older persons to retire. But the past decades have seen a striking shift to defined contribution pensions, which are generally closer to actuarially neutral with respect to retirement age. (See, e.g., CBO 2003a) Second, the aging of the population may result in higher demand for older workers as firms have more difficulty in replacing retirees. In order to attract older workers, employers may be more willing to accommodate their needs, such as more flexible working hours. Finally, while not as clear-cut as the mortality improvement at older ages, there is strong evidence of morbidity improvement as well. Research has clearly shown that health status is a crucial factor in individual retirement decisions. But the trend towards a healthier and longer-lived older population has not to date been accompanied by increased labor force participation.

While we believe that OCACT and the Trustees should consider these factors, there is not yet sufficient evidence that their possible effects justify an assumption of a sustained, long-term adjustment to the projections of the base model.

D. Unemployment

Assumption Recommendation A-7. The Panel recommends that the assumptions on unemployment remain the same as those in the 2003 Report. Given recent experience, a long-run unemployment rate of 5.5 percent is a reasonable assumption for future unemployment rates.

As explained in the section on inflation, strong macroeconomic forces tend to push the unemployment rate toward the “natural rate of unemployment” that is consistent with steady inflation. Recent academic papers have estimated this “natural rate” to be in the range of 5.0 to 5.5 percent. The 2003 Trustees Report selects an unemployment rate in the future of 5.5 percent. The Panel supports the continuation of an assumption of a 5.5 percent unemployment rate into the indefinite future.

V. Recommendations on Economic Assumptions And Models

An increase in wage rates results in a direct increase in OASDI payroll tax revenues. Social Security benefits are indexed to wage growth, but the effect of wage growth on benefit expenditures is smaller than the effect on payroll tax revenues. First, there is a lag between the years a worker pays taxes and the year the worker becomes entitled to benefits. Second, following entitlement, benefits are indexed not to wages but to the slower-growing Consumer Price Index (CPI). Therefore, system finances are sensitive to changes in real wage growth.

To clarify the analysis behind the projections, the Trustees Report projects separately the growth in labor productivity and the growth in each of several linkages between labor productivity and real wage growth. As shown in the following expression, real wages depend on output per hour (labor productivity); labor compensation as a share of GDP; wage, salary and self-employment earnings as a share of labor compensation; hours per worker; and the ratio of the GDP deflator to the consumer price index:

$$\left[\frac{\text{earnings/CPI}}{\text{employment}} \right] = \left[\frac{\text{GDP/GDP deflator}}{\text{total hours}} \right] \left[\frac{\text{labor compensation}}{\text{GDP}} \right] \left[\frac{\text{earnings}}{\text{labor compensation}} \right] \left[\frac{\text{total hours}}{\text{employment}} \right] \left[\frac{\text{GDP deflator}}{\text{CPI}} \right]$$

The term on the left hand side of the expression is average real annual earnings per employed person, referred to as the real wage. The real wage equals wage, salary and proprietors' earnings as reported in the National Income and Product Accounts, deflated by the CPI to convert it to a real figure and divided by employment to put it on a per-worker basis. The first term on the right hand side of the equation is real output per hour, or labor productivity. In the second term, the ratio of labor compensation to GDP, labor compensation includes employers' benefit and social insurance costs in addition to amounts disbursed as wages, salaries and self-employment income. The third term on the right hand side shows earnings as a share of total labor compensation. The fourth term equals average annual hours per employed person. The last term captures the ratio of the price deflator relevant to the total output of the economy to the price deflator relevant to the goods and services purchased by consumers. It is straightforward to convert this expression written in terms of the levels of the relevant linkage variables into an expression written in terms of their rates of change.

Assumptions used in Past and Present Trustees Reports

The 2003 Trustees Report in fact projects values for the rates of change for labor productivity, the real wage and each of the linkage variables just described, rather than projecting the levels of these variables directly. The relevant growth rates and their projected values are as follows:

Real wage growth	~	Labor productivity growth	+	Growth in labor compensation/GDP ratio	+	Growth in earnings/labor compensation ratio	+	Growth in total hours/employment ratio	+	Growth in GDP deflator/CPI ratio
1.1 pct/yr		1.6 pct/yr		no change		-0.2 pct/yr		no change		-0.3 pct/yr

As can be seen, the most important influence on the rate of real wage growth is the rate of growth in labor productivity, but other factors matter as well. For purposes of the discussion that

follows, note that the rate of growth in the ratio of the GDP deflator to the CPI can be rewritten as the difference between the rates of growth in the two series.

The 1999 Technical Panel recommended that the Trustees increase the projected rate of growth in the real wage (referred to as the real wage differential) from 0.9 to 1.1 percent per year, and that they also increase the high- and low-cost levels of annual real wage growth by 0.2 percentage point.

Effective with the 2000 Trustees Report, the assumed rate of productivity growth increased by 0.2 percentage point for all 3 scenarios, but the price differential (CPI growth rate less GDP deflator growth rate) increased by 0.1 percentage point, resulting in a net 0.1 percentage point increase in the rate of real wage growth for all three sets of assumptions.

In the 2002 Report, the assumed rate of productivity growth increased by an additional 0.1 percentage point for all 3 scenarios, increasing the real wage growth rate to 1.1 percent per year (up by a total of 0.2 percentage point from the 1999 Report).

In the 2003 Report, both the productivity assumption and the real wage differential assumption stayed the same, but the assumed annual rate of change in average hours worked increased by 0.1 percentage point per year for all three scenarios, and the assumed annual rate of growth in the GDP deflator fell by an offsetting 0.1 percentage point per year.

Thus on net, from 1999 to 2003, the assumed rate of annual productivity growth increased by 0.3 percentage point per year and the assumed rate of change in average hours increased by 0.1 percentage point. However, the offsetting 0.2 percentage point annual increase in the difference between the growth rates of the CPI and the GDP deflator resulted in a net increase of 0.2 percentage point per year in real wage growth.

A. Productivity Growth

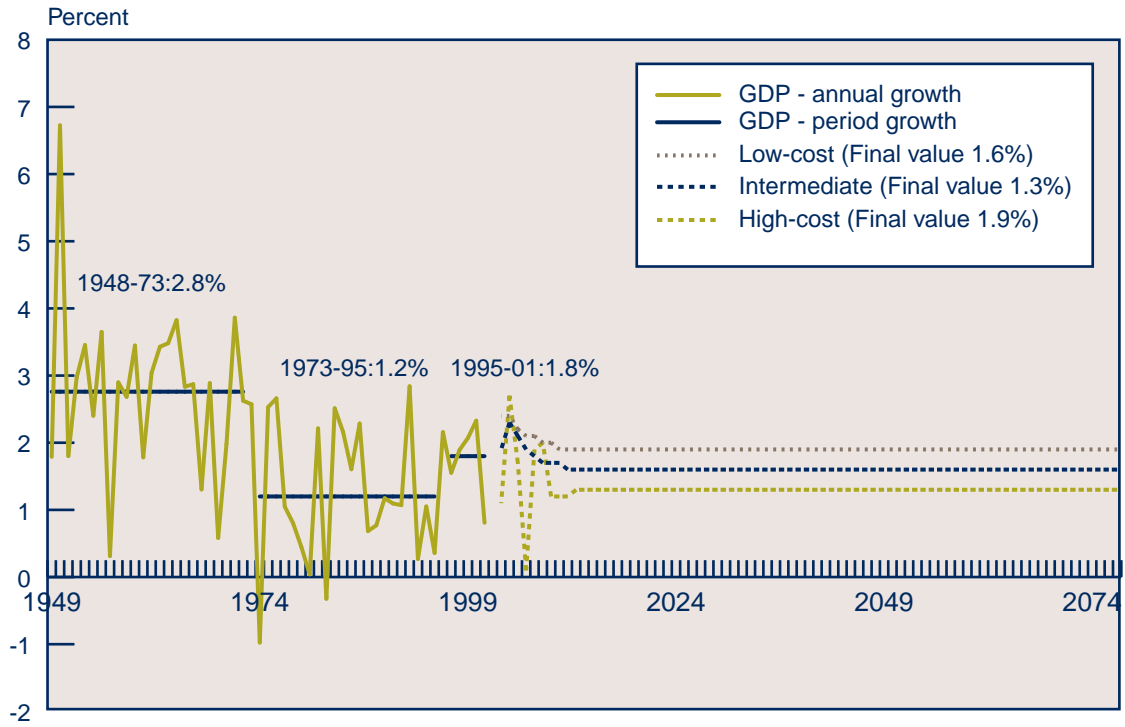
Assumption Recommendation A-8. The Panel recommends that the assumption on productivity growth be increased by 0.1 percentage point to 1.7 percent per year. This recommendation reflects the work of private and government forecasters for the next decade, assumptions about future demographic trends, and analysis of more recent productivity data.

The 2003 Trustee Report projects ultimate labor productivity growth rates of 1.6 percent per year in the intermediate case, 1.9 percent in the low cost, and 1.3 percent in the high cost. These projections are for the total U.S. economy (real GDP per hour worked). This compares to average annual growth in labor productivity of 1.73 percent from 1961 to 2001.

For the non-farm business (NFB) measure of productivity, which is the focus of more economic analysis, average annual growth was 1.96 percent for the same period. More recently, however, productivity has accelerated, with an annual rate of 1.80 percent for the total economy and 2.22 percent for the NFB sector for the period 1995-2001. We note the widening divergence between the NFB sector and the rest of the economy in the post-1995 period.

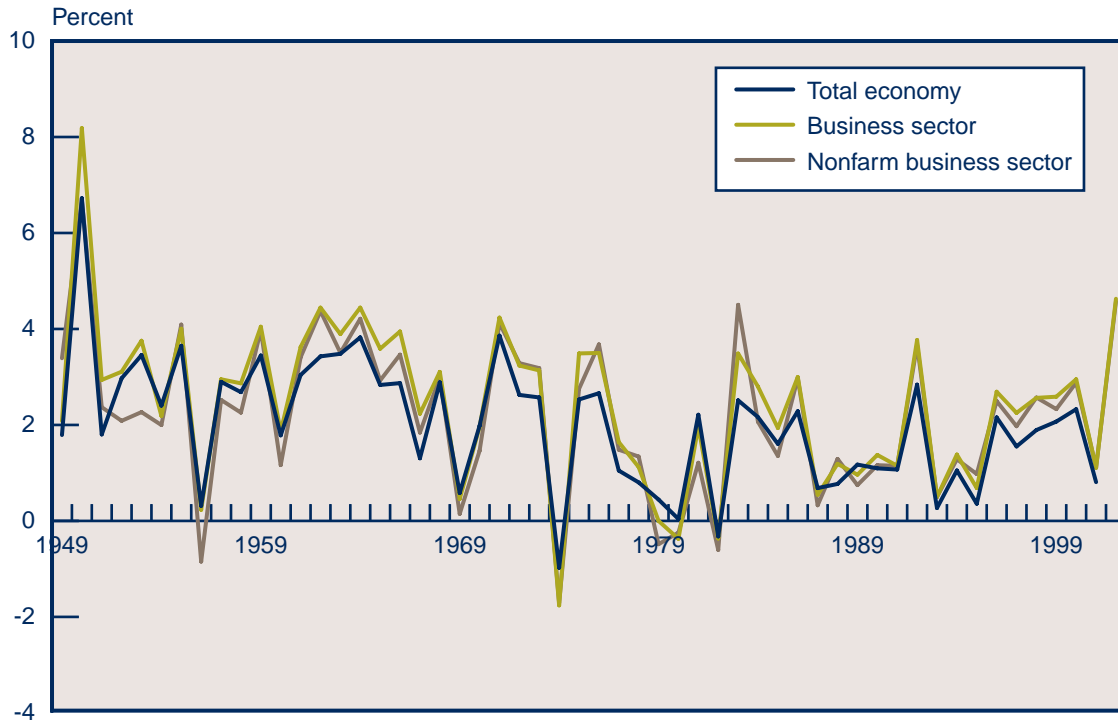
In August 2003, the U.S. Bureau of Labor Statistics (BLS) revised its estimates of productivity growth for the NFB sector. These revised data, which are not directly comparable to the numbers reported by SSA in earlier reports or shown above, show even stronger productivity growth in the post-1995 period. For the seven and one half years from 1995:Q4 through 2003:Q2, productivity growth for the NFB sector was 2.9 percent per year. We do not yet have comparable numbers for the full economy.

