# CBO PAPERS

BUDGETARY AND MILITARY EFFECTS
OF A TREATY LIMITING CONVENTIONAL
FORCES IN EUROPE

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## NOTES

Unless otherwise indicated, all years referred to in this report are fiscal years.

Unless otherwise indicated, all dollar amounts reflect budget authority in constant fiscal year 1990 dollars.

Details in the text, tables, and figures of this report may not add to totals because of rounding.

# PREFACE

The United States and its allies in the North Atlantic Treaty Organization (NATO) are currently negotiating a treaty with the Warsaw Pact that would limit the number of conventional forces in Europe (CFE). This CFE treaty could result in disproportionately large reductions in the Pact's military weapons and personnel. Coupled with the dramatic political changes that have occurred in Eastern Europe, this proposed treaty has raised the possibility of a large reduction in the U.S. defense budget.

At the request of the Senate Committee on the Budget, the Congressional Budget Office (CBO) analyzed the effects of NATO's proposed CFE treaty on the U.S. military. CBO's analysis deals only with the Army and tactical Air Force--the forces that would be directly limited by the CFE treaty--and examines both budgetary and military effects. This paper updates and provides details of findings summarized in a study published in January 1990. In keeping with CBO's mandate to provide objective analysis, the paper makes no recommendations.

The paper was prepared by Frances M. Lussier of CBO's National Security Division under the general supervision of Robert F. Hale and John D. Mayer. William P. Meyers of CBO's Defense Cost Unit provided cost analyses. The author wishes to thank Michael Berger, Lane Pierrot, and Bruce Arnold of CBO, and Jonathan Ladinsky and Elizabeth Chambers, formerly of CBO, for their assistance. The author also wishes to thank several members of the RAND Corporation, particularly Richard Kugler, Paul Davis, and Adele Palmer, for their comments. (The assistance of external participants implies no responsibility for the final product, which rests solely with CBO). Sherry Snyder edited the report. Darlene Miller-Young and Kathryn Quattrone prepared the report for publication.

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## SUMMARY

The treaty that has been the subject of intense negotiations between members of the North Atlantic Treaty Organization (NATO) and those of the Warsaw Pact would limit conventional military forces in Europe (CFE). NATO's proposed CFE treaty would establish parity between NATO and the Warsaw Pact in the number of major weapons held by each alliance, a step that would require disproportionately large reductions in Pact weapons. For example, the Pact would have to destroy about 40,000 tanks compared with about 3,000 for NATO. The Soviet Union would have to withdraw from Europe 405,000 troops compared with 80,000 for the United States.

These large reductions in Warsaw Pact military forces should significantly lessen the threat posed to NATO by the Pact. This prospect, in turn, has raised the possibility of substantial reductions in U.S. military forces and in the military budget. The likelihood of such a "peace dividend" has been further enhanced by recent events in Eastern Europe--notably, the opening of the Berlin Wall, less cohesion within the Warsaw Pact, and the move toward democratic governments in several Eastern European countries. An examination of the military consequences of a CFE treaty can lead to a better understanding of the potential budgetary savings that could also result.

## THE BALANCE OF MILITARY FORCES IN EUROPE TODAY

The relative capability of Pact and NATO forces cannot be established on the basis of numerical comparisons alone. The Pact's striking numerical advantage in weapons and combat units may be offset somewhat by the higher quality of NATO's weapons and the larger size of NATO's combat units. To evaluate Pact and NATO forces on a common basis, CBO used analytic methods that take into account both the quantity and quality of each side's weapons. Using these methods, CBO totaled the scores of all the ground and air forces that would fight for the Pact and compared them with the total of the scores for NATO's forces. Dividing the Pact's total score by NATO's total score yielded a ratio of Pact capability to NATO capability. These ratios do not take into account losses resulting from combat; rather, they represent only the capability of forces that would be available to each side during mobilization, before an attack begins.

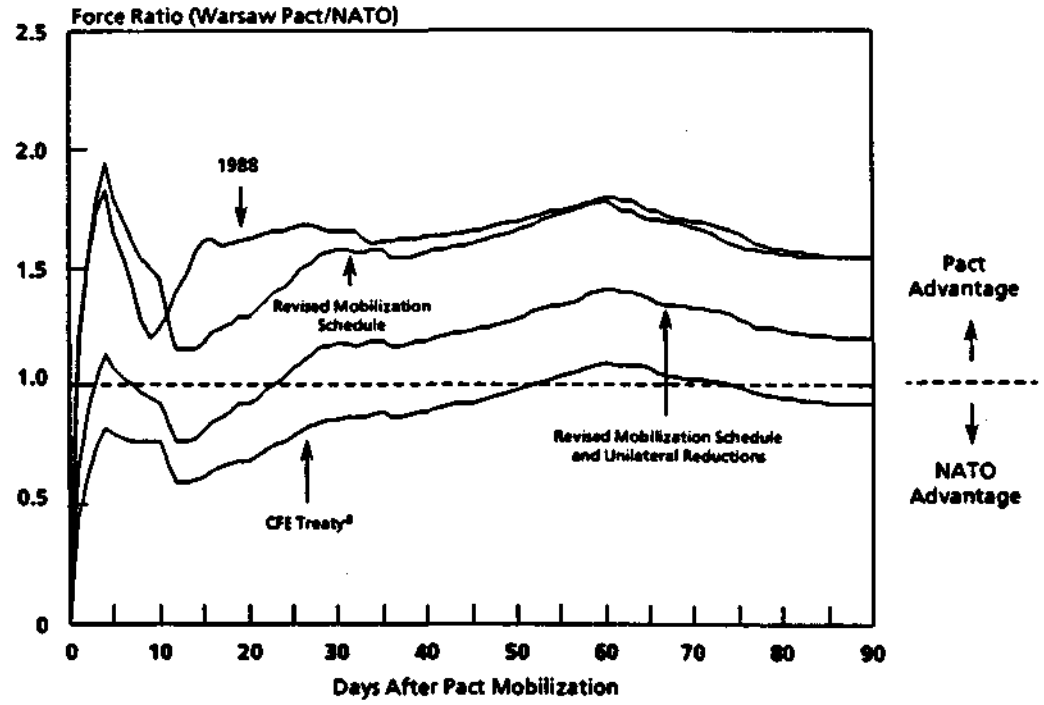
Analysis based on these methods leads to the conclusion that, prior to recent events in Eastern Europe, the Warsaw Pact enjoyed a substantial advantage in military forces. For example, Pact ground forces in the central region--assumed to encompass the two Germanys, Belgium, Luxembourg, the Netherlands, Poland, and Czechoslovakia--had an advantage of about 1.6 to 1 over NATO forces after both sides had fully mobilized. The Pact's advantage in tactical air capability was about 1.1 to 1, when all aircraft available to the Pact and NATO throughout Europe were taken into account.

## Diminishing Pact Advantage

The advantage that the Pact might have early in the mobilization process--before NATO had much time to respond--may not be so large as it was perceived to be during the 1980s. Recent press articles indicate that the Department of Defense (DoD) is reevaluating the time that the Pact might need to ready its ground forces that are not on full active status during peacetime. Extending these times would not reduce the total forces available to the Pact, but would limit the size of the Pact's advantage over NATO in ground combat capability at different points during the mobilization process (see the Summary Figure). Most important, from NATO's perspective, the longer Pact mobilization times greatly reduce the likelihood that the Pact would attack with little warning.

Unilateral reductions in military forces currently being carried out by members of the Warsaw Pact would reduce significantly, though would not eliminate,

Summary Figure.
Ground Force Ratios in the European Central Region




SOURCES: Congressional Budget Office based on Department of Defense data; William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); Institute for Defense and Disarmament Studies, "Karber Applauds Gorbachev Initiative," *Defense and Disarmament Alternatives* (April 1989), p. 3; Dale R. Herspring, "Reassessing the Warsaw Pact Threat: The East European Militaries," *Arms Control Today* (March 1990), p. 8; and Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

a. Based on withdrawal of combat units to meet treaty's ceilings on weapons.

the Pact's advantage over NATO in ground force capability in the central region. The reductions in Soviet forces announced by President Gorbachev in December 1988 could result in an eventual reduction in Soviet ground force capability of as much as 25 percent. In addition, East Germany, Czechoslovakia, and Poland have announced reductions in their ground forces of 18 percent to 33 percent. If all of the announced reductions are carried out, the Pact's advantage in ground forces at full mobilization would fall from 1.6 to 1.3 (see Summary Table 1 and the Summary Figure). The Pact's advantage in air combat capability would also fall but not as much.