Figure 14
Total Economy Productivity Growth: History and Projections



Source: Office of the Chief Actuary, Social Security Administration.

Figure 15
U.S. Productivity Growth 1948-2002



Source: Business and nonfarm business sector productivity from the U.S. Bureau of Labor Statistics. Total economy productivity from the Office of Chief Actuary, Social Security Administration.

Recent projections of productivity growth, all completed prior to the latest revisions to the BLS productivity data, include the Congressional Budget Office (CBO 2003b), Economic Report of the President (Council of Economic Advisors 2003), Jorgenson, Ho, and Stiroh 2002, and Oliner and Sichel 2002. For the NFB sector, these four estimates average about 2.2 percent for the next decade. Two estimates for the total economy (Jorgenson, Ho, and Stiroh and CBO) average about 1.9 percent for the next decade. For comparison, the Trustees' 10-year projections are 1.4 percent, 1.8 percent, and 2.1 percent for the high-cost, intermediate, and low-cost scenarios.

Given these projections and the recent strength of U.S. productivity growth, the Trustees' ultimate assumption of 1.6 percent annual growth seems conservative. Over the next decade, for example, the Trustees' estimates are slower than the Jorgenson, Ho and Stiroh and CBO total economy projections by 0.1 percentage point per year. While we cannot compare projections for the longer term, this suggests that the SSA forecasts are slightly below others. Alternatively, one can combine the 2.2 percent average NFB productivity projection from these four sources with an assumption that the differential between the NFB and the rest of the economy remains as in the late 1990s. Using constant weights on NFB and other sectors of the economy generates a total economy estimate of 1.8 percent, which matches the Trustees' 10-year projections. If this divergence narrows and approaches the average over a longer time period, productivity growth in the rest of the economy will approach the NFB sector, and the total economy growth rate will rise.

We emphasize that these private and government projections behind these comparisons were all made based on earlier vintages of data that showed somewhat slower productivity growth in the post-1995 period. It is likely that if similar projections were made using the more recent data, they would be slightly higher.

Finally, we can compare the historical data that were incorporated into earlier Trustees Reports. The 2002 Trustees Report, for example, raised the intermediate productivity assumption to 1.6 percent from the 1.5 percent in the 2001 Trustees Report. At that time, data were available roughly through 2001:Q4 and the average annual growth rates for the NFB were 1.67 percent for 1973:Q4 to 2001:Q4 and 2.56 for 1995:Q4 to 2001:Q4. When the data are extended to 2003:Q2, the average annual growth rates for the NFB increase to 1.81 percent for 1973:Q4 to 2003:Q2 and 2.92 for 1995:Q4 to 2003:Q2.⁵ This again supports the recommendation that the productivity projection should be raised.

Over a projection horizon of many decades, however, the Trustees Report is unique, so there are no independent projections with which to compare, and evaluation of long-run projections is more difficult. Nonetheless, some factors should be considered. Since World War II, for example, there has been a steady improvement in the quality of the labor force, due to gains in education and experience. Demographic trends suggest that this growth will slow. Without this quality improvement, long-run productivity growth could be as much as 0.2 percentage point lower than in the past. Alternatively, technological factors like the growing size of the information technology (IT) sector will likely contribute to faster productivity growth. Harder to quantify are the pace of technological gains within the IT sector and the adoption patterns elsewhere in the economy; i.e., will IT continue to increase in speed and power, and will IT-using firms continue to invest in these new goods? More generally, long-run changes in technological progress and productivity trends have proven difficult to predict. Shifts in productivity trends, such as the sharp

⁵ All of the growth rates in this paragraph are based on data from BLS released on September 4, 2003. Because the August 2003 revision affected productivity estimates back to 1998, this comparison actually overstates the estimates of productivity available to earlier Trustees Reports and understates the increase with recent data.

slowdown in 1973 and the acceleration in 1995, are easily observed but difficult to understand. Even in retrospect, their causes are being debated.

Based on the recent projections of productivity and the continued strength of productivity growth in the post-1995 period, the Panel recommends that the long-run total economy productivity projection should increase to 1.7 percent per year. The high- and low-cost scenarios should also increase by 0.1 percentage point to 1.4 percent and 2.0 percent, respectively.

Given the inherent uncertainty on the technology side, it is prudent not to place too much weight on the recent technology-led boom and project these strong growth rates continuously into the future. Thus, the long-run projections are slower than both the period 1961-2001 and the more recent post-1995 growth rates. Nonetheless, the continued strength of productivity growth through the recent highly turbulent period, which included a recession, the terrorist attack of September 2001, a marked investment slowdown, and the war in Iraq, contributes to mounting evidence that a portion of the recent gains are indeed permanent.

Finally, it would be useful for SSA to provide more documentation on how this rate of growth is determined by the Trustees. If documentation on the methodology exists, it should be publicly available, although not necessarily in the Trustees Report. Similarly, a discussion of the rationale for the range across scenarios would be useful. For example, none of the NFB projections cited above are forecasting a return to the slow growth period from 1973 to 1995, but some have noticeably higher estimates, so it might be reasonable to raise the low-cost estimate. There is no need for the high- and low-cost values to be symmetric if the probability distribution is asymmetric.

B. Compensation to GDP Ratio

Assumption Recommendation A-9. The share of labor compensation in GDP has historically been quite stable, and the Panel agrees with the current assumption of a constant ratio.

The ratio of employee compensation (defined to include wage and salary accruals and supplements to wages and salaries) to GDP has shown little variation over the last five decades. The average ratio over the period from 1950 through 2002 was 57.0 percent, with a high of 59.4 percent and a low of 53.5 percent. As shown in Table 5, the ratio edged up from the 1950s to the 1970s, but has stabilized over the past three decades at around 58 percent. The 2003 Trustees Report assumes the ratio will remain stable, and the Panel recommends that this assumption be retained.

Table 5
U.S. Average Compensation Ratios

	1950-59	1960-69	1970-79	1980-89	1990-99	2000-2002	1950-2002
Compensation/GDP	0.548	0.564	0.585	0.581	0.571	0.579	0.570

Compensation is defined as wage and salary accruals plus supplements to wages and salaries.

Source: National Income and Products Accounts (7/21/03).

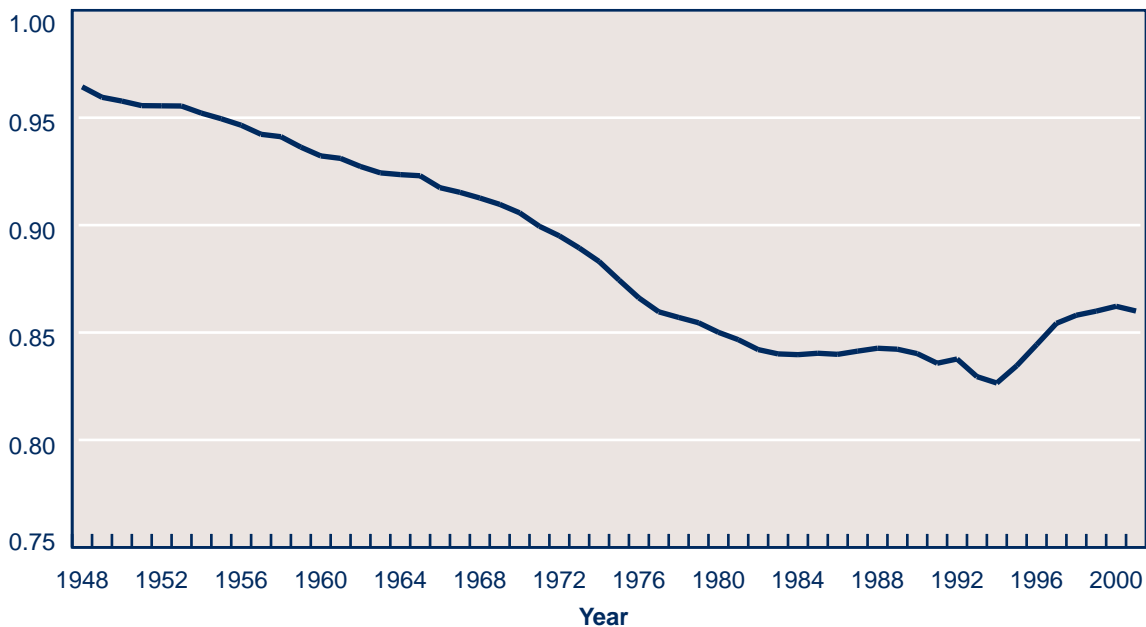
C. Earnings to Compensation Ratio

Assumption Recommendation A-10. The Panel recommends that the change in the earnings to compensation ratio be reduced in the intermediate assumption from a decline of 0.2 percent per year to a decline of 0.1 percent per year. In the low-cost assumption, the current ratio should be held constant, while in the high-cost assumption, the ratio should decline by 0.2 percent per year. In addition, in both the intermediate and high-cost projections, the earnings to compensation ratio should be held constant after it has declined from its current level of 0.86 to 0.75.

Prior to World War II, noncash compensation accounted for only a tiny fraction of workers' total compensation. Restrictions on cash wage increases imposed by the War Labor Board during the war years encouraged employers to offer nonwage benefits such as pension plans and health insurance. These employer-provided benefits proved over time to be popular, in part because such noncash compensation is not subject to personal income tax, and they grew in importance in subsequent decades. The costs of legally-required benefits also became a larger share of total compensation.

As shown in Figure 16, these changes led to a steady decline in the share of total compensation accounted for by cash earnings that persisted through about 1980. The National Income and Product Accounts provide the most consistent source of data on labor compensation and its composition. In 1929 (not shown in the chart), cash earnings accounted for 98.9 percent of total compensation; by 1980, this share had fallen to 85.0 percent. Since 1980, however, there has been no consistent growth in benefit costs as a share of total compensation, and the ratio of

Figure 16
Trend in the Ratio of Total Earnings to Total Compensation

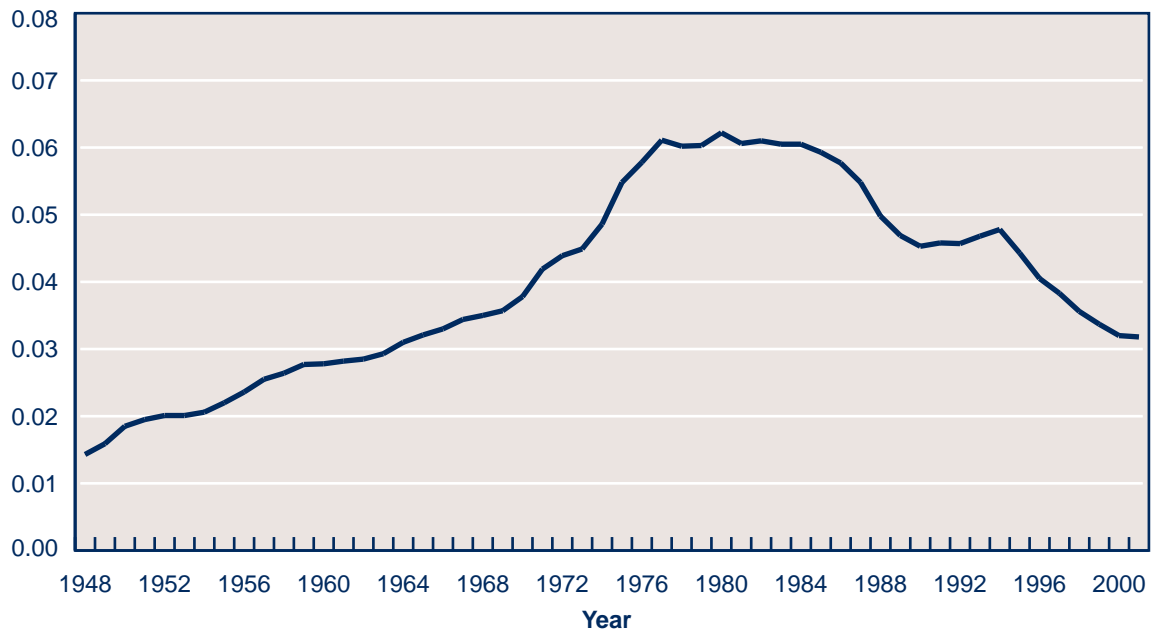


Source: Data from the National Income and Product Accounts, Bureau of Economic Analysis. The numerator of the ratio equals farm and nonfarm proprietors' income plus wage and salary disbursements; the denominator equals farm and nonfarm proprietors' income plus total employee compensation, including social insurance contributions and employer-provided benefit costs.

earnings to total compensation has stabilized and, in recent years, even risen slightly, to 86.0 percent in 2001.

One factor that has contributed to the leveling in the ratio of earnings to compensation has been the declining ratio of employer pension and profit sharing contributions to total compensation shown in Figure 17. The long-term shift from relatively generous defined benefit plans to less generous defined contribution plans helps to explain this decline. In addition, the strong performance of the stock market during the late 1990s greatly reduced the amount employers were required to contribute to their defined-benefit pension plans. (See Rappaport 2003 for an overview of recent trends.)

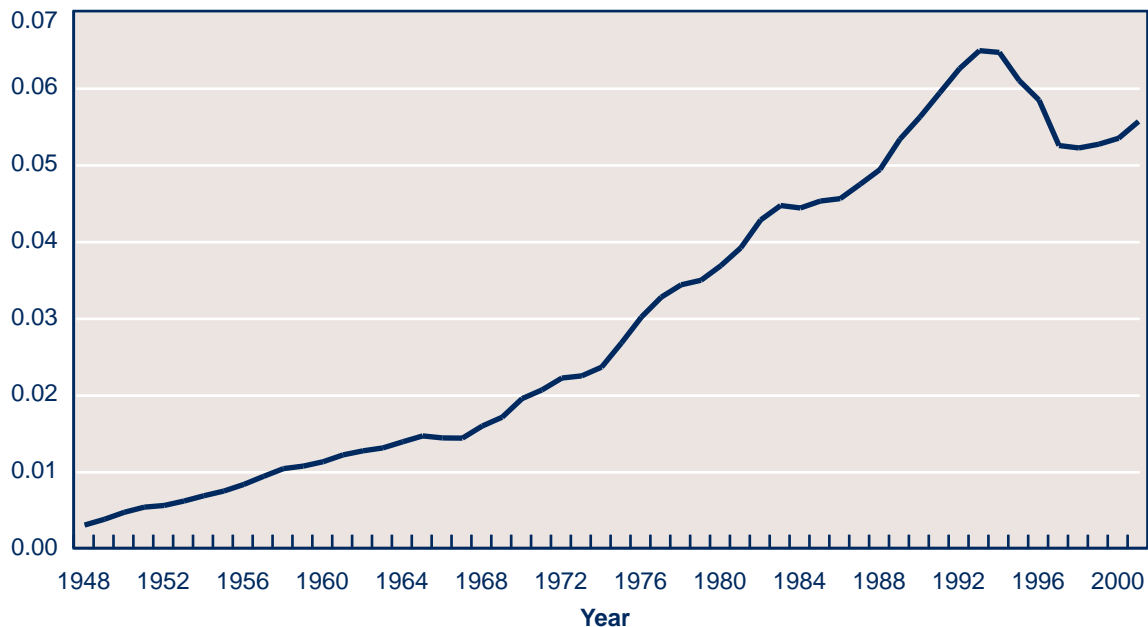
Figure 17
Employer Pension and Profit-Sharing Contributions as a Share of Total Compensation



Source: Data from the National Income and Product Accounts, Bureau of Economic Analysis. The numerator of the ratio is employer pension and profit sharing plan contributions; the denominator equals farm and nonfarm proprietors' income plus total employee compensation, including all social insurance contributions and employer-provided benefit costs.

Employer-paid health insurance costs rose steadily as a share of compensation through the early 1990s. This growth slowed dramatically in the mid-1990s, reflecting the growth in HMOs and Preferred Provider Organizations, together with the shifting of some health insurance costs from employers to employees (Schwenk 1999). Employers' group health insurance costs as a proportion of compensation dropped by a full percentage point. More recently, however, employer-paid health insurance costs as a share of total compensation have again ticked upwards.

Figure 18
Employer Group Health Insurance Contributions as a Share of Total Compensation



Source: Data from the National Income and Product Accounts, Bureau of Economic Analysis. The numerator of the ratio is employer group health insurance contributions; the denominator equals farm and nonfarm proprietors' income plus total employee compensation, including all social insurance contributions and employer-provided benefit costs.

The Trustees currently assume that the ratio of earnings to compensation will fall by 0.2 percent per year for the indefinite future. The projected decline in the earnings to compensation ratio is based primarily on the Trustees' belief that tax-exempt health benefits will make up an increasingly large portion of compensation. As already noted, earnings accounted for 86 percent of total compensation in 2001; a 0.2 percent annual decline in the earnings to compensation ratio would lead to earnings accounting for just 74 percent of compensation after 75 years.

Over much of the 20th century, the development of new treatments fueled steady growth in health care expenditures. Many observers believe that scientific advances will continue to push health care costs upward for the foreseeable future (see, for example, Aaron 2002).

On the other hand, recent experience suggests that there will be significant resistance to future increases in the health insurance costs borne by employers. The reasons for the growth of defined contribution pension plans are complex, but one important feature of such plans is the ability they give to employers to control the magnitude of their pension liabilities. Employers already have shifted a significant share of health insurance costs to their employees. Even more

dramatic shifts in this direction should perhaps be anticipated, with employers offering their workers a defined contribution to be applied towards health insurance coverage – or even a defined contribution to be applied towards the benefit package of an employee’s choice – rather than a health insurance plan that offers a defined set of benefits (U.S. Department of Labor 2001, p. 82). Another factor is that lower income tax rates could reduce the attractiveness of employer-provided benefits relative to wage and salary compensation.

Simply shifting health insurance costs from employers to employees need not raise the share of earnings that are subject to payroll taxes, which ultimately is what matters for the revenues flowing into the Social Security trust funds. A growing number of employers offer premium conversion or flexible benefit plans, under which employee-paid health insurance premiums are sheltered from both income and social insurance taxes (see U.S. Bureau of Labor Statistics 1999). But by making the tradeoff between health insurance benefits and cash compensation more explicit, shifting costs to employees may slow the growth in total health insurance expenditures.⁶ We also can expect continued efforts by insurers and policymakers to restrain costs through familiar measures such as co-pays and deductibles, requirements for second opinions, and potentially even restrictions in coverage to treatments deemed cost effective. Looking further into the future, continued upward pressure on medical care costs could lead to increased interest among medical researchers in the development of innovations that can reduce treatment costs without compromising the quality of care.

Even with nonwage compensation accounting for a growing share of total compensation, the Trustees’ assumption that total compensation will grow by 1.3 percent per year implies that average real wages would be 127 percent higher 75 years from now than they are today. Nonetheless, the Panel is uncomfortable with projecting that the share of earnings in total compensation will fall as much over this period as is currently assumed. The idea that this ratio will continue to decline over the indefinite future, and the resulting implication that the earnings share of compensation eventually will approach zero, is even more problematic.

On balance, these considerations, together with the relative stability of the earnings to compensation ratio over the last 20 years, lead the Panel to conclude that, for the intermediate projections, it would be more realistic to adopt as an intermediate assumption a 0.1 percent annual decline in the earnings to compensation ratio until the ratio falls to 0.75, after which it should be held constant. With a current ratio of about 85 percent, the rate would not fall to 75 percent for more than 130 years.

In the low-cost assumption, the current ratio should be held constant, while in the high-cost assumption, it should decline by 0.2 percent per year until falling to 75 percent, which would occur around 2070.

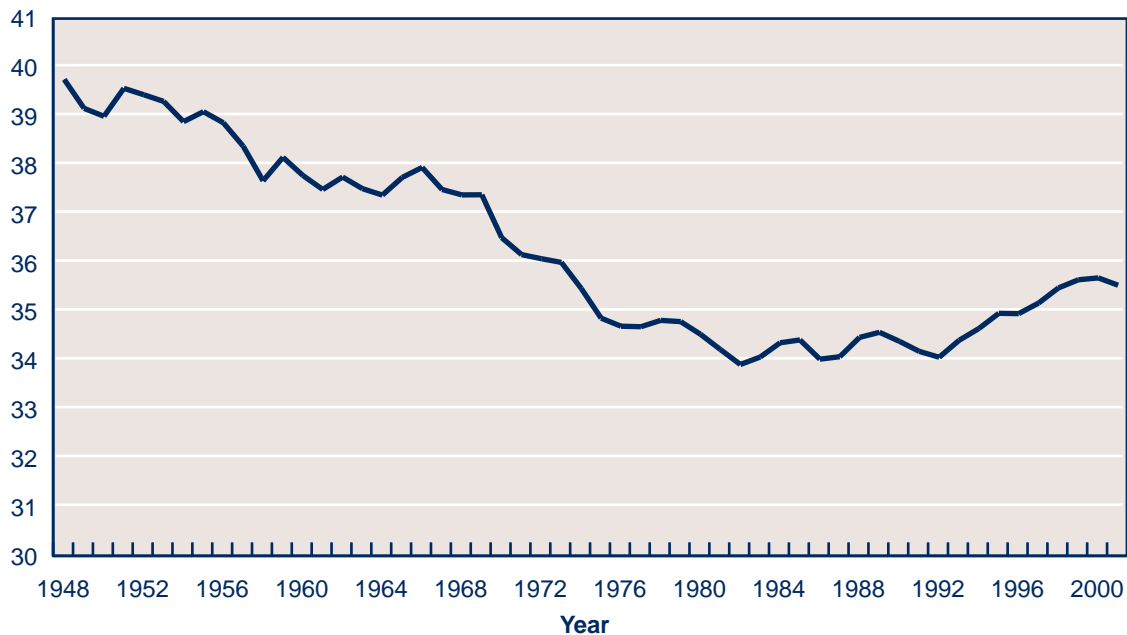
D. Average Hours of Work

Assumption Recommendation A-11. The Panel recommends that the assumption of no change in average hours of work per week be retained in the intermediate assumption. This assumption seems reasonable in light of recent data. The current high-cost assumption of an annual 0.1 percent decline and the low-cost assumption of a 0.1 percent increase should also be retained.

⁶ Recent evidence on individuals’ cost sensitivity with respect to health insurance purchases is reported in Goldman, Sood, and Leibowitz 2003, which shows that increases in the relative price of health insurance faced by participants in a large company’s flexible spending plan reduced the amount of insurance they purchased.

For much of the twentieth century, average weekly hours exhibited a declining trend. As shown in Figure 19, average weekly paid hours fell from 39.7 hours in 1948 to 34.0 hours in 1983, continuing a secular decline that had begun much earlier. Recent data suggest this process may have reached its limit. Since the mid-1980s, average weekly hours have not fallen and in fact have increased slightly, to 35.6 hours in 2000 and 35.5 hours in 2001.

Figure 19
Trend in Average Weekly Paid Hours



Source: Data from the Bureau of Labor Statistics. Average weekly hours equal total annual hours divided by 52 times average monthly employment. The total annual hours estimates were provided to OCACT by the Office of Productivity and Technology and are based primarily on the monthly employer payroll survey, with nonproduction and supervisory worker hours imputed in the same fashion as for the BLS productivity calculations and appropriate adjustments made to account for sectors not covered by the productivity statistics. Average employment is a CPS figure, with an adjustment to account for armed forces employment. The figures reported are benchmarked to the 1990 Census; benchmarking to the 2000 Census will raise employment and reduce average weekly hours for 2000 and later years. In 2001, for example, employment will be 1.4 percent higher and average weekly hours will fall from 35.5 hours to 35.0 hours.