NATO's military disadvantage could be all but eliminated as a result of the disintegration of the Warsaw Pact. Recent events in Eastern Europe cast serious doubt on the willingness of the Eastern European members of the Pact to join the Soviet Union in an attack on Western Europe. Without its allies, and after completion of the announced unilateral reductions, the forces of the Soviet Union alone will be on a par with NATO forces, both on the ground and in the air (see Summary Table 1 and the Summary Figure).

SUMMARY TABLE 1. RATIOS OF MILITARY FORCES AFTER FULL MOBILIZATION

| | Ground Forces[a] | | Air Forces[b] | |
|---|---|---|---|---|
| | Pact/ NATO | Soviet/ NATO | Pact/ NATO | Soviet/ NATO |
| Before Conventional Arms Reductions | | | | |
| 1988 Mobilization Schedule | 1.6 | 1.2 | 1.1 | 1.0 |
| Revised Mobilization Schedule and Unilateral Reductions | 1.3 | 1.0 | c | c |
| After NATO's Proposed CFE Treaty | 1.0 | 0.7 | 0.7 | 0.6 |
| Option I: Make Larger Reductions in U.S. Forces for NATO Based on Possible Administration Plans | 1.1 | 0.8 | 0.8 | 0.7 |
| Option II: Make Reductions in U.S. Forces for NATO Proportional to Pact Reductions | 1.6 | 1.2 | 1.0 | 0.8 |

SOURCE: Congressional Budget Office.

a. Based on ratios after 75 days of Pact mobilization.

b. Based on ratios of capability of air forces available in the region between the Atlantic Ocean and the Ural Mountains, including reinforcements.

c. The impact of the Pact's unilateral reductions was not analyzed for air forces.

### What the Ratios Mean

The measures of air and ground combat capability used in this study are crude and subject to many limitations. They do not take into account losses during combat, the aptitude and training of the soldiers and pilots operating the weapons, or the contribution of noncombat capabilities such as logistics support, communications, and medical equipment. Thus, these methods cannot be used to predict the outcome of a war. Despite these limitations, the methods provide a simple way to assess the approximate relative level of combat capability of the two alliances.

Based on these methods, CBO's estimates of relative ground and air capability suggest that the Pact's advantage over NATO, considered significant in the 1980s, has diminished greatly and may have all but disappeared. Nevertheless, the political situation in the Soviet Union and Eastern Europe remains highly uncertain, which fosters uncertainty in any military assessment. Thus, there remains strong interest in negotiating reductions in the Pact's military advantage through a binding agreement that limits conventional arms.

## THE EFFECT OF NATO'S PROPOSED CFE TREATY

NATO's proposal for a treaty limiting conventional forces in Europe would reduce to equal levels the number of weapons held by each alliance in various categories. The proposed ceilings are purposely set below current NATO holdings. Although NATO would have to reduce its weapons holdings in various categories by between 7 percent and 15 percent, the Pact would have to make much larger reductions--as high as 67 percent. The proposed treaty would also limit the number of U.S. and Soviet troops stationed in Europe, requiring the withdrawal of 80,000 U.S. and 405,000 Soviet troops.

Once NATO's proposed version of the treaty has been carried out, NATO and the Warsaw Pact would have roughly equal capability on the ground, and NATO would have a significant advantage--about 1.4 to 1--in the capability of its tactical aircraft. Even based on the conservative assumption that all Warsaw Pact nations would participate in an attack on Western Europe, the greatly improved balance of forces that would result from the proposed treaty would sharply reduce the risk of a successful invasion of NATO countries.

In contrast to the sharp reduction in risk, the proposed treaty would result in only a modest reduction in the U.S. military budget because few U.S. weapons and personnel would be eliminated. CBO constructed an illustrative withdrawal in order to estimate potential budgetary savings associated with the treaty. The withdrawal included two Army divisions and two wings of fighter aircraft from Europe--a total of 80,000 troops (73,730 Army and 6,270 Air Force). Some additional units and personnel--about 2,900 troops--based in the United States would also be eliminated.

After the treaty is fully in place and military reductions have been made, which might not occur until 1993, savings might average $6 billion a year--about 6 percent of the budgets for the Army and tactical Air Force, and about 2 percent of the total DoD budget (see Summary Table 2). Savings reflect reductions from the

level of funding in the 1990 budget in both operating and procurement costs. None of the savings estimated in this paper reflect added costs of verifying the CFE treaty. With the possible exception of costs for additional satellites to monitor compliance, however, the costs of verification are not likely to be large compared with the operating and procurement savings resulting from the treaty.

Because it is not clear how long it will take to reach agreement on, ratify, and carry out a CFE treaty, it is hard to predict when the savings associated with the treaty might actually be realized. To avoid the short-term fluctuations in funding that would accompany the moving and disbandment of units currently in Europe, the savings associated with the treaty--and the options for further reductions discussed later in this paper--are assessed for a future period after enough time has elapsed to permit full implementation of the treaty and all related force reductions, which may not be until 1993 or even later.

SUMMARY TABLE 2. SUMMARY OF ANNUAL BUDGETARY SAVINGS (In billions of 1990 dollars)

| | Operating and Support | Long-Term Procurement[a] | Total Annual Savings | Percentage Reductions: Army and Tactical Air Force Budgets | Percentage Reductions: Total DoD Budget |
|---|---|---|---|---|---|
| Reductions Required by NATO's Proposed CFE Treaty | 5 | 1 | 6 | 6 | 2 |
| Option I: Make Reductions in U.S. Forces for NATO Based on Possible Administration Plans | 13[b] | 3 | 16 | 15 | 5 |
| Option II: Make Reductions in U.S. Forces for NATO Proportional to Pact Reductions | 25[b] | 7 | 32 | 30 | 11 |

SOURCE: Congressional Budget Office based on Department of Defense (DoD) data.

a. Long-term procurement savings are based on proportional reductions in procurement budgets for the Army and tactical Air Force.

b. Includes share of overhead.

## OPTIONS FOR FURTHER U.S. FORCE REDUCTIONS

The United States could decide that the reduction in military tensions that would follow in the wake of a CFE treaty, coupled with political changes in Eastern Europe, would allow it to commit an even smaller force to NATO. Although this approach would forgo some of the reduction in military risk afforded by the treaty, it would also realize greater budgetary savings by eliminating more U.S. military forces than required by the treaty.

Since the focus of this paper is on changes in the U.S. military that might occur as a result of the completion of a treaty limiting conventional forces in Europe, only those forces that would be limited by a CFE treaty were considered as candidates for elimination from the U.S. military. The options that CBO analyzed therefore do not include reductions in naval, marine, or strategic forces. Nor are any reductions assumed in the defense agencies that support the U.S. military as a whole, or in the research and development programs.

### Option I: Further Reduce U.S. Forces for NATO by Implementing Possible Administration Proposals

Secretary of Defense Cheney has said that, if a CFE treaty has been signed and ratified and political changes in Europe are not reversed, the United States could eventually reduce its forces below 1990 levels by five Army divisions and five Air Force tactical fighter wings. These actions would reduce by about 16 percent the air and ground forces that would be provided by the United States to NATO in the event of a major war.

Army documents state that three of the five divisions that are to be eliminated would be active divisions. This option assumes that two of the three active divisions are withdrawn from Europe in order to comply with the CFE treaty. The other two of the five divisions that are to be eliminated would be reserve divisions. As a consequence of these reductions in force structure, the active Army would shrink by 126,100 personnel. All five Air Force wings eliminated would be active, with two wings coming from those currently stationed in Europe. The size of the Air Force would shrink by 26,900 active-duty personnel.

Savings. Once fully implemented--not until 1993 at the earliest--budgetary savings associated with these reductions could total as much as $16 billion a year, relative to the 1990 budget. This figure compares with annual savings of about $6 billion if the United States makes only the cuts required by the proposed treaty. Approximately $7 billion of the $16 billion in potential savings stems from reductions in operating and support costs that are associated directly or indirectly with the units that are eliminated (see Summary Table 2). Another $5 billion of the $16 billion in savings could be realized through reductions in what this study labels "overhead," a category of support commonly assumed not to vary in size as the number of operating units changes, especially if such changes are small. But because the reductions envisioned in this option are rather large, CBO assumed that overhead costs could be reduced in proportion to the number of units eliminated. Finally, because the Army and the Air Force would have a smaller force to equip and modernize, this option could eventually save $3 billion a year in procurement costs.

Military Consequences. Although this option would negate some of the benefits afforded by the CFE treaty, most would be retained. If the United States reduces its forces for NATO by 16 percent and its NATO allies reduce their forces proportionally, then the balance of ground forces would modestly favor the Warsaw Pact (see Summary Table 1). Only the ground forces of the Warsaw Pact as a whole would have an advantage over NATO ground forces, however. If the Soviet Union must fight alone, its forces would be less capable than those of NATO, even after NATO carries out this option. In contrast, the Pact enjoyed an advantage during the past decade that generally exceeded 50 percent.