Until 2002, the Trustees had assumed that average weekly paid hours would decline at 0.1 percent per year over the projection period. The current Trustees' assumption is that average weekly paid hours will remain constant.

The reasoning underlying the prior assumption of continuing decline in average weekly hours seems to have been that, as workers' real incomes rose, they would choose to consume increased leisure, leading to further reductions in the length of the work week. Beyond a certain point, however, the fixed costs of maintaining an employment relationship borne by both employers and employees argue against further declines in hours. This consideration, together with the fact that average hours have not declined for more than two decades, lead the Panel to believe that any future increases in leisure consumption associated with higher real incomes are more likely to take the form of longer retirement periods or even reductions in labor force participation at other points in the life cycle, and that average weekly hours during periods of

labor force attachment will not decline further from present levels. We thus agree with the Trustees' projection of constant hours per worker. The current high-cost assumption of an annual 0.1 percent decline and the low-cost assumption of a 0.1 percent increase should also be retained.

One fact that might lead some observers to question the Trustees' projection of stability in average weekly hours is the shortening of the work week that has been observed in some European countries. This is one among a number of areas in which it is the Panel's judgment that future U.S. trends can better be predicted based on our own past experience than on European developments.

The issue of how to think about hours of work is slightly complicated because while *weekly* hours worked is a common measure, the variable of interest for Social Security purposes is total *annual* earnings, and thus annual hours. If the ratio of average weekly employment (the average of the number of people working in each week) to average annual employment (number of people working at all during a year) is constant, weekly and annual hours will have the same trend. Over recent decades, however, there has been a decline in the prevalence of part-year work, as women have become more attached to the labor market. This shift presumably is picked up in the adjustment that the actuaries make when they project (annual) Social Security covered employment based on (weekly) CPS employment. More explicit attention to the factors that underlie the trend could perhaps improve the projections, though any effect is likely to be quite small.

E. GDP Deflator/CPI Growth Rate Differential

Assumption Recommendation A-12. The differential growth rate between the GDP deflator and the Consumer Price Index (CPI-W) should be maintained at -0.3 percentage point, which is roughly equal to its value during the last two years and, adjusted for methodological changes, also equal to its average value over the last ten years.

Of the 0.5 percentage point gap between projected productivity growth and real wage growth, the largest single component is the differential in growth between the GDP deflator and the CPI, projected in the 2003 Trustees Report to be -0.3 percentage point annually. This factor stems from the underlying definition of productivity as real GDP per hour in the entire economy. The GDP deflator is used to derive the productivity growth rate, which directly affects total growth in the economy and the taxable wage base. Yet continuing Social Security benefits are escalated by the CPI-W, the wage earners' version of the Consumer Price Index, one of three versions released monthly by the BLS. Any tendency for the GDP deflator to grow more slowly than the CPI-W affects the future actuarial balance of the system by pushing up benefits relative to the gains in system income made possible by productivity gains.

Six price indexes are relevant to a consideration of the future evolution of the differential growth in the GDP deflator and the CPI-W. The first two are the deflators for total GDP and for Personal Consumption Expenditures (PCE), both published quarterly by the Bureau of Economic Analysis (BEA). These differ only in coverage; the GDP deflator covers all of current production, whereas the PCE deflator covers only the two-thirds of GDP consisting of personal consumption expenditures, thus excluding equipment and structures investment, as well as government spending and net exports.

The other four indexes are different versions of the CPI. The CPI-U reflects the price experience derived from the spending patterns experienced by all households in the U.S. except those households residing in rural areas, in the armed forces, or in institutions. The CPI-W

applies to a subset of the CPI-U population: those households with a full-time employee, the majority of whose income is derived from wage-earner or clerical-worker occupations. The same methodology is employed in the CPI-U and CPI-W, and the samples of areas, retail outlets, and prices are identical. The only difference in their construction is the expenditure weights used to aggregate the prices. Social Security benefits are indexed to the CPI-W, the only CPI definition available when benefits were indexed by legislation, in 1972. The GDP and PCE deflators are often revised back into history to reflect new data and methodological improvements. But because they are used in many legal contracts, the CPI-U and the CPI-W are almost never revised.

While the CPI-U and CPI-W are never changed after publication, the BLS also publishes two alternative versions of the CPI-U that reflect methodological changes over time. The CPI-U-RS (“research series”) is available back to 1978 and incorporates numerous methodological improvements made to the CPI during the last 25 years. It has increased more slowly than the CPI-U over that period, because, taken together, the methodological improvements tended to reduce the rate of inflation in the CPI-U. The difference between the CPI-U and CPI-U-RS growth rates steadily narrowed toward zero between the early 1990s and late 1990s as the methodology improved.

The CPI-U-X1 is another version of the CPI-U. It is useful in assessing CPI inflation in years before 1978. It makes one major change to the CPI-U: it takes the treatment of homeownership costs used in the CPI-U starting in 1983 and restates the CPI-U with the post-1983 methodology back to 1967. Between 1978 and 1983, the CPI-U-RS is superior to the CPI-U-X1, since it incorporates both a consistent treatment of housing prices and reflects other methodological improvements (particularly changes in the method of weighting individual items within commodity groups) incorporated into the CPI-U in the late 1990s. Between 1967 and 1978, the CPI-U-X1 uses the current treatment of homeownership costs but does not incorporate the other methodological changes. Due to the difficulties in methodology, the CPI-U-RS has not been extended prior to 1978. (While adjustments are made to the PCE using the CPI-U-RS series, prior to 1978 there are no adjustments made to the PCE.)

We focus on the CPI-W, which is used to index Social Security benefits. It differs from the CPI-U only in its weighting structure; all the methodological changes incorporated into the CPI-U-RS and CPI-U-X1 are equally relevant for the CPI-W. We have calculated a hypothetical CPI-W-RS as equal to the official CPI-U-RS and (before 1978) to the CPI-U-X1, adjusted for the differential growth rates of the CPI-U and CPI-W.

Table 6 displays growth rates for all six of these price indexes – the GDP and PCE deflators, the CPI-U and CPI-W, the CPI-U-RS linked at 1978 to the CPI-U-X1, and our calculation of the CPI-W-RS. The annualized growth rate of all six indexes is displayed for five year intervals beginning in 1967, and the most recent five-year interval starting in 1997 is divided at 2000 to allow an examination of differences for the most recent two-year period.

It is often assumed that the GDP deflator and the CPI grow differentially mainly because computers and other high-tech business investment goods push down the prices of non-consumption goods and services relative to consumption goods and services. Yet there is no presumption that the GDP deflator should rise more slowly than the PCE deflator. The rapidly declining prices of computers are more important for investment spending than consumer spending, but other components of non-consumption spending normally exhibit faster price increases than consumption spending. Among these are government spending and investment in residential and nonresidential structures.

Even foreign trade can push up the GDP deflator relative to the PCE deflator. If foreign trade is balanced, with exports equal to imports, and if export prices rise at the same rate as import prices, then there is no effect of foreign trade. However, for a nation like the U.S., experiencing an appreciating dollar (as from 1995 to 2002) with the resulting decline in the relative prices of imports as compared to exports, and with a large trade deficit in which imports are much larger than exports, the negative sign on falling relative import prices will cause the GDP deflator to rise relative to the PCE deflator.

Table 6 displays all six price indexes. To highlight the differences in the growth rates of the various price indexes, Table 7 displays key growth rate comparisons, allowing positive and negative differences among the price indexes to be easily identified. In most periods the GDP deflator grows more slowly than the PCE deflator, but in the most recent period (2000-2002) and in the first two periods (1967-72 and 1972-77) the GDP deflator grows more rapidly than the PCE deflator. There is no “iron law” that the GDP deflator must grow more slowly than the PCE deflator.

Table 6
Major U. S. Price Indexes, Annualized Growth Rates, 1967-2002

	GDP Deflator	PCE Deflator	CPIU	CPIW	CPI/ RS-UX1	Implied CPIW/RS
2000-2002	1.73	1.68	2.19	2.03	2.17	2.01
1997-2000	1.58	1.74	2.35	2.31	2.25	2.21
1992-1997	2.09	2.13	2.69	2.63	2.34	2.28
1987-1992	3.38	3.87	4.22	4.11	3.74	3.63
1982-1987	3.15	3.47	3.26	2.99	3.28	3.01
1977-1982	7.73	7.92	9.30	9.29	8.13	8.12
1972-1977	6.95	6.93	7.43	7.38	7.06	7.01
1967-1972	4.65	4.10	4.49	4.51	4.00	4.02

In all periods shown (except for 1982-87) the rate of inflation in the PCE deflator is substantially slower than in the CPI-U. This is the major reason for the historical differential between the growth rate of the GDP deflator and the CPI-W. A small offsetting contribution is made by the fact that in all periods but the first, the growth rate of the CPI-W is modestly slower than the CPI-U.

The fourth column in Table 7 displays the differential growth rates between the CPI-W (used for Social Security indexation) and the implied constant-methodology CPI-W-RS. This difference is negligible in the latest 2000-2002 period but is quite large in earlier periods, especially in 1977-1982, when the pre-1983 CPI methodology for the measurement of housing prices had its greatest impact in overstating inflation.

The critical differential is in the fifth column of Table 7, namely the differential between the GDP deflator and the CPI-W-RS that incorporates current measurement methodology. By coincidence, in the latest two-year period (2000-2002) this differential of -0.28 was almost exactly the same as the future differential assumed in the 2003 Trustees Report.

The most important issue in projecting this differential forward is that methodological improvements in the CPI have not eliminated the differential growth rate of the PCE deflator and the CPI-U. What causes this differential, and is there any reason to think that it will be larger or smaller in the future?

A conference presentation by David Johnson of the BLS (Johnson 2003) addresses this issue. It begins by outlining the differences between the PCE deflator and the CPI. A main difference is the scope of the expenditures covered in each index. The PCE deflator is broader in scope than the CPI, including more items for a larger population. Components that are only in the PCE include foundations and non-profit research, lotteries, and the important category of medical care expenses paid for by a third party (over and above the households' out-of-pocket expenses).

Table 7
Differences Between Price Indexes, Annualized Growth Rates, 1967-2002

	GDPD - PCED	PCED - CPIU	CPIU - CPIW	CPIW - CPIW/RS	GDPD - CPIW/RS
2000-2002	0.05	-0.51	0.16	0.02	-0.28
1997-2000	-0.16	-0.61	0.04	0.10	-0.63
1992-1997	-0.04	-0.56	0.06	0.35	-0.19
1987-1992	-0.49	-0.35	0.11	0.48	-0.25
1982-1987	-0.32	0.21	0.27	-0.02	0.14
1977-1982	-0.19	-1.38	0.01	1.17	-0.39
1972-1977	0.02	-0.50	0.05	0.37	-0.06
1967-1972	0.55	-0.39	-0.02	0.49	0.63

To compare the two indexes, the PCE must be adjusted for its broader scope. Using a restrictive definition of comparability would require eliminating medical care and educational expenses from the indexes. Alternatively, Johnson uses a less restrictive criterion, excluding only those PCE categories that have no counterpart in the CPI. This comparison excludes foundations and non-profit research, yet allows medical care to be comparable even though the PCE includes third-party payments. As a result, his comparison excludes only 10 percent of total PCE.

Another major difference is that the PCE deflator uses chain-type Fisher weights that are updated each quarter, whereas the CPI is a fixed-weight Laspeyres index.⁷ We would expect the weighting issue to have become less important in recent years, because the lag of the actual CPI data behind its Laspeyres weights has been reduced from about 13 years in 1996 (when the weights were based on an average of 1982-84 expenditures) to about three years now (since 2002 the CPI has been based on 1999-2000 expenditure weights).

Further differences are that the CPI weights are based on the Consumer Expenditure Survey, which is a household survey, whereas the PCE deflator weights are based on Personal Consumption Expenditures, which relies on a variety of Census sources. Finally, the PCE deflator uses different underlying price index information for some component series, including airline fares and the important component of hospital services.

Substantial research has now been undertaken to identify the role of these methodological differences in explaining the differing behavior of the PCE deflator and the CPI. Over the period of Johnson's study, 1997:Q4 to 2001:Q4, the growth rate of the PCE deflator minus the CPI was minus 0.60 percent per annum, similar to the rates displayed in the top two lines of the second table. How is this difference explained?

The chain-weight methodology of the PCE deflator is the source of much of the difference. When the PCE deflator is reweighted with fixed weights, its annual rate of change over the same

⁷ In February 2002, the BLS began publishing the C-CPI-U, a chained version of the CPI-U.

period is 0.43 points faster. Of the remaining 0.17 points, virtually nothing (-0.02) is contributed by the larger scope of the PCE universe. This is mainly due to the small amount of out-of-scope items.⁸ Instead, the remaining differential of 0.19 reflects two largely offsetting factors. Where the underlying price indexes in the PCE deflator and CPI differ, those chosen for the CPI tend to increase faster, and this accounts for a difference of 0.43. Partly offsetting this is the different set of weights that the CPI uses in several important categories (especially much lower weights for fast-rising health-care prices) that tend to reduce the inflation rate by 0.24 points. The 0.43 contributed by different price indexes minus the 0.24 point effect of different CPI sub-index weights accounts for the remaining differential of 0.19 points.

What should the Trustees do about the GDP deflator vs. CPI-W “wedge”? Historical perspective is provided by Table 8, which restates the differences from the second table over alternative historical horizons of 10, 20, 30, and 35 years.

Table 8
Differences Between Price Indexes Over Alternative Horizons, 1967-2002

	GDPD - PCED	PCED - CPIU	CPIU - CPIW	CPIW - CPIW/RS	GDPD - CPIW/RS
1992-2002	-0.06	-0.57	0.07	0.21	-0.34
1982-2002	-0.23	-0.32	0.13	0.22	-0.20
1972-2002	-0.12	-0.61	0.08	0.40	-0.25
1967-2002	-0.04	-0.48	0.08	0.31	-0.14

The fifth column is the most important. It displays the differential growth rate of the GDP deflator and constant-methodology CPI-W-RS. Over the past ten years, this differential of -0.34 points has been very close to the Trustees’ assumption of -0.3, and over longer horizons the differential has been smaller. The most important source of the differential is the differential growth of the PCE deflator and the CPI-U, which in turn is mainly due to the difference between the fixed weights used in the CPI and the chain weights used for the PCE deflator.

Looking out into the future, we expect the two government agencies to maintain their different methodologies, and in particular we expect CPI-W to continue to be calculated with fixed weights. The differential between the GDP deflator and the constant-methodology CPI-W-RS over the past 10 years (-0.34 percent) is likely to provide the best guideline for the future differential, and so we recommend that the Trustees maintain their assumption of a -0.3 point differential.

F. Summary of Real Wage Growth

Assumption Recommendation A-13. Together, Assumptions A-8 through A-12 result in a rate of real wage growth in the intermediate assumptions of 1.3 percent per year, slightly higher than the 1.1 percent assumed in the 2003 Trustees Report.

⁸ Johnson also reports that BLS and BEA are jointly working on revising this comparison to construct a more comparable PCE index that would exclude third-party medical care expenditures and education expenditures. It is expected that this revised comparison will increase the importance of the scope differences and change the relationship between the price and weight effects.

In summary,

Real wage growth	~	Labor productivity growth	+	Growth in labor compensation/GDP ratio	+	Growth in earnings/labor compensation ratio	+	Growth in total hours/employment ratio	+	Growth in GDP deflator/CPI ratio
1.3 pct/yr		1.7 pct/yr		no change		-0.1 pct/yr		no change		-0.3 pct/yr

The recommendations also result in recommended low-cost wage growth of 1.8 percent and high-cost wage growth of 0.8 percent, in both cases 0.2 percentage point higher than the 2003 Trustees assumptions.

G. CPI Growth Rate

Assumption Recommendation A-14 . The Panel recommends that the assumed rate of increase in the Consumer Price Index be reduced by 0.5 percentage point in the intermediate assumption, to 2.5 percent per year. The assumption of the future inflation rate in the GDP deflator should be reduced from the current 2.7 percent assumption to 2.2 percent.

Social Security is generally indexed to inflation, so the effect of unexpected changes in future inflation on system finances is also muted. However, due to timing effects, in that faster inflation will increase the growth in the taxable wage base prior to its effect on benefits, some sensitivity remains. An increase in the CPI of a percentage point (from 3.0 to 4.0 percent) results in a 0.22 percentage point improvement in the 75-year actuarial balance (in the 2003 Trustees Report from the 1.92 percent deficit to 1.70 percent).

Our consideration of the future behavior of inflation and unemployment profits from an enormous literature on the U. S. inflation process. For 25 years a consensus model has performed well in explaining the historical behavior of U. S. inflation – why inflation accelerated in the late 1960s and late 1980s, why inflation was so high in the 1970s and so low in the late 1990s, why inflation and unemployment moved in opposite directions in the late 1960s and late 1980s but in the same direction in the 1970s and late 1990s.

The consensus or mainstream model of the inflation process can be written as:

$$\text{Inflation today} = \text{Inherited Inflation} + \text{Demand Effect} + \text{Supply Effect}$$

Because this model of inflation has three driving forces—inertia, demand, and supply, it has frequently been called the “triangle” model. (See Gordon 1998.)

The role of “inherited inflation” is fundamental. If there are no pressures pushing up or down on current inflation from demand or supply factors, then inflation will continue at the rate inherited from the past. There are many specialized theories of why this occurs, but the mainstream model incorporates all of them. If past inflation has been running over the last few years at 2 percent, producers of final goods will contract with their suppliers to assume future inflation of 2 percent. Wage contracts will assume a 2 percent rate of inflation. People will make decisions (“inflation expectations”) based on the assumption that inflation will continue to run at a rate of roughly 2 percent.

However, inflation can be jarred away from this inherited 2 percent rate by shocks to the demand or supply sides of the economy. The classic demand-induced inflation in the United

States occurred during 1965-1970, when a combination of Vietnam-War government spending, sharp cuts in income tax rates, and a generally ebullient atmosphere for spending on consumer durables and business investment pushed the unemployment rate down from 5.5 percent in 1963 to roughly 3.5 percent during 1966-1969.

The mainstream model uses the above equation to quantify the “demand effect.” This can be represented as the “gap” between the actual unemployment rate and a hypothetical “natural unemployment rate” that is consistent with steady inflation.⁹ For instance, from the perspective of 40 years of data (1962-2002), we can estimate that in the late 1960s an unemployment rate of 5.5 percent would have been necessary to avoid an acceleration of inflation. The actual observed 1966-1969 unemployment rate of 3.5 percent implied an acceleration of inflation of roughly 1 percentage point per year; inflation accelerated from 1 percent in the early 1960s to 5 percent in 1970. The rule of thumb is that inflation accelerates by 0.5 percent for each percentage point gap between actual and natural unemployment. This rule of thumb was first noticed in the 1960s and is validated forty years later in the latest academic estimates of the inflation process. Likewise, a positive gap—with unemployment above the natural rate—will cause inflation to decelerate. This is validated by the disinflationary periods of 1981-1986, 1990-1993, and 2000-2003.

So far, the influence of inherited inflation implies a negative correlation between inflation and unemployment. Inflation remains at the rate of inherited inflation if the demand effect is zero, that is, if the unemployment gap is zero. When unemployment is low and the gap is negative, inflation accelerates, as in 1966-1969 and 1987-1989. When unemployment is high and the gap is positive, inflation decelerates, as in 1981-1986, 1990-1993, and 2000-2003.

But inflation and unemployment have not always been negatively correlated. The U.S. experienced “twin peaks” of high unemployment and inflation in 1974-1976 and 1979-1981, and a “valley” of low unemployment and inflation in 1997-1999. Theories developed at the time of the first 1974-1975 oil shock, and subsequent empirical work, have validated the role of supply shocks (the “supply effect” in the above equation) as an additional factor that can cause inflation to accelerate or decelerate, sometimes quite rapidly.

These theories reflect two realistic aspects of any economy, which can usefully be imagined as divided into energy and non-energy sectors. The first aspect is that price and wage behavior in the non-energy sector is very “sticky,” or slow to adjust, which makes inflation adhere to inherited inflation when there are no demand or supply effects. Second, sudden quantum jumps to prices have occurred for crucial products, e.g., farm products and oil, for which the demand is highly price inelastic.

The combined effect of these two aspects is that when oil prices jump by a factor of four, as in 1974-1975, the economy cannot cut back its spending on oil to any significant degree. It is stuck with its gas-guzzling automobiles, its aging fleet of jet planes, and its poorly-insulated houses and apartments. Expenditures on oil may not jump by a factor of four, but possibly by a factor of three. This decreases the income available to purchase non-energy goods and services, and real spending in the non-energy sector declines. In 1974-1975 and 1979-1981 it declined by a lot. “Inflation creates Recession,” in the words of a 1975 New York Times article – and this mantra has been subsequently ratified by theory, econometric estimation, and is now incorporated in all macroeconomic textbooks.

⁹ The “natural unemployment rate” in the contemporary literature is more often labeled as the “NAIRU,” the Non-Accelerating Inflation Rate of Unemployment.

The mainstream model of inflation and unemployment behavior greatly simplifies the Trustees' task of projecting the future inflation rate. Over long periods of time, the supply shocks are likely to average out to zero. Over long periods of time, the demand unemployment gap is likely to average out to zero. This means that future inflation will equal inherited inflation.

We can simulate the mainstream model, based on estimated parameters for the period 1962-2002, assuming in the future no supply shocks and an economic recovery that causes the actual unemployment rate to decline from its current value to the natural rate of unemployment (perhaps 5.5 percent) by early 2005.¹⁰ This yields a future inflation rate in the GDP deflator of 1.7 percent. Since, in another section of our report, we project a differential between the GDP deflator and the CPI-W of -0.3 percent, this implies future growth in the CPI-W of 2.0 percent.

The Panel has extensively discussed the reasons why inflation was so high from 1965 to 1995, and whether this history has any relevance for future projections of the inflation rate. Our interpretation is that there was a major change in the behavior of monetary policy that can be dated to the 1979 arrival of Paul Volcker as Chairman of the Federal Reserve. Until then, the Fed pursued a policy of targeting nominal interest rates, and this led to the monetary accommodation of excess demand in the Vietnam War period of the 1960s that allowed inflation to accelerate. Then the Fed accommodated the supply shocks of the 1970s, particularly the sharp jump in oil prices and the effect of the depreciation of the dollar that occurred after the breakdown of the Bretton Woods system of fixed exchange rates. As a result, inflation in the GDP deflator approached 10 percent in 1979-1980.

The history of inflation since 1979-1980 reflects the new approach to monetary policy, which broke the back of inflation in 1981 by allowing short-term interest rates to reach 15 to 20 percent, in turn leading to a deep recession and a long period of economic slack (a negative "demand effect"). This downward pressure on inflation was augmented by a decline in the price of oil from roughly \$35 per barrel in 1981 to about \$15 per barrel in 1986.

Why did inflation decelerate further in the 1990s from the average level of 3.5-4.0 percent reached in the late 1980s? The 1990-1991 recession, and a prolonged period of high unemployment lasting until 1993-1994, brought inflation down to 2 percent. The economic boom of the late 1990s, when the unemployment rate reached 3.9 percent, would ordinarily have caused an acceleration of inflation. However, the effect of "beneficial" supply shocks in the 1995-2000 held down inflation by more enough than to offset the upward pressure on inflation caused by low unemployment. These supply shocks included a continuous decline in import prices fostered by an appreciating dollar and the emergence of China as a major source of inexpensive manufactured goods, low oil prices through early 1999, a temporary cessation of excess medical care inflation, and an accelerated rate of decline in computer prices.