The situation is even more favorable for NATO air forces (see Summary Table 1). Even with the 16 percent reductions assumed in this option, NATO would continue to enjoy a modest advantage in air combat capability once reinforcing units had arrived from the United States.

This option may also provide enough ground forces to ensure adequate geographic coverage of NATO's border with the Pact. Some analysts have argued that, regardless of the threat from the Warsaw Pact, a minimum number of combat units would be required in the central region to cover adequately the entire 750-kilometer border between NATO and the Warsaw Pact countries. They claim that a minimum force is required to provide adequate firepower along the border and to provide enough personnel to maintain communications. Adequate geographic coverage is particularly important if NATO is to mount a forward defense near the inter-German border, as has been NATO's strategy since the 1960s, rather than withdraw to better defensive positions deep within West Germany. The forces that would remain available to NATO under this option should meet most of the minimum requirements that were established for adequate geographic coverage in a recent study performed by the RAND Corporation.

### Option II. Make Reductions in U.S. Forces for NATO Proportional to Pact Reductions

In view of the large reductions in Warsaw Pact forces required by the proposed treaty and the accompanying political shifts in Eastern Europe, the United States could decide to make much larger force reductions than the ones discussed by Secretary Cheney. The United States might, for example, reduce its forces committed to NATO by roughly the same proportion as the cut that would be imposed on the Warsaw Pact's ground and air forces under the proposed CFE treaty. Such a proportional reduction would involve cuts of 50 percent and 40 percent, respectively, in the Army and tactical air forces that the United States commits to NATO. In view of the strong pressure for military reductions in NATO countries, this option assumes that the United States' NATO allies reduce their air and ground forces by the same proportion.

Under this approach, the Army would eliminate 7 of its 18 active divisions, including half of the 4 2/3 divisions currently stationed in Europe, and 5 divisions stationed in the United States intended as reinforcements for European forces in the event of war. As a result of these reductions and proportional reductions made in Army overhead, the active Army would need 268,200 fewer soldiers, leaving the Army about one-third smaller than it is today.

In addition, three reserve divisions would be eliminated from the Army Reserve and Army National Guard. Army reserve units would not be reduced by the same proportion as active Army units because they are relatively inexpensive to maintain and because they help to offset the capability provided by late-arriving Soviet units.

U.S. tactical air forces for NATO would also be reduced, but by a smaller proportion--40 percent. Because operating costs for active and reserve units are more similar for air forces than for ground forces, reductions in air units are assumed to affect both active and reserve units by the same proportion. Specifically, this option would reduce the size of the tactical air forces by 9 active wings and 4 reserve wings. Counting personnel directly and indirectly associated with the eliminated units and a proportional reduction in overhead, a total of 55,800 personnel would be removed from the active Air Force.

Savings. Once fully implemented, possibly several years after 1993, this option could reduce U.S. defense spending from the 1990 level by as much as $32 billion a year (see Summary Table 2). About three-quarters of the total savings would represent reduced funding for the Army; the remainder would come out of funds for the tactical Air Force. Considering the Army and Air Force together, about $15 billion of the total savings of $32 billion would stem from operating costs directly and indirectly associated with the units that are eliminated. More than $10 billion would be saved if overhead costs were reduced in proportion to the number of units eliminated. The remaining savings of more than $6 billion would result from reductions in funds for procurement.

Military Consequences. Of course, if the United States and its NATO allies made cuts proportional to those imposed on the Warsaw Pact, then the balance of military forces would remain at roughly today's levels, giving the Warsaw Pact an advantage, especially on the ground. Thus, NATO would forgo most of the military benefits afforded by the proposed treaty. Indeed, some analysts would argue that NATO would be worse off than it is today because NATO ground forces would probably not be able to provide the geographic coverage necessary for a forward defense.

These risks may, however, be acceptable in view of the reduced military threat that the Pact is likely to pose to NATO in the near future. The Soviet Union cannot count on the support of its Warsaw Pact allies in any military attack on Western Europe. If the Soviet Union must fight alone, then--even after the large cuts in NATO forces assumed under this option--the ratio of forces would favor the Soviet Union by only 1.2 to 1 (see Summary Table 1). This small advantage may not be sufficient to make the Soviet Union confident of its ability to achieve a quick military victory. Moreover, the risks inherent in the military balance that would result from carrying out this option must also be weighed against the probability of a major war in Europe, which currently seems very low.

## Other Approaches

The options examined in this paper do not, of course, exhaust all possible U.S. responses to the CFE treaty. Reductions larger or smaller than those discussed here also deserve serious consideration. Another approach would involve offsetting large

cuts in U.S. active forces by augmenting the reserve forces. Such an approach would increase the ability of the United States to rebuild its military forces quickly in the event that threats to U.S. security worsen in the future.

Although this paper does not analyze all available options, it illustrates an important choice that the United States will face in the wake of the CFE treaty. The United States can garner the benefits of the treaty primarily in the form of reduced military risk and make only a modest reduction in its defense budget. Alternatively, this country can forgo some of the reductions in military risk and realize the benefits of the treaty primarily in the form of reductions in the U.S. defense budget.

# CHAPTER I
# INTRODUCTION AND BACKGROUND

A treaty that would limit conventional military forces in Europe (CFE) by establishing parity in the number of major weapons held by the North Atlantic Treaty Organization (NATO) and the Warsaw Pact would require disproportionately large reductions in weapons held by the Pact. Such a treaty would have a profound impact on the military balance in Europe and is currently being considered by members of each alliance.

Recent political events in Eastern Europe have already radically altered the relationship between East and West. What had previously been characterized as the "cold war" and "East-West tension" has now been, perhaps permanently, replaced by a new cooperation among all European countries, decreased belligerence, and expectations of a reunited Germany. These radical political changes on the European landscape, coupled with the large reductions in Warsaw Pact forces that would be required by a CFE treaty, have raised the possibility--indeed, the likelihood--of substantial reductions both in U.S. military forces committed to NATO and in the military budget.

This paper updates and presents the detailed analysis that supported the conclusions and findings summarized in an earlier CBO report, *Budgetary and Military Effects of a Treaty Limiting Conventional Forces in Europe* (January 1990). That report assessed the balance of forces in Europe in 1988 and discussed how NATO's proposed CFE treaty would affect U.S. military forces and budgets. It also examined two options that would make larger cuts in U.S. forces than would be required by the treaty.

The remainder of this chapter discusses the recent history of arms control negotiations and political changes in the Soviet Union and Eastern Europe.

## PAST CONCERNS ABOUT THE CONVENTIONAL BALANCE IN EUROPE

Until very recently, Western European nations and the United States have felt threatened by the military ambitions of the Soviet Union and its Warsaw Pact allies. Indeed, the United States has invested a large portion of its defense budget in support of NATO's mission to deter or, if necessary, counter an attack on Western Europe.[1] The two principal European alliances, NATO and the Warsaw Pact, amassed large arsenals of weapons on the European continent bounded by the Atlantic Ocean on the west and the Ural Mountains in the Soviet Union on the east, as East-West tensions continued through the 1980s (see Table 1). Increasingly, NATO military leaders perceived the alliance as being at a disadvantage relative to

1. Official Department of Defense estimates of the portion of its budget spent in support of NATO range from 18 percent to 58 percent.

TABLE 1. WEAPONS IN EUROPE, 1970-1990

| | 1970 | 1975 | 1980 | 1985 | 1990 |
|---|---|---|---|---|---|
| NATO | | | | | |
| Tanks[a] | 11,400 | 13,000 | 17,000 | 20,800 | 22,600 |
| Aircraft[b] | 4,200 | 3,600 | 3,600 | 4,200 | 4,600 |
| Warsaw Pact | | | | | |
| Tanks[a] | 41,200 | 43,500 | 51,400 | 51,800 | 57,200 |
| Aircraft[b] | 8,500 | 8,100 | 8,000 | 8,000 | 7,800 |

SOURCE: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance*, various years (London: IISS).

a. Excludes light tanks.

b. Excludes training aircraft.

the Pact, and that the disadvantage was growing as Soviet military production outpaced that of every other country. General Bernard Rogers, then NATO Supreme Commander, stated in 1987 that "Every year. . .the gap continues to widen."[2] These concerns, shared by U.S. military commanders and civilian experts alike, were based on two aspects of the East-West military balance: the Pact's numerical superiority in weapons, troops, and combat units; and the increased sophistication of the Pact's weapons that was seen as eroding NATO's technological superiority.

Concerns by NATO military commanders that their conventional forces would be inadequate to stop a Pact invasion close to NATO's eastern border led, in part, to the introduction of shorter-range or theater nuclear weapons into NATO's arsenal. Eventual inclusion of theater nuclear weapons of many kinds in both Pact and NATO forces raised the specter of nuclear as well as intense conventional warfare on the European continent. The possibility of this unpalatable escalation to theater nuclear war may have provided added impetus to an arms control process that would limit conventional forces in Europe. From NATO's perspective, it seemed that the only likely way to reduce the Warsaw Pact's numerical advantage was through the arms control process, since NATO members were obviously unable or unwilling to field weapons and troops in numbers equal to those of the Warsaw Pact.

2. Christopher Redman, "Battle of the Bean Counters," *Time* (June 15, 1987), p. 33.

## RECENT HISTORY OF CONVENTIONAL ARMS CONTROL

The attempt to limit conventional arms in Europe has not been a recent phenomenon. The NATO allies issued a communique in June 1967 expressing their interest in a balanced reduction of forces by the East and the West. More than six years later, the first round of talks on force reductions between representatives of the two alliances finally opened in Vienna. These talks covered only the central region of Europe and so excluded some NATO members (for example, Spain and Italy). Furthermore, the talks did not address the many forces stationed outside the central region in peacetime that would reinforce the alliances in a conflict.

Attempts to bring about "mutual and balanced force reductions" (MBFR) continued fruitlessly for more than 12 years through 38 rounds of negotiations. Two major areas of disagreement between NATO and the Pact prevented substantial progress toward controlling conventional arms. The first was NATO's use of the term "balanced" force reductions. NATO claimed that the Pact enjoyed a substantial numerical advantage in central Europe, and argued that the Pact would have to make larger reductions than would NATO in order to reach an equitable outcome. Pact representatives strongly disputed NATO's claim. The two sides could not agree on the level of forces deployed in the area, a dispute that proved to be central in blocking progress. The second area of contention involved unspecified verification measures, which NATO representatives indicated would ultimately be required. The Pact was reluctant to discuss such measures before agreement was reached on the size and terms of force reductions.

These two disagreements, particularly the one concerning the size of Warsaw Pact forces stationed in the region under consideration, effectively prevented an MBFR agreement. It was bold pronouncements and initiatives by Mikhail Gorbachev that finally revitalized the conventional arms control process. The initiatives first appeared in his April 1986 speech in East Berlin calling for substantial reductions in troops, aircraft, and nuclear systems based in the region between the Atlantic Ocean and the Ural Mountains--known as the ATTU region and covered by the ongoing CFE negotiations. In proposals issued two months later based on Gorbachev's April speech, the Pact indicated its willingness to consider intrusive verification measures in exchange for cuts in virtually all categories of weapons in the ATTU region.

The hope for a successful conclusion of this new round of arms reductions talks, referred to as the CFE talks, is much higher than that associated with the MBFR negotiations. The Pact has accepted both NATO's conditions of the large asymmetric reductions that will be needed to bring the two alliances into numerical parity, and the need for thorough verification procedures. The CFE talks opened in March 1989 and have been pushed along by strong statements and concessions by both President Bush and President Gorbachev.

## THE CHANGING POLITICAL LANDSCAPE OF EASTERN EUROPE

Further impetus for progress has been added by the extraordinary political events that have occurred in Eastern Europe during the past year. Little would anyone have imagined, much yet predicted in early 1989, that one year later no hard-line

communist regimes would remain in Eastern Europe, that Hungary and Czechoslovakia would ask Soviet troops to leave their soil, that East Germany would hold free elections, that the Berlin Wall would no longer exist, and that the Germanys would apparently soon be reunited. All these events have called into doubt many traditionally held assumptions about East-West confrontation and the NATO/Pact military balance.

The first long-held assumption that is probably no longer valid is that the Warsaw Pact is a cohesive military alliance. Without the hegemony of the Soviet Union, and with the opening of societies of several Warsaw Pact members to Western influences, it is unlikely that the Pact as a whole would participate in any Soviet-led invasion of NATO countries. This view has been acknowledged by the Director of the Central Intelligence Agency, William Webster, in testimony before the Senate Committee on Armed Services.[3] Indeed, Webster went on to state that it is unlikely that the Soviet Union could reassert authority over its former Eastern European satellites, even if Gorbachev is replaced by a more repressive leader.

Another factor complicating discussion of the East-West balance is the approaching reunification of Germany. The traditional East-West border had been viewed, at least in central Europe, as the inter-German border between East and West Germany. With this line of demarcation removed, it is difficult to establish where the forward line of NATO's defenses against the Warsaw Pact should be. Would the border between a unified Germany and Poland now become the place where NATO would move its forces and defenses? Will NATO troops be positioned on what is currently East German soil to prepare these defenses? Or, instead, will Germany be declared a militarily neutral zone, with NATO troops from allied countries stationed outside German territory? These questions will need to be answered as the political situation in Europe evolves.

## SCOPE OF THIS PAPER

Because of the immense uncertainty surrounding the political situation in Europe today, this paper does not presume to postulate the location or the exact nature of any future war in Europe. Instead, the paper estimates the number of military forces that would exist, under various assumptions about arms control and budgetary decisions, in the nations that today belong to the NATO alliance. Those forces are compared with two opposing entities: the forces of the nations that today make up the Warsaw Pact, and those of the Soviet Union alone. To provide a contrast with current and past circumstances, these forces are measured against the forces that NATO might command in the future. This is the only way of measuring the effect of changes brought about by arms control or unilateral reductions. This analysis is not meant to imply that there is a likelihood of a NATO confrontation with the Pact or the Soviet Union alone in the near future. The Soviet Union, however, may very well continue to control the most powerful military force on the European continent for a long time to come, even after a proposed CFE treaty is carried out.

3. Patrick E. Tyler, "CIA's Webster Says Military Threat Declining," *Washington Post*, January 24, 1990, p. A4.

As background, the paper discusses the balance of military forces in Europe as it was perceived in 1988 and how that balance has evolved from 1988 to today. It then analyzes both the budgetary and military effects of the proposed CFE treaty and of two alternatives that make reductions in U.S. forces larger than those required by the treaty. These alternatives illustrate opportunities for significant budgetary savings that could result from a major arms control agreement coupled with the recent political events in Europe.

The possibility of large budgetary savings comes with a cost of increased military risk should events in Europe reverse themselves, however. The purpose of this study is to examine the costs and benefits, in terms of military security and budgetary savings, that would result from enactment of NATO's proposed CFE treaty and further reductions to U.S. forces committed to defending Europe.

Several limitations are inherent in the scope and approach of this paper. The paper assumes that NATO's proposals for the CFE treaty are fully accepted even though negotiations are still continuing. Furthermore, because it is not clear when all the provisions of a yet-to-be-signed CFE treaty will be implemented, budgetary effects are assessed for a future period after the treaty has been fully carried out. For the two options that go beyond the reductions mandated by the treaty, that period could be five years or longer.

Finally, this analysis is limited to the military forces that would be affected directly by the CFE treaty, namely those of the Army and tactical Air Force.[4] Since a CFE treaty would not limit other types of U.S. forces--specifically naval, strategic, or marine--they are assumed to be outside the scope of this analysis. The budgets for the Army and tactical Air Force together account for about 35 percent of the total 1990 budget for the Department of Defense. Almost two-thirds of the current U.S. military budget, therefore, would not be affected by reductions in U.S. conventional forces for Europe resulting from either a treaty or perceptions of a significantly reduced threat.

4. The rest of the Air Force includes strategic, air defense, and airlift forces.

# CHAPTER II
# THE BALANCE OF NATO AND WARSAW PACT FORCES BEFORE ARMS CONTROL REDUCTIONS

The balance of military forces in Europe is currently in a state of flux. The Soviet Union and some of its allies are unilaterally reducing the size of their military forces, and the Warsaw Pact has disintegrated as a cohesive military alliance. At the same time, however, large numbers of weapons remain in Europe. Thus, the relationship between the forces remaining in Europe under the control of NATO and Pact members continues to be an important factor in the ongoing debate over arms control.

To illustrate the changing nature of the relationship between NATO and Pact forces, this chapter first assesses the balance as it was perceived in 1988, before most of the major military changes began. In order to assess the possible impact of some of the political and military events of the past two years, the chapter also examines the balance of Pact and NATO forces under various assumptions intended to capture the effect of recent actions by members of the Warsaw Pact. Specifically, an attempt is made to quantify the changes that would result from the Pact's unilateral reductions in weapons and the dissolution of the Pact as a military entity.