In our interpretation, monetary policy responded to this fortunate confluence of beneficial supply shocks by allowing unemployment to decline to the lowest level in three decades. By adopting a policy of stabilizing the inflation rate, the Fed allowed the supply shocks to reduce unemployment.

We see no reason to think that monetary policy will "unlearn" the lessons learned from the 1965-1985 period. On average, supply shocks are likely to average out to zero in the future, and any temporary period of adverse supply shocks is likely to elicit a tightening of monetary policy and an increase in unemployment rather than any significant acceleration of inflation, just as the beneficial supply shocks of the 1990s indirectly created a decline in unemployment.

¹⁰ The simulations are based on the estimated equations in Eller and Gordon (2003).

In contrast, the Trustees assume a future inflation rate in the GDP deflator of 2.7 percent. Some of the critical actuarial variables may be best modeled as an average over the past 20 or 30 years, but the inflation rate is decidedly not among that set of variables. Inflation earlier than six years ago is simply irrelevant for any projection of future inflation, including the 5 percent inflation rate registered in 1970 or the 10 percent registered in 1980. Unless a specific reason is suggested to support a positive demand or supply effect on average over the next 75 years, then the best projection of inflation for the future is not 2.7 percent, but rather that implied by the inflation inherited from a weighted average of the actual experience of the past six years, and this turns out to be roughly 1.7 percent.

We recognize, however, that there is some risk that future monetary policy-makers will not show the same anti-inflation zeal as recent policy-makers and could respond to negative supply shocks with an accommodative monetary policy. This suggests a somewhat higher expected rate of long-run inflation than the U.S. has recently experienced. Thus, the Panel recommends an intermediate projection of 2.5 percent per year. We also note that improved monetary policy should reduce the volatility of inflation, so we recommend a tightening of the inflation bands to 2.0 percent in the low-cost and 3.0 percent in the high-cost assumptions. (Note that lower inflation results in a larger actuarial deficit, due to the time lag between the effects of CPI changes on taxable payroll and on benefit payments. Lower inflation has an immediate effect on nominal wages, and thus on revenues, while the reduction in benefits due to a smaller cost of living adjustment is experienced only after about a year. Thus, the lower taxable payrolls have a stronger effect than the lower benefits, thereby resulting in higher cost rates.)

H. Interest Rate

Assumption Recommendation A-15. The Panel recommends that the assumption on the real interest rate be retained at the current 3.0 percent.

The real interest rate is one of the most important variables in the Trustees Report, both because it determines the amount the system earns on its invested assets and because it is used in the calculation of the present value of unfunded liabilities. A higher real interest rate results in higher earnings on Social Security assets prior to Trust Fund exhaustion, and lower present value of any given yearly stream of deficits.

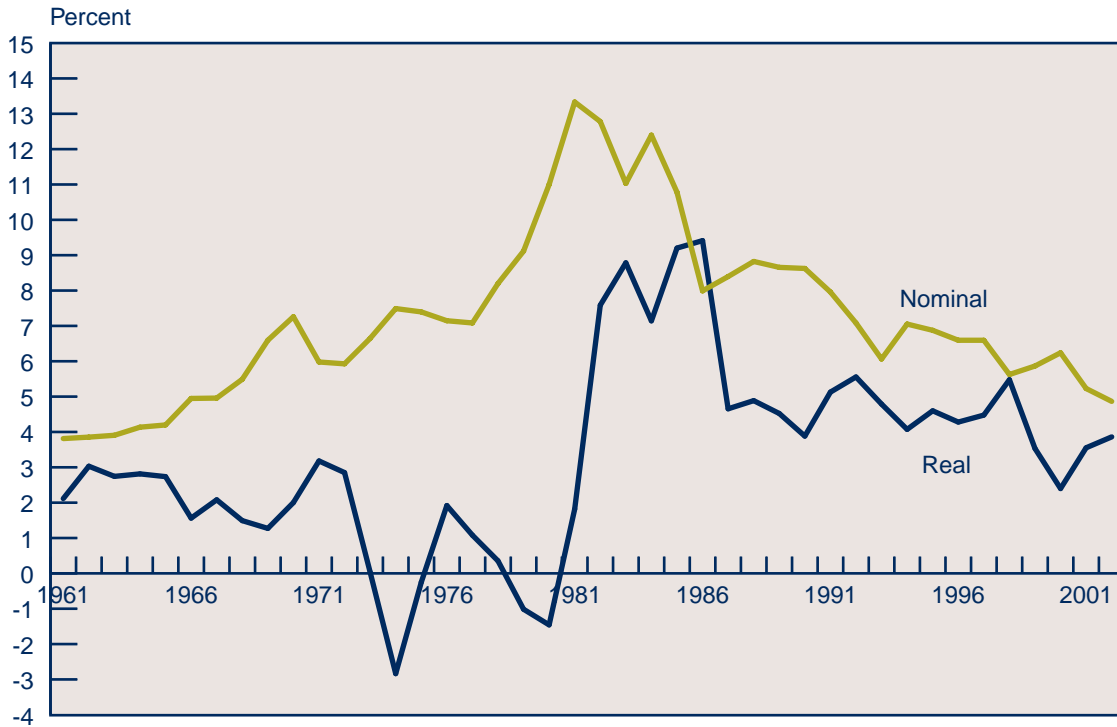
The 2003 Trustees report assumes an ultimate real interest rate of 3.0 percent, with a low-cost estimate of 3.7 percent and a high-cost estimate of 2.2 percent.

The real interest rate is defined as the “nominal” (i.e., actual) interest rate minus the rate of inflation. In turn, the nominal interest rate relevant for the Social Security system is equal to the average market yield on all Treasury securities that are not callable and do not mature over the next four years. As of August, 2002, the average maturity of these securities was about 14 years. The relevant rate of inflation is the CPI-W-RS, discussed above in the discussion of the “wedge” between the GDP deflator and the CPI. This CPI concept applies to wage earners and is adjusted for changes in measurement methodology over the period 1978-2000.¹¹

Figure 20 shows the real interest rate over the period since 1961. There appear to have been two quite different “regimes” over this 41-year period. Over 1961-1981, the average real interest rate is 1.67 percent. In contrast, over 1982-2002, it was 3.79 percent.

¹¹ The suffix “RS” refers to “Research Series.” Continuing Social Security benefits are indexed to the CPI-W, without adjustment for measurement methodology.

Figure 20
The Nominal and Real Interest Rate, 1961-2002



Source: Office of the Chief Actuary, Social Security Administration.

Macroeconomic theory provides two sets of relationships that help us to understand the historical behavior of the real interest rate. First, the rate tends to be low when inflation is accelerating and high when inflation is decelerating. Market participants set the nominal interest rate as the expected real interest rate plus the expected rate of inflation:

$$\text{Nominal interest rate} = \text{expected real interest rate} + \text{expected rate of inflation}$$

However, the realized real interest rate plotted in the chart is calculated as

$$\text{Actual real interest rate} = \text{nominal interest rate} - \text{actual rate of inflation}$$

Substituting the first equation into the second yields the relationship:

$$\text{Actual real interest rate} = \text{expected real interest rate} - \text{inflation surprise}$$

Here the “inflation surprise” is the actual inflation rate minus the expected inflation rate. Below we discuss how to measure the “inflation surprise.”

The second set of macroeconomic determinants applies to the “expected real interest rate.” Macroeconomic theory views the real interest rate as the fundamental “price” that moves up and down to equate flows of saving and investment in the economy, including not just private saving and investment, but also the government budget surplus or deficit and the current account surplus or deficit.¹² For the purposes of long-run forecasts, we examine the behavior of the real interest rate at a constant unemployment rate (projected by the 2003 Trustees Report to be 5.5 percent).

¹² The government surplus includes all branches of government – Federal, State, and Local. The current account is equal to exports minus imports of goods and services, plus net international investment income, plus net international transfer payments.

The expected real interest rate moves up and down in order to maintain the following definitional equality:

Private gross domestic investment = private domestic saving + government surplus + current account surplus¹³

At a constant unemployment rate, the real interest rate increases with an increase in the demand for borrowing (the total of the demand for funds coming from private investment, the government budget deficit, and the current account deficit), and falls with a decline in demand. Symmetrically, the real interest rate declines with an increase in the supply of saving, and grows with a decline in the supply of saving.

The expected real interest rate is also influenced by monetary policy. The Federal Reserve conducts its monetary policy by setting a short-term interest rate (the Federal Funds rate). The long-term interest rate relevant for the Social Security system represents market expectations of future interest rates, and this long-term interest rate responds quite promptly to changing expectations of the future expected Federal Funds rate. For instance, long-term interest rates declined in the period 2001-2003 in response to Federal Reserve actions that lowered the Federal Funds rate from 6.5 percent in December 2000 to 1.0 percent in June 2003.

Looking back at Figure 20, we now have two explanations for the change in the real interest rate “regime” that occurred so sharply in the period 1981-1982. First, those years marked the transition between accelerating inflation over the interval 1963-1981 and decelerating inflation that began in 1982, thus marking the transition between successive years of positive inflation “surprise” to successive years of negative inflation “surprise.”

Second, beginning in 1981-82 there was a change in Federal fiscal policy that appears in retrospect to have been permanent. Prior to 1982, the Federal government either ran surpluses or relatively small deficits that still resulted in a declining debt-to-GDP ratio. After 1982, the Federal government shifted to an entirely different regime of sustained deficits, in both expansion and recession years. Since 1982 the Federal government has run a surplus only for a brief period in 1998-2000. Current forecasts by the Congressional Budget Office predict an ongoing Federal government deficit out to the horizon of their forecasts.¹⁴

In assessing the likely future behavior of the real interest rate, the Panel is faced with the same problem as with other assumptions. What span of history is relevant? What hypotheses would help to sort historical data into intervals that are more or less relevant to a 75-year forecast?

First, the Panel rejects any notion that the 75-year future average real interest rate will be equal to the average over the past 75 years since 1928.¹⁵ Just as we have ignored the Great Depression in making our projections of the long-term unemployment rate, baby-boom fertility rates in making our projections of fertility, and a world in which women stayed at home in making our projections of future labor force participation rates, likewise we ignore the period before 1960 in making projections of the real interest rate. From 1930 to 1941, the real interest rate was extremely low, driven by the low demand for investment during the Great Depression. From 1941

¹³The government surplus includes all branches of government—Federal, State, and Local. The current account is equal to exports minus imports of goods and services, plus net international investment income, plus net international transfer payments.

¹⁴ Each comment in the text about the Federal government surplus or deficit also applies to the combined surplus or deficit of the Federal, State, and Local governments. State and Local governments tend to run a relatively steady surplus that partly but incompletely offsets the Federal government deficit.

¹⁵ The real return on long-term government bonds between 1926 and 1998 was 2.2 percent. (See Diamond 2000.)

to 1951, the nominal long-term interest rate was “pegged” at 2.5 percent by a formal “Accord” between the Treasury and the Federal Reserve in order to facilitate Federal government finance of its huge deficits incurred as the consequence of fighting World War II. Since the actual rate of inflation between 1941 and 1951 was 5.9 percent, the negative real interest rate during this period skews downward any long-term averages that go back into this period.

What weight should be given to the quite different averages of 1.67 percent over the period 1961-80 and 3.79 percent during 1981-2002? Looking only at the post-1981 period, the first few years 1981-86 were marked by a significant deceleration of the rate of inflation and presumably were accompanied by a significant negative inflation “surprise” that must have boosted the real interest rate. Likewise, the last two years 2001-2002 were influenced by an unusually aggressive countercyclical monetary policy stance by the Federal Reserve that is not relevant to forecasts of average business cycle conditions over the next 75 years. Thus the most relevant interval for discussing the future is arguably the period 1987-2000 over which the average real interest rate was 3.92 percent.

Should any weight be given to the period 1961-80? While inflation was rather stable in the early and mid 1960s, it was followed by a period of accelerating inflation, leading to a positive inflationary “surprise”. The Federal government budget was balanced over the business cycle during these two decades. Further, it was a period influenced by the extremely low interest rates of the 1940s and early 1950s mandated by the Fed-Treasury “Accord”.

In its predictions of future fertility rates, the Panel places primary emphasis on the past 20 years and ignores the baby-boom fertility rates of the period 1947-64. In its predictions of inflation, the Panel places primary emphasis on the past decade and ignores the accelerating inflation of the period 1963-80 induced by Vietnam-War deficits, excessively easy monetary policy, and the twin oil shocks of 1973-74 and 1980-81.

Likewise, the panel places primary emphasis in its predictions of future real interest rates on the “normal” period of 1987-2000 in which the Federal government ran a persistent deficit and expectational surprises about the inflation rate were minimal. For instance, the Livingston survey of CPI expectations over the period between early 1992 and mid-2003 reveals an average expected CPI inflation rate of 2.71 percent per year, compared to the actual outcome of 2.66 percent per year, an error of only 0.05 in comparing actual with expected inflation.¹⁶

Should the 3.92 percent average real interest rate of 1987-2000 be extrapolated 75 years into the future? The Panel thinks not, for the simple reason that the government deficits of the past 20 years are unsustainable. Current Federal government deficits in the range of \$400 billion are financed in large part by a current account deficit of \$500 billion or more, much of which consists of China’s willingness to accumulate dollar reserves in order to finance a Chinese trade surplus of over \$100 billion in 2003. Over a 75-year horizon, this combination of Federal fiscal deficits and current account deficits cannot continue, simply because implied levels of Federal debt to GDP and U. S. international indebtedness to GDP in 2080 are inconceivable.

In conclusion, the Panel finds the high interest rates experienced in 1987-2000 quite relevant. But the 3.92 percent rate realized in that period is higher than will occur over the next 75 years, primarily because the rate was boosted by Federal government deficits that cannot persist. Additionally, the low-rate years during the relatively stable 1960’s cannot be completely disregarded. On net, the Panel agrees with the Trustees’ assumption of a 3.0 percent real interest rate.

¹⁶ Data available at <http://www.phil.frb.org/econ/liv/index.html>

VI. Risk and Uncertainty

Method Recommendation M-8. The Panel believes that the Trustees Report should strive to improve the presentation of risk and uncertainty so that the public will recognize the possibility of outcomes other than the intermediate projections. Greater emphasis should also be placed on identifying those factors that are most likely to alter the future projections. The Trustees are to be commended for the inclusion of projections based on a stochastic model for the first time in the 2003 Report. The Panel recommends that the results from a stochastic approach be included in future reports. The Panel also believes that this model needs to be refined and evaluated in the future in accordance with best practice suggestions from the research community.

Method Recommendation M-9. The Trustees should place greater emphasis on communicating the importance of risk and uncertainty imbedded in the projections. The Panel also recommends that consideration be given to illustrating potential outcomes through the use of integrated scenarios based on internally consistent sets of assumptions.

The report currently presents uncertainty in three ways: sensitivity analysis, a stochastic model, and high- and low-cost scenarios. A fourth method of illustrating a range of possible outcomes that should be considered is “integrated scenarios,” which would apply the projection models using sets of assumptions that would have a positive or negative overall impact on the program but would also be consistent in the sense that the various assumptions could plausibly be expected to occur in combination. Presenting the results of several integrated scenarios that incorporate a more realistic set of assumptions might better communicate possible ranges of uncertainty to general audiences.

Method Recommendation M-10. Consideration should be given to the development of a separate chapter to unify the presentation on risk and uncertainty and to discuss the importance of risk and uncertainty in long-range projections.

Underlying the cost estimates for the Social Security system is a basic assumption that there is no major change or discontinuity in our society. Assumptions for the next 75 years, and even over an infinite horizon, are made using the best information we have about likely futures including measurement of uncertainty. Because the goal is to choose the likely future, the intermediate estimates, appropriately, do not include any major or fundamental changes.

The 75-year period is extremely unusual for forecasts of government programs. It is much more common for programs to be forecast for five or ten years, but for Social Security, a much longer period is needed because benefits are earned as people work and paid during retirement. Therefore the benefits to current workers will extend for 75 years or more, and it is not possible to determine financial balance without looking over a long period. This need creates challenges that are not present for other forecasts.

Analysis of Uncertainty

At this point there are three separate approaches used in the annual report:

- High, medium and low cost estimates
- Sensitivity analysis based on single assumptions
- An appendix on the stochastic analysis

Each of these three approaches provides insight into the uncertainty surrounding the projections, and thus has value, but at present each appears at a different point in the Trustees Report and is discussed separately from the others. It would be useful to clarify how the approaches relate to one another. Getting users to understand and pay attention to uncertainty is a significant challenge. Another promising approach to illustrating the uncertainty surrounding the projections is to develop and present integrated scenarios – in essence, plausible stories about possible alternative futures. If appropriately structured, these integrated scenarios could help readers to focus on the interrelationships among different areas of change and the consequences of potential future discontinuities in established trends.

Comments on the Stochastic Analysis

The 2003 Trustees Report provides a stochastic analysis for the first time. Such an analysis is based on running many simulations and looking at the distribution of results. The stochastic analysis indicates that the probability of reaching the high-cost estimate is less than 2.5 percent and the probability of reaching the low-cost estimate is less than 2.5 percent. (However, because these analyses are based on historical patterns, they do not take into account the possibility of discontinuities larger than those experienced in the past.)

The introduction of the stochastic analysis into the 2003 Trustees Report is to be commended, but we would discourage too much reliance on these projections. Stochastic forecasting of Social Security is a relatively new field, and the actuaries point out that this is a first generation model. The correct model specifications are not always clear. Modelers must decide which assumptions to vary and which specific assumptions and method of stochastic forecasting to use. While they help us to understand the range of variation, and they can also help us to understand the interrelationships between various inputs, the results of such forecasts should be interpreted with care. Stochastic forecasts can currently indicate the general range and distribution of uncertainty, but the models are not yet well enough developed to allow precise probabilistic judgments about the likelihood of specific outcomes.

Further Treatment of Uncertainty and Use of Scenarios

The Trustees are encouraged to explore other approaches to measuring uncertainty, including the use of scenarios. One difficulty with the current approaches is that they do not look at the interrelationships between different types of changes. A change in one variable can occur at the same time as changes in other variables. In some cases they compound so that the multiple changes are greater than the sum of the single changes, and in other cases they are offset. Using the sensitivity analysis alone tends to miss these effects. The high- and low-cost estimates are unrealistic since they assume changes that produce high or low cost in all variables at once. Integrated scenarios allow looking at different combinations. They are also useful for thinking about discontinuities and bigger changes.

Uncertainty is difficult to understand, and integrated scenarios bring a different view to the people seeking to understand the system’s future and how it might evolve.

There is a set of expertise and technology involved in the construction and application of scenarios (Wack 1985a, 1985b; Schwartz 1991; van der Heijden et al. 2002). Further exploration is needed to see how scenarios can best be constructed and applied to the understanding of variability in OASDI costs.

Focusing on the Sensitivity Analysis

The sensitivity analysis shows how changes in individual assumptions affect system finances. The results show us that some assumptions are much more important than others. For example, the 75-year actuarial balance is affected more by changes in the mortality or real interest rate assumptions than by changes in some other assumptions. The Trustees Report’s sensitivity analysis shows the effect on summarized income rates, cost rates, and actuarial balances for 25-year, 50-year, and 75-year periods. The relative sensitivity to different assumptions can vary, depending on the period considered. For example, over the first 25 years, the system is more sensitive to changes in the CPI than changes in fertility, while the reverse is true over 75 years.

Table 9 looks at the difference in cost based on varying eight key items. This very brief summary of some of the sensitivity analyses helps us focus on which assumptions affect system finances the most. The 75-year actuarial balance varies between -1.26 percent under the low cost mortality assumption and -2.69 percent under the high cost rate, a range of 1.43 percent.

While these estimates are useful for considering magnitudes, it is important to remember that they can change from year to year, and that they vary with the ranges of assumptions chosen. While the Trustees attempt to choose ranges for each assumption that capture a similar range of uncertainty, this range remains a judgment call.

Table 9 summarizes the sensitivity analysis from the 2003 Trustees Report. It shows the total spread in the 75-year actuarial balance: the difference between the high-cost and low-cost estimates for each assumption. (Sensitivity analysis is not done for unemployment because it does not significantly affect the balance.) The difference between the complete set of high-cost and low-cost assumptions is also shown.

Table 9
Range of 75-Year Actuarial Balance Under High-Cost and Low-Cost Assumptions

Mortality	1.43 %
Real interest rate	1.16 %
Real wage growth	1.02 %
Fertility	0.54 %
Disability incidence	0.48 %
Net immigration	0.46 %
CPI growth	0.44 %
Disability termination	0.06 %
All assumptions.	5.49 %

Sudden vs. Gradual Changes

We also note that there are different implications from gradual and from sudden changes. The more rapid the change, the less time there is to adapt. Fertility changes would probably be gradual, and in any case there are about 18 years before significant numbers of the children pay taxes, although of course some will collect benefits before that. On the other hand, a disability epidemic could occur quite suddenly and would have an immediate effect on program costs.

Informing Policy Makers about Uncertainty

The Trustees Report presents information on measures of uncertainty, and not on what might be done to reduce uncertainty. We endorse the recommendation of the 1999 Technical Panel, which stated, “It is our view that the Social Security Administration must develop different techniques for measuring uncertainty—not merely to refine predictions but to allow policy makers to consider reforms to Social Security that would lessen its sensitivity to adverse economic and demographic trends.”

In evaluating different reforms, policy makers need to be informed not only about the expected effects, but the effects on system sensitivity. There are no “risk free” systems. Within the framework of social insurance programs, pay-as-you-go and partially pay-as-you-go systems are subject to the risk of changes in the dependency ratio and other demographic shifts. On the other hand, funded systems are subject to investment risk. The sensitivity of any type of system to these various risks depends on specific program rules. Policy makers must understand all effects of proposed reforms, including changes to the structure of risk.

VII. Recommendations to the Social Security Advisory Board, the Commissioner of Social Security, and the Board of Trustees for Additional Research

Other Recommendation O-3. The Panel recommends that additional research be undertaken to provide a stronger basis for projecting immigration. Such research should examine current gross and net flows of immigration, the major determinants of these flows, and possible future trends in immigration including both immigration for permanent legal residence and other types of immigration.

The Panel has discussed immigration projections with members of the Office of the Chief Actuary, a representative of the Census Bureau, and a group of immigration demographers. Within this community, there is an even greater level of uncertainty and debate than is typically found in social research. While all projections are uncertain, two factors make immigration especially difficult.

First, historical data are unreliable and complicated to interpret. Most of the uncertainty comes from illegal immigrants, who can be counted only indirectly. The 2000 Census found more population growth from 1990 than expected. This could be due to undercounts in the 1990 Census, overcounts in the 2000 Census, or higher than expected illegal immigration. And while data on legal immigration is available, the complexity of the system, with a combination of permanent and temporary immigrants – some of whom may have originally entered the country illegally – makes measurement a challenge. Processing delays and waits vary from year to year, making comparison of year-to-year data on legal immigration somewhat risky.

Second, unlike assumptions like fertility, mortality, and productivity, future levels of immigration will be driven to a large extent by changes in law and other policy decisions. The Trustees are constrained by a requirement to value the plan based on current Social Security law. The Panel believes that because immigration law is separate from the Social Security Act, and because it is likely that immigration law will change over the next 75 years, assumptions should not be constrained in this manner. This does not require specific assumptions about new laws. Instead, the assumptions used in the projections should incorporate the likelihood of various changes in immigration law as well as the variation in immigrations levels that will exist under any given law.

The Office of the Chief Actuary consults with staff of the Census Bureau, and they should continue to draw upon the Census Bureau's expertise. The Census Bureau is expanding its immigration research capabilities, and OCACT should coordinate with the Census and encourage Census work that would respond to the specific research recommendations made here. The Panel also recommends that additional efforts be made to involve immigration researchers outside of government, particularly in estimating recent levels of immigration.