Despite these recent changes, the density of weapons currently stationed in Europe remains very high. Indeed, including weapons held by both the Warsaw Pact and NATO in the region between the Atlantic Ocean and the Ural Mountains, there are more than twice as many tanks in Europe today than in the fall of 1944 at the height of World War II. The majority of the tanks and other major weapons for ground combat, including artillery and armored combat vehicles, belong to countries in the Warsaw Pact. In fact, based on data compiled by NATO during preparations for the CFE negotiations, the Pact enjoyed an advantage of more than 2 to 1 over NATO in tanks, armored combat vehicles, and artillery (see Table 2). Although the Pact's advantage in these areas may have diminished slightly as its members reduce their military forces, it is still considerable.

Furthermore, the Soviet Union controls a large part of the Warsaw Pact's military assets, accounting for more than two-thirds of the Pact's weapons and troops. In contrast, the United States plays a much smaller relative role within NATO, fielding between 13 percent and 26 percent of weapons for ground combat stationed in Europe.

Simple numerical comparisons of military forces available to NATO and the Warsaw Pact do not tell the whole story concerning the relative military capabilities of the two alliances, however. For example, the Pact's striking advantage in number of divisions can be partially explained by the fact that most Pact divisions contain fewer soldiers than NATO divisions. The Pact's numerical advantage in combat equipment may be offset somewhat by the higher quality of NATO's weapons. Finally, some analysts feel that NATO's troops are better trained, fed, and supplied and so would be better able to fight. Thus, defense analysts have had to develop methods to take into account both the quality and quantity of each side's weapons.

## TABLE 2. EQUIPMENT AND TROOPS POSITIONED BETWEEN THE ATLANTIC OCEAN AND URAL MOUNTAINS

| | NATO | | | Warsaw Pact | | | |
|---|---|---|---|---|---|---|---|
| | Total | U.S. | U.S. Share (Percent) | Total | Soviet | Soviet Share (Percent) | Ratio Pact/NATO |
| Tanks | 23,000 | 6,000 | 26 | 59,800 | 38,100 | 64 | 2.6 |
| Armored Combat Vehicles[a] | 34,025 | 7,400 | 22 | 74,000 | 51,200 | 69 | 2.2 |
| Artillery | 17,700 | 2,232 | 13 | 46,270 | 33,000 | 71 | 2.6 |
| Aircraft | 5,700 | 700 | 12 | 10,400 | 7,600 | 73 | 1.8 |
| Helicopters | 2,235 | 700 | 31 | 3,500 | 2,850 | 81 | 1.6 |
| Ground Troops (Thousands) | 2,214 | 216 | 10 | 3,090 | 2,200 | 71 | 1.4 |
| Divisions[b] | 103 | 5 2/3 | 6 | 224 1/3 | 161 2/3 | 72 | 2.2 |

SOURCES: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (October 30, 1989); Department of Defense, *CFE, Conventional Armed Forces in Europe* (July 1989); North Atlantic Treaty Organization, *Conventional Forces in Europe: The Facts* (Brussels: NATO, November 1988); The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base* (Arlington, Va.: TASC, April 1988); International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, Autumn 1989); Department of Defense, *Soviet Military Power 1989* (September 1989); "Ambassador R. James Woolsey: Closing in on a CFE Treaty," *Arms Control Today* (April 1990), p. 3; and Michael Z. Wise, "Soviets, West Agree on Limits for Tanks," *Washington Post*, June 28, 1990, p. A36.

NOTE: Based primarily on NATO and U.S. assessments of alliance totals.

a. National totals may not be consistent with alliance totals because of definitional differences between sources.

b. Includes separate brigades and regiments. Assumes three brigades or regiments are equivalent to one division.

Because of the inherent differences between air and ground forces, CBO used separate methods to analyze them. These methods are explained briefly below and more fully in Appendix B.

## GROUND FORCES

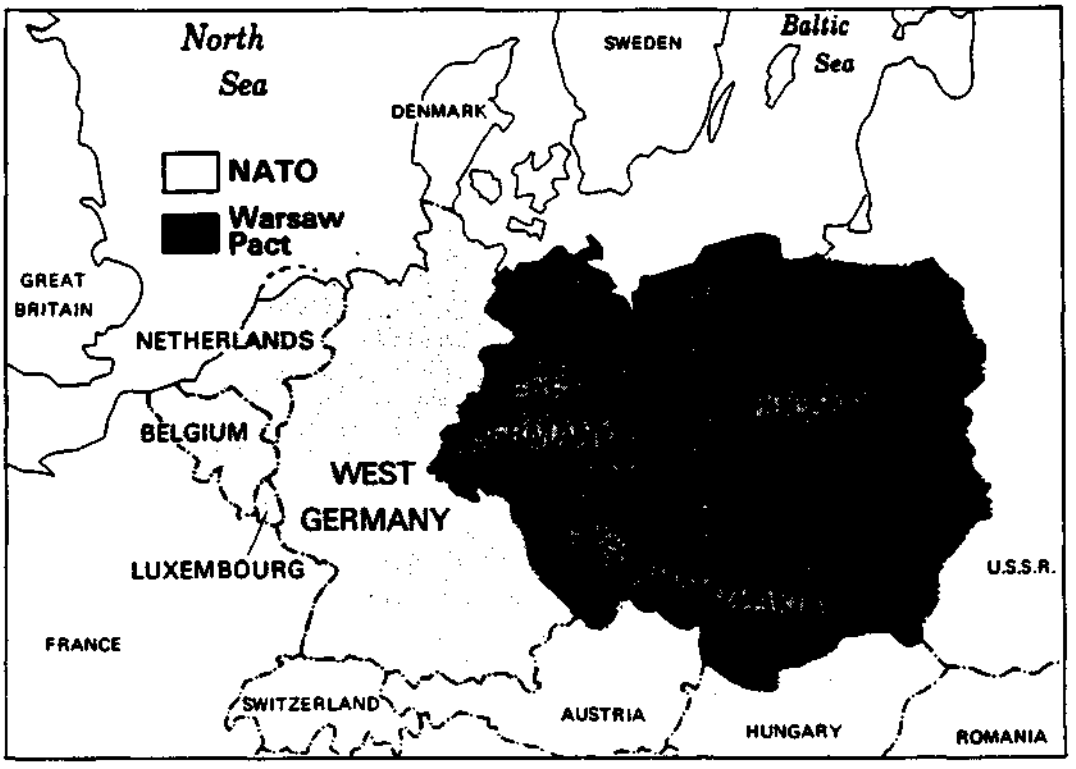
Although all of the military forces--ground, air, and naval--controlled by NATO and the Warsaw Pact affect the overall balance of military capability of the two alliances, most studies of the conventional balance in Europe focus on ground forces. This is because an invasion of NATO by the Pact implies use of ground forces, and it is only ground forces that can occupy and hold territory. The Warsaw Pact currently holds a significant advantage in numbers of weapons for ground combat and in combat units. Some of this advantage could be mitigated, however, by NATO's superior weapons and larger combat units. Only by converting Pact and NATO ground forces into standard units can the capability of the two sides for land warfare be compared.

To measure the combat capability of Pact and NATO ground forces, CBO used a method developed by the Army that is based on weapon effectiveness indices (WEI) and weighted unit values (WUV). The WEI/WUV technique evaluates and ranks each ground weapon, such as an M1 tank, relative to other weapons of the same type and assigns it a score or index (WEI). Each type of weapon--such as tanks, artillery, or armored personnel carriers--then receives a weighting factor (WUV) that reflects its contribution to a combat unit's overall ability to perform its mission. For all the weapons in a combat unit, the individual indices (WEIs) are multiplied by the weighting factors (WUVs) and added up to attain a score for the unit. A standard combat unit--the armored division equivalent (ADE), which is based on the score for a standard U.S. armored division--is used as the standard unit of measure for all NATO and Pact combat units that would be involved in a conflict in Europe. In this way, the ground forces of NATO and the Warsaw Pact can be evaluated on a common basis, taking into account both the quantity and quality of their weapons.

To compare the combat capability of the two alliances, CBO converted all the combat units that would fight for the Pact to ADEs and did the same with all of NATO's combat units. The Pact's total ADEs were then divided by the total number of ADEs available to NATO to determine a ratio of Pact capability to NATO capability. These ratios do not take into account combat attrition; rather, they represent only those forces that would be available to each side before an attack begins.