Projections also require assumptions about the secondary effects of immigration on the economy and Social Security finances. Currently, assumptions do not explicitly account for differences between immigrants and native-born in such characteristics as fertility, mortality, productivity, or employment. We believe that some of these interactions are likely to be important. The model does recognize that other-than-legal immigrants are less likely to be fully integrated into the Social Security system. The actuaries assume that half of other-than-legal immigrants both pay taxes and receive benefits, that a quarter pay taxes but do not receive benefits, and that the remaining quarter neither pay taxes nor receive benefits. Unfortunately, no data are available to either support or conflict with this assumption.

Therefore, the Panel recommends that the Trustees, the Social Security Advisory Board, or the Social Security Administration sponsor new research on these topics. Such research would primarily improve Social Security projections, but it might also add valuable knowledge about the lives of immigrants, especially their labor force participation.

***Other Recommendation O-4.* The Trustees should attempt to assess structural changes in the labor market and how these changes might influence future decisions to retire and decisions to claim retirement or disability benefits. Considerable research has been published on these issues. A careful review of the current debate on reasons for the ending of the trend toward early retirement among men would provide further guidance on how to incorporate such changes into the labor force models.**

As discussed above, the current Trustees Report made an adjustment to labor-force projections, citing increasing life expectancy. We do not find this reasoning convincing, given past experience. The effect of the increase in life expectancy has generally been dominated by the effect of rising real incomes, leading to earlier retirement. However, there are a number of other factors that influence work and retirement decisions, including the changing structure of the pension system, improving health at older ages, shifts in demand as the number of younger workers declines, the possibility of more flexible work schedules, the trend towards “bridge jobs” that can be held after retirement from a primary career, the increasing number of older wives in the labor force (which may discourage husbands from early retirement), and the reduction in the number of firms offering health insurance to retirees.

While many of these factors have been studied, it is difficult to estimate how they would affect aggregate retirement trends, hours worked, and labor force participation. Such a calculation needs to take into account how prevalent the practices are, how much they have changed from the past, and how they can be expected to develop over the next 75 years. Further, the magnitude of the effect of each of these changes on labor-force participation needs to be estimated. Finally, estimates need to account for the two major factors: life expectancy and real income levels.

Likewise, the declining employment of working-age people with disabilities over the 1990s, despite what appears to be a long-term trend of improved health of working-age Americans, suggests that environmental factors play a major role in their labor force behavior. Recent literature suggests that public policy may play an important role in both the decline in the employment rate of working age people with disabilities and their increased use of DI and SSI.

The Trustees and actuaries should draw on the research done both within government, by the Office of Policy and the Department of Labor, and that done by academics and other policy researchers, on the work and exit-from-work behavior discussed above. However, they should remain modest about their ability to project long-term changes based on recent labor-market changes. Absent more conclusive results, they should project steady participation rates by age and sex.

***Other Recommendation O-5.* The Panel endorses the approach begun in the 2003 Trustees Report of projecting the status of the trust funds into the infinite horizon in addition to the traditional short-range and 75-year projections. However, there is a need to examine more carefully the question of whether different methodologies and different approaches to developing ultimate assumptions, particularly those which are based on rates of change, may be appropriate for making projections that extend to**

infinity. The Panel recommends that research be undertaken with a view to better understanding how infinite horizon projections should be made.

The 2003 Trustees Report added projections of the system's financial status over the infinite horizon. While 75 years is a very long period for projections, infinite time horizon projections can show different results. The infinite horizon measures include not only the system's 75-year balance but its trajectory in later years. In addition, some reform proposals would take longer than 75 years to phase in, so analysis without infinite horizon measures may be misleading. Even the 75-year projections are unusual, and uncertain, and infinite time horizon projections are even more so, making further study important.

Traditionally, changes in assumptions have continued over the full 75 years. In some cases, it may be inappropriate to let changes continue over the infinite time horizon. The implementation of the infinite time horizon makes it very important to look at how long each assumption should be allowed to change, and whether it should stabilize at an ultimate level and in how long. For example, average life expectancy should not be longer than the longest lifetime yet observed. And as discussed above, wages should not be a tiny fraction of compensation.

OCACT should also examine whether infinite horizon projections can be modeled using simpler alternative methodologies. Just as their 10-year models include detail that is not necessary over 75 years, an even simpler model may be superior for the infinite horizon calculations. For example, a straightforward extension of the trends in cost and income rates projected over the first 75 years may provide a great deal of the necessary information. Another possibility would be to project population growth by age and project age-specific per capita average revenues and expenditures. These simpler models may not require as many explicit input assumptions.

VIII. Unfunded Obligations and Other Summary Measures

Method Recommendation M-6. The Panel believes that the 2003 Report made substantial improvements in the presentation of the financial status of the OASDI program compared to earlier reports. In particular, the Trustees are to be commended for including in the 2003 Report:

- a. the present value of the 75-year open group unfunded obligations,
- b. the present value of the closed group unfunded obligations, and
- c. the present value of the infinite time period open group unfunded obligations.

The Report also briefly mentions the infinite horizon actuarial deficit of 3.8 percent. This figure is more informative than the dollar value of the infinite horizon unfunded obligations, and should be presented more prominently.

Future reports should continue to report each of these measures of the unfunded obligations of OASDI and better integrate them into the overall discussion.

The 1999 Technical Panel recommended that the Trustees Report incorporate additional measures of sustainability as well as measures of unfunded obligations. Several additions have been made since the 1999 Report, and the Panel believes that these additional sources of information substantially improve the report and should be retained.

Beginning with the 2001 Report, Table II.D3 allows readers to better understand sustainability by showing the necessary tax increase or benefit cut required at the time of exhaustion of the combined funds and at the end of the 75-year projection period.

The 2003 Report presented several measures of unfunded liabilities that were not present in previous reports.¹⁷ The “75-year open group unfunded balance” is the difference between the present value of costs and tax income over the 75-year projection period. Currently estimated at \$3.5 trillion, it is simply the dollar equivalent of the widely noted 1.92 percent actuarial deficit, adjusted for the difference between the current trust fund balance and the present value of the ending target trust fund (the target is to have a balance equal to one year’s outlays). Without the adjustment, the value is \$3.8 trillion, which is equal to 1.92 percent of \$200 trillion, the present value of taxable payroll over the next 75 years.

Also included in the 2003 Report is the infinite-horizon open group unfunded obligation, a fundamentally new measure. This includes not only the 75-year deficit, but also the estimated present value deficit of \$7.0 trillion for projection years 76 and later, for a total of \$10.5 trillion. The Report also calculates that this \$10.5 trillion is 3.8 percent of the present value of the infinite horizon taxable payroll. The policy implication is that an immediate and permanent tax increase of 3.8 percent of taxable payroll or an equivalent reduction in benefit levels would result in an infinitely sustainable system. While such a policy change is highly unlikely, it is a useful measure for policymakers.

While the present value information is useful, the idea of a present value summed over the infinite horizon is difficult to understand. The \$10.5 trillion is a large figure, but it needs to be seen in the context of the present value of taxable payroll over the infinite horizon, which is on the order

¹⁷ For a detailed discussion of various solvency measures, see Goss (1999).

of \$275 trillion. Just as the discussion of the 75-year projections focus on the actuarial deficit as a percent of taxable payroll, with supplementary information on the present value measure, the discussion of the infinite horizon projections should emphasize the measure as a percent of taxable payroll.

The third measure is the closed-group unfunded obligations – the present value, for current participants only, of future cost less future taxes. This is, coincidentally, also equal to \$10.5 trillion, implying that the present value of benefits paid to future program participants will equal the present value of taxes they pay. In other words, they would receive an actuarially fair rate of return assuming the continuation of current-law tax and benefit levels (which, however, are not in balance). Some analysts object to the closed-group measure. They note that Social Security is designed to be a Pay-As-You-Go system, while the closed-group measure is better suited to private firms, which need to have a funded system. It is true that the measure is not directly related to OASDI as it was designed or is currently run. But given the wide-ranging debate over the future path of the system, additional measures, even a theoretical one that excludes future participants, can only serve to better inform analysts and policymakers.

IX. Benefit Audit

Other Recommendation O-6. The Panel recommends that Congress enact a statutory requirement that the Social Security Commissioner publish an annual Benefit Audit that provides a comprehensive assessment of taxes paid and benefits received by different types of households and different groups of people. The annual Trustees Report is primarily a report on the financial status of OASDI; it does not examine the distribution of lifetime taxes and benefits across different types of households and different groups of people, nor does it provide an assessment of the net value of Social Security coverage and how this varies by household and personal characteristics.

The annual Trustees Report provides information to Congress and the public about the financial status of the program, but does not discuss how taxes paid and benefits received vary across different types of Social Security participant groups. Nor does it detail how the composition of retirement income varies by income group, with poorer groups generally more dependent on Social Security. Some of this information is published in the Office of Policy's *Annual Statistical Supplement to the Social Security Bulletin* and *Income of the Population 55 and Older*, in other SSA reports, and in papers by academic researchers, but these data are not easily accessible to Congress and the public. An additional major report should be produced annually to provide information on the taxes paid and benefits received by typical participants in various socioeconomic and demographic groups. These examples should illustrate clearly features in the benefit design.

Examples of different types of households that should be examined include (1) high, medium, and low earners; (2) singles compared to one-earner and two-earner households; (3) men and women; (4) different birth cohorts; and (5) retirees, disabled, divorced individuals, and survivors. These assessments should indicate the effect of a lifetime of participation in the system as well as indicating the distribution of taxes paid and benefits received during a single year.

An excellent example of this type of analysis can be found in Steuerle and Bakija (1994). Similar analysis has been done by Sandell and Iams (1996). Burkhauser et al. (forthcoming) demonstrate the value of this type of analysis in determining who gets what from Social Security reforms. This type of systematic comparisons of lifetime contributions and expected benefits will alert Congress to the importance of evaluating how alternative proposals will affect different types of Social Security participants as well as how they will balance future revenues and expenditures.

Goals and Outcomes for Project

Such a report would:

- Improve the public debate by increasing the focus on how alternative reforms would affect the distribution of net Social Security benefits as well as how they would bring future liabilities into line with future revenues.
- Provide a regular, visible, prominent source of information so that the media, policymakers, and the public develop a deeper understanding of the relationship between taxes paid and benefits received by various types of Social Security participants.
- Increase understanding of how families in different situations are treated by Social Security.

- Show the importance of Social Security benefits relative to other sources of income for various income and demographic groups.
- Develop a base set of examples that can be used to ensure consistent comparisons of the effects of proposed reforms.

The report would enable readers to disentangle the insurance and redistributive consequences of the Social Security program and insure that they are consistent with Social Security policy goals. In doing so, the Benefit Audit would answer or, in the case of considering proposals, facilitate answering questions like:

- Do lower income households gain the most from Social Security?
- How would any specific change in the tax or benefit formula affect the value of being covered by Social Security to different types of households?
- How do family structure and the way that labor income is earned within a family affect benefits?
- How important is a minimum benefit in redistributing income?
- Are there cost-neutral ways to redistribute benefits over the lifetime of a family to reduce the likelihood of a survivor falling into poverty (e.g., shifting from a joint and two-thirds to a joint and three-quarters benefit formula, etc)?
- How would major reforms, such as the addition of personal accounts, affect the redistributive features of the overall system?

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Acronyms

ART	Assisted Reproductive Technology
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CPI	Consumer Price Index
DI	Disability Insurance
GDP	Gross Domestic Product
IT	Information Technology
IRCA	Immigration Reform and Control Act
LFPR	Labor-Force Participation Rate
LPR	Legal Permanent Residence
NMR	Net Migration Rate
OASI	Old-Age and Survivors Insurance
OECD	Organisation for Economic Co-operation and Development
OASDI	Old-Age, Survivors, and Disability Insurance
OCACT	Office of the Chief Actuary
PCE	Personal Consumption Expenditures
SSI	Supplemental Security Income
SSA	Social Security Administration
TFR	Total Fertility Rate