The analysis of ground forces focuses on the central region of Europe, which is generally assumed to include the NATO countries of West Germany, Belgium, Luxembourg, and the Netherlands, and the Pact countries of East Germany, Poland, and Czechoslovakia (see Figure 1). This region is where U.S. forces stationed in Europe are concentrated in peacetime and where most U.S. forces would fight in the event of war. Not all of the ground forces that might be involved in a conflict in the central region are stationed there during peacetime, however. In fact, most of the forces would have to be brought in from other countries, including a large

Figure 1.
The European Central Region




SOURCE: Congressional Budget Office.

number of reinforcing units from both the continental United States and the Soviet Union. When these reinforcements would arrive in theater is a matter of some debate.[1]

Assessing the effects that the arrival of reinforcements would have on the balance between NATO and Pact forces requires making specific assumptions about the participants in and rapidity of preparations for a war that might take place in Europe in the future. Because political conditions in Europe are in flux, this paper considers a range of assumptions, beginning with those that were commonly made in 1988 and earlier years, and progressing to those that would be more likely to be relevant in the future.

## Pact Forces

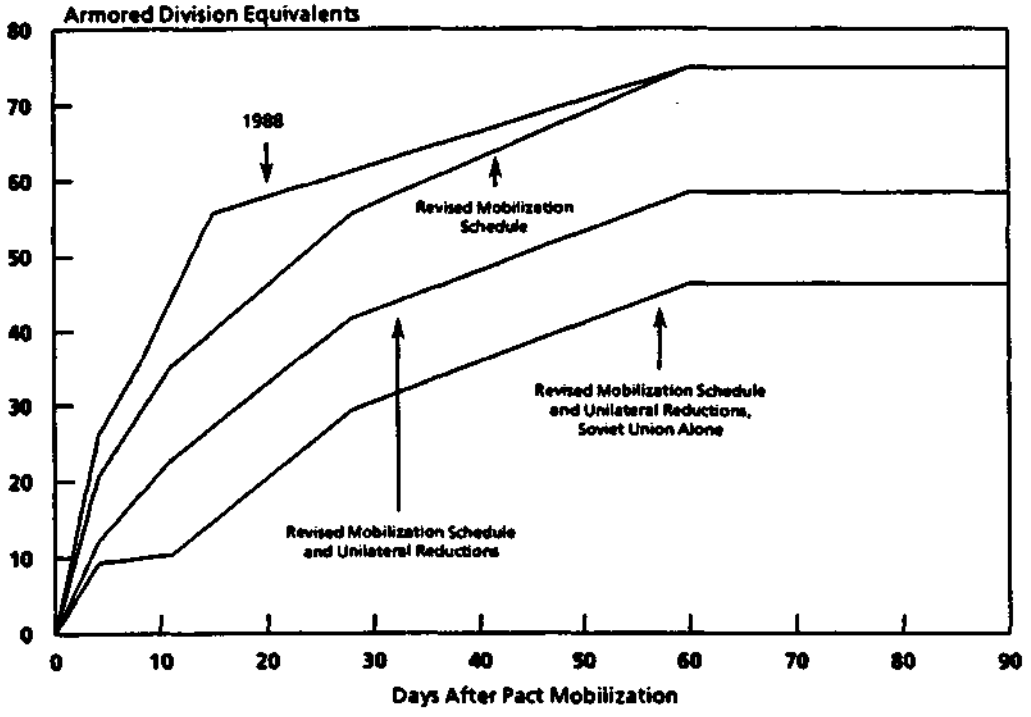
Western analysts have always assumed that any crisis in Europe would be precipitated by the Warsaw Pact; that is, the Pact would initiate hostilities and would

1. For a detailed discussion of CBO's analysis of the military balance in Europe, see Congressional Budget Office, *U.S. Ground Forces and the Conventional Balance in Europe* (June 1988).

begin military mobilization first. If the Pact is to invade NATO, it would have to amass its forces near its border with NATO countries.

In 1988, the Pact maintained only 40 divisions--24 of which were Soviet divisions--in East Germany and Czechoslovakia, the two countries in the central region bordering on NATO. Additional Pact units, including Soviet units from the western military districts and reserves in the central military districts of the Soviet Union as well as Polish units, would have to be transported to the area in times of increasing tension. Furthermore, many Pact divisions are not maintained on a fully active status during peacetime. Indeed, 52 of the 121 Pact divisions that would have been available for combat in central Europe in 1988 would not have been considered combat-ready during peacetime (see Appendix A for a detailed breakdown of combat units available to the Pact and NATO for conflicts in the central region).

Figure 2.
Pact Ground Forces in the European Central Region Under Various Scenarios




SOURCES: Congressional Budget Office based on Department of Defense data; William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); Institute for Defense and Disarmament Studies, "Karber Applauds Gorbachev Initiative," *Defense and Disarmament Alternatives* (April 1989), p. 3; and Dale R. Herspring, "Reassessing the Warsaw Pact Threat: The East European Militaries," *Arms Control Today* (March 1990), p. 8.

NOTE: Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

Estimates of the time needed to ready all of those divisions for combat and bring them from the western and central Soviet Union to the battlefront vary from just over two weeks to as long as four months.

Mobilization Schedule, 1988. As recently as 1988, analysis of a potential Pact invasion of NATO was largely based on the assumption that the Pact would have forces sufficient for an attack after two weeks of mobilization. A schedule for the arrival of Pact units in the region near the inter-German border that would support such an attack is contained in a 1979 study by the Office of the Secretary of Defense (OSD).[2] That schedule for Pact mobilization leads to a rapid buildup of Pact forces and assumes that out of a total of 121 Pact divisions, 33 Soviet divisions from the western Soviet Union could be available for combat in the central European theater within two weeks. Measured in terms of armored division equivalents, the Pact could command 56 ADEs in the central region 15 days after mobilization began, and a total of about 75 ADEs after 60 days of mobilization (see Figure 2, page 11).

Revised Mobilization Schedule. Recent press articles have indicated that some analysts in the Department of Defense have revised their estimate of how long it would take the Pact to mobilize its forces for an attack. Indeed, some sources indicate that the Pact might need 33 to 44 days to prepare for an attack.[3] No details to support these revised estimates have been made publicly available, nor has any rationale for these revisions been reported. Various analysts, however, had previously argued that amassing and transporting a force of up to 90 divisions in two weeks might not be feasible.[4] Assuming that four weeks would be a more reasonable estimate of the time needed to mobilize and transport Soviet units from the western Soviet Union that are not on active status in peacetime leads to a more gradual buildup of Pact forces in central Europe and might be more in line with recent Department of Defense estimates. A curve depicting the buildup of Pact forces based on this revised schedule shows that 40 armored division equivalents could be mobilized within 15 days (see Figure 2); capability after 60 days of mobilization would be the same as in the generally accepted scenario as of 1988.

Revised Mobilization Schedule and Unilateral Reductions. Another development that has revised the traditionally held view of the Warsaw Pact's ability to amass forces in central Europe is the unilateral reductions occurring in Soviet, East German, Polish, and Czech forces (see Table 3). In addition to the reduced number of divisions available to the Pact, each division will have fewer tanks, thereby reducing the combat power of each division. These reductions followed President Gorbachev's address to the United Nations in December 1988, and included 10,000 Soviet tanks, about half of which were stationed in East Germany, Hungary, and Czechoslovakia. The net impact of all the announced unilateral reductions could be a 10 percent to 25 percent decrease in Warsaw Pact combat capability in the central region. The combined effect of these unilateral reductions and the revised mobil-

2. Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979).

3. Patrick E. Tyler and R. Jeffrey Smith, "Study Finds NATO War Plans Outdated," *Washington Post*, November 29, 1989, p. A1.

4. Congressional Budget Office, *Assessing the NATO/Warsaw Pact Balance* (1977), p. 23.

TABLE 3. UNILATERAL REDUCTIONS ANNOUNCED BY THE WARSAW PACT

| | Tanks | Divisions | Troops | Aircraft |
|---|---|---|---|---|
| Soviet Forces in: | | | | |
| East Germany | 3,300 | 4 | n.a. | n.a. |
| Czechoslovakia | 300 | 1 | 73,500 | n.a. |
| Poland | 100 | 1/3 | n.a. | n.a. |
| All of Europe[a] | 10,000 | 6 | 240,000 | 800 |
| East German Forces | 600 | 2 | 10,000 | 50 |
| Czech Forces | 850 | 3 | 12,000 | 51 |
| Polish Forces | 850 | 2 2/3 | 33,000 | 80 |

SOURCES: Congressional Budget Office based on Department of Defense, *Soviet Military Power 1989* (September 1989); Institute for Defense and Disarmament Studies, "Karber Applauds Gorbachev Initiative," *Defense and Disarmament Alternatives* (April 1989), p. 3; and Dale R. Herspring, "Reassessing the Warsaw Pact Threat: The East European Militaries," *Arms Control Today* (March 1990), p. 8.

NOTE: n.a. = not available.

a. Includes all reductions in Soviet ground forces west of the Ural Mountains, including those in East Germany, Czechoslovakia, Poland, Hungary, and the European portion of the Soviet Union.

ization schedule would reduce the forces available to the Pact to about 27 armored division equivalents within 15 days after mobilization begins and 59 ADEs within 60 days (see Figure 2).

As yet, not all of the announced unilateral reductions have been made. A Congressional delegation that visited the Soviet Union in August 1989 concluded, however, that these reductions were indeed being carried out apace and that about half had actually been implemented.[5]

Revised Mobilization Schedule and Unilateral Reductions, Soviet Union Alone. The final, and perhaps most significant, modification of the military threat posed by the Warsaw Pact results from the recent movement of the Pact's non-Soviet members toward self-determination and more democratic governments. The more independent stance of East Germany, Poland, and Czechoslovakia casts serious doubt on their willingness to participate in any invasion of NATO countries. These allied forces account for as much as half of the total Pact forces in the central region at some points during mobilization, and a minimum of 20 percent during all phases.

5. House Committee on Armed Services, "Status of the Soviet Union's Unilateral Force Reductions and Restructuring of its Forces" (October 16, 1989).

Absence of these non-Soviet members of the Pact in any military undertaking would significantly reduce the forces available to oppose NATO, particularly in combination with the revised mobilization schedule and recent unilateral reductions. Assuming that it needs the longer preparation times included in the revised mobilization schedule, the Soviet Union alone--after the announced unilateral reductions have been completed--will be able to mobilize only 15 armored division equivalents within 15 days after the start of mobilization and about 46 ADEs after 60 days (see Figure 2).

In conclusion, much has changed in how the threat posed to NATO by the Warsaw Pact is perceived. Most analysts no longer consider a devastating attack by scores of Warsaw Pact divisions with little warning possible in central Europe. Today, most analysts feel that longer preparations would be required and that the Soviet Union would operate alone. Nevertheless, even with all these revisions, the Soviet ground forces still command tens of thousands of tanks and more than 150 divisions, a large fraction of which could be directed at central Europe. In contrast, NATO commands a much smaller force.

## NATO Forces

The forces available to defend NATO's central region are less numerous than those potentially available to the Warsaw Pact, but their status has not changed significantly since 1988. NATO has maintained its cohesion in the face of a rapidly changing political landscape. Although its members have indicated that they will reduce their military forces in the next few years, no major reductions have been made to date.

Several NATO members--including the United Kingdom, Belgium, Canada, the Netherlands, Denmark, France, and the United States--remain committed to providing forces to defend the area near the inter-German border in the event of a Pact attack. West Germany, of course, would also fight to defend its territory. (The types of forces provided by NATO members are discussed in Appendix A.)

As with the Pact, many of the NATO forces that might actually be available to defend West German territory are not stationed there in peacetime. Indeed, 44 out of a total of 72 NATO divisions that would be available to fight in central Europe are stationed outside of West Germany, and 25 of these divisions would have to be transported from the United States. In addition, NATO would need time to mobilize the reserve forces that form 20 of NATO's 72 divisions.

Again, the amount of time needed to bring all of NATO's forces to bear within the central region is a matter of speculation. Many analysts believe that most European forces, including reserves, could be available quickly--within 10 days after NATO begins to mobilize. The United States is also committed to providing 10 divisions for NATO's defense after 10 days of mobilization. Four U.S. divisions are permanently stationed in West Germany. Another six divisions are part of a special program that stores a full set of equipment in Europe for use in the event of war. Thus, in times of crisis, only the troops need to be transported to Europe from the continental United States (CONUS), something that can be done easily in 10 days, given enough airplanes. The last of the remaining 19 U.S. divisions, 15 of which

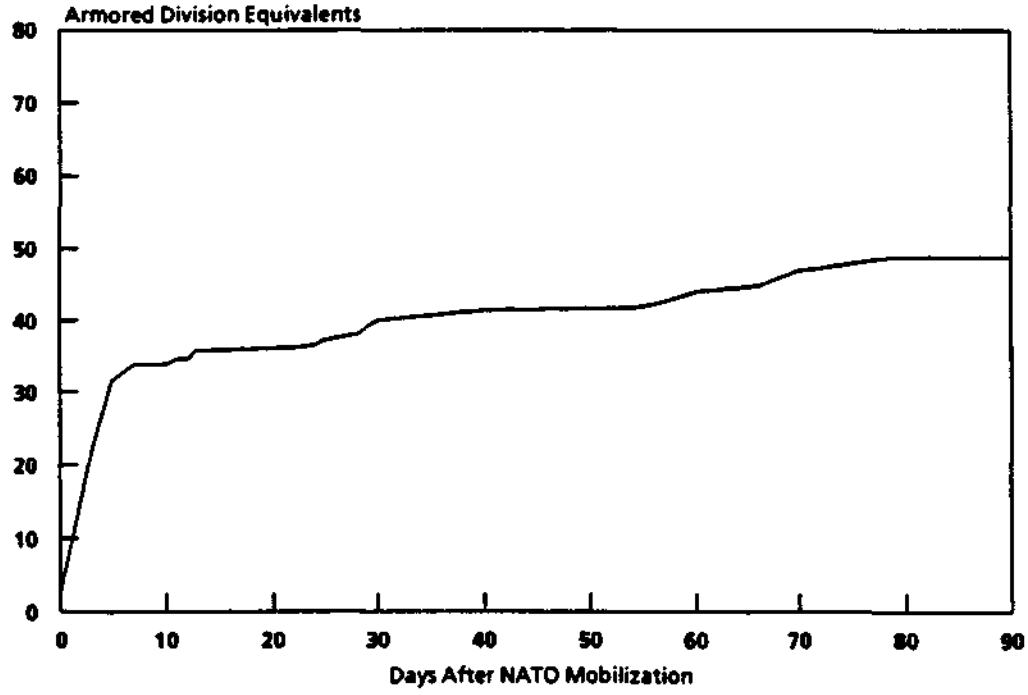
would be created from reserve units, should arrive in theater less than three months after NATO starts to mobilize, based on the schedule in the OSD study.

Thus, NATO would eventually have at its command 72 divisions in the central region. Measured in terms of armored division equivalents, NATO could mobilize 36 ADEs within 15 days after it starts to prepare for war and a total of 49 ADEs after 79 days of mobilization (see Figure 3).

## The Balance of Pact and NATO Ground Forces

How would these NATO forces compare with those available to the Warsaw Pact? The answer depends in part on how many Warsaw Pact forces would be available and how quickly they could be mobilized, issues already discussed in this chapter. But especially in the early days of a war, the answer also depends on how soon NATO mobilizes its troops after the Pact starts to mobilize. Most defense analysts

Figure 3.
NATO Ground Forces in the European Central Region




SOURCES: Congressional Budget Office based on data from William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); and Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979).

feel that, given modern technical capability and NATO's significant surveillance network, Western military intelligence would know almost immediately of any large-scale efforts by the Pact to mobilize. How soon NATO begins its own mobilization after the Pact starts to mobilize is, therefore, a matter of political will to begin the process. The shortest delay conceivable is none, with NATO beginning to mobilize as soon as the Pact does. Two longer delays considered more likely and used in past analyses are four days and seven days. During the 1980s, when NATO was particularly concerned about a Pact attack with little warning, a four-day reaction time seemed reasonable. Given recent favorable political events, however, a NATO response within seven days--an assumption that was also used by the Defense Department in the 1970s--seems more in tune with a scenario that assumes the Pact would mobilize for at least 30 days before an attack.[6]

By dividing the number of Pact ADEs available each day after mobilization by the number of NATO ADEs available on the same day, one can determine the ratio of Pact to NATO ground forces as a function of various assumptions about mobilization time and forces available. The ratio of Pact ground forces to NATO ground forces in the central region for the first 90 days after the Pact starts to mobilize is displayed in Figure 4. Because the ratios are in terms of Pact forces to NATO forces, higher ratios indicate a greater advantage for the Pact.

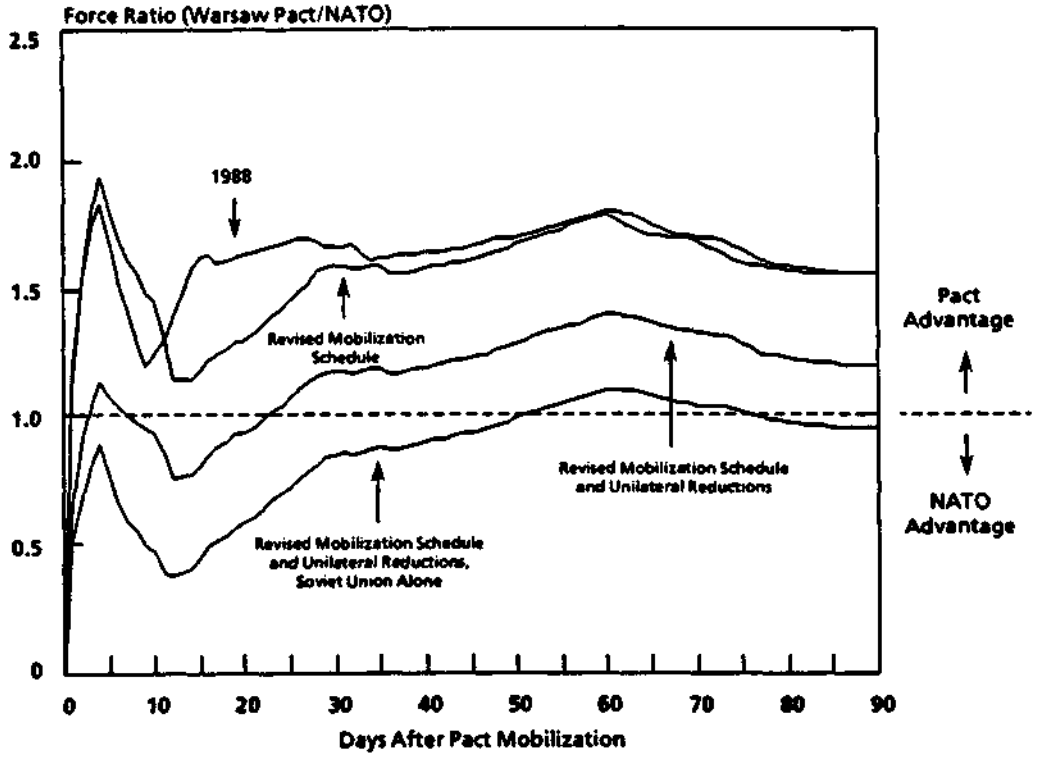
The Balance in 1988. The Pact/NATO balance, as it was commonly perceived from the late 1970s through 1988, resulted from two assumptions: that the Pact could ready and bring to the central region almost 90 divisions in two weeks; and that NATO would respond quickly (within four days) with a mobilization of its own. The ratios depicted by the curve in Figure 4 reflect the belief widely held among defense analysts before the recent political events: that the Warsaw Pact held a substantial advantage in the central region of Europe in ground force capability. As measured by the force ratios, the Pact's advantage peaked at about 1.8 on the fourth day of its mobilization process, before NATO could respond on a large scale. The ratio then dropped to about 1.2 after nine days when all of NATO's divisions stationed in the central region during peacetime could have been ready for combat, and then stabilized at a value of 1.6 or slightly higher through the seventy-fifth day after mobilization began.

Revised Mobilization Schedule. Press reports cited earlier suggest that the United States now assumes NATO would have more warning of any Pact attack, but these revised assumptions would not by themselves greatly diminish the Pact's military advantage. For example, assume that NATO would have more warning of a Pact attack but, in this more relaxed era, assume also that NATO takes seven days (rather than four days) to begin its own mobilization. The ratio peaks at 1.9 after four days (see Figure 4); it then takes longer to fall to a minimum of 1.2 at day 12 when all of NATO's forward-stationed divisions are assumed to be ready. During the next 18 to 20 days, the Pact's advantage appears to be somewhat smaller than previously estimated because of the longer time (28 days, as opposed to 15 days) assumed necessary to ready and transport divisions from the western Soviet Union to the front. Ultimately, however, the Pact advantage climbs back up to and remains at approximately 1.6 to 1.

6. Congressional Budget Office, *Assessing the NATO/Warsaw Pact Balance*, p. 22.

Revised Mobilization Schedule and Pact Unilateral Reductions. A more substantial reduction of the Pact's advantage over NATO is realized as a result of the unilateral reductions spurred by Gorbachev's speech to the United Nations in December 1988. The maximum impact that might result from the announced reductions--assuming full implementation and that all reductions in tanks and artillery are realized in forces designated for use in the central region--could be the elimination of a significant Pact advantage within the first few days after mobilization and roughly

Figure 4.
Effect of Recent Events on Ground Force Ratios in the European Central Region




SOURCES: Congressional Budget Office based on Department of Defense data; William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); Institute for Defense and Disarmament Studies, "Karber Applauds Gorbachev Initiative," *Defense and Disarmament Alternatives* (April 1989), p. 3; and Dale R. Herspring, "Reassessing the Warsaw Pact Threat: The East European Militaries," *Arms Control Today* (March 1990), p. 8.

NOTE: Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

a 20 percent reduction in the Pact's advantage after 80 days or more. If and when these unilateral reductions have been fully implemented, the Pact's advantage over NATO's ground forces might never exceed 1.5 to 1.

Revised Mobilization Schedule and Unilateral Reductions, Soviet Union Alone. The greatest effect on Pact capability would occur if the Soviet Union's Warsaw Pact allies--in particular, East Germany, Poland, and Czechoslovakia--refuse to participate in an invasion of NATO. If the Soviet Union must fight alone after making the unilateral reductions in its forces, then Soviet forces would generally be outnumbered by those of NATO in the central theater (see Figure 4).

Moreover, the ratios depicted for this scenario in Figure 4 assume that the Eastern European military forces, nominally members of the Pact, would not oppose Soviet forces crossing their countries and that the Soviet Union would not leave forces behind to protect its supply routes. If the Soviet Union feels it must protect its military supply routes, then NATO's advantage would increase. For example, assume that, in a future conflict, the Soviet Union feels compelled to protect its supply routes through Poland with a force roughly equal in size to the one used during the invasion associated with the "Prague Spring" in 1968. In this case, 25 of the 85 Soviet divisions remaining after the unilateral force reductions would not be available for use against NATO. The Soviet forces would be at a larger disadvantage in the early days after mobilization and would never gain a theaterwide advantage over NATO.

## TACTICAL AIR FORCES

The Warsaw Pact enjoys a much smaller advantage over NATO in the air than on the ground. Indeed, under some assumptions, Warsaw Pact tactical air forces are inferior to NATO air forces. (In this paper, tactical air forces include fighters that attack enemy aircraft and short- and medium-range bombers that attack ground targets.) In the region between the Atlantic Ocean and the Ural Mountains, the Pact, according to NATO's estimates, has many more aircraft than NATO. According to NATO's assessment, the Pact has 10,400 combat aircraft in the ATTU region compared with NATO's 5,700 aircraft, an advantage of almost 2 to 1.

The Pact advantage may, however, be smaller than these numbers suggest. The Pact's numerical total includes about 2,200 trainer aircraft, which may not be fully capable of performing combat missions. In contrast, NATO's inventory includes only about 1,000 trainers. The Pact total also includes about 1,800 interceptor aircraft designed primarily to defend the Soviet Union; NATO has no comparable aircraft. Some analysts question whether these interceptors would play a significant role in an invasion of Western Europe. Moreover, some NATO aircraft not stationed in Europe in peacetime could be introduced into the theater during a war, including more than 1,400 additional U.S. aircraft based in the continental United States that could arrive within 10 days after NATO started to mobilize. If the total number of aircraft is adjusted for these factors, the Pact's numerical advantage appears less formidable.

Moreover, as with ground forces, these numerical tallies do not reflect the variations in quality among the many types of aircraft in each alliance. To account

for differences in quality, CBO used a method called TASCFORM, developed by The Analytic Sciences Corporation. In a manner similar to the WEI/WUV method used for the ground forces, TASCFORM assigns scores to each type of aircraft.[7] The scores are derived by assessing each aircraft's capability based on various characteristics such as range, speed, and maneuverability. In addition, aircraft are rated based on the quality of their avionics equipment and on the types of weapons they can carry, factors that enable them to find and destroy targets. In general, newer and more sophisticated aircraft receive higher scores, although some older aircraft that can carry large numbers of weapons might also score well.

### Pact and NATO Air Forces Throughout Europe

Comparisons of ground combat capability focused on the central region of Europe. But because aircraft are more mobile, this assessment of air capability focuses on all NATO and Pact air forces stationed in Europe (that is, in the entire ATTU region), although it also compares those NATO and Pact air forces that would play a major role in the central region.

Taking into account the quality of Pact and NATO aircraft through application of the TASCFORM scores reduces the Pact's advantage in air forces because NATO's aircraft are more sophisticated and more capable. While Pact aircraft in the ATTU region outnumber NATO aircraft by a ratio of 1.8 to 1, the ratio of TASCFORM scores is only about 1.6 to 1 before the arrival of reinforcements from the continental United States (see Figure 5).[8] The Pact advantage would be even smaller if trainer and interceptor aircraft are assumed not to be used in combat.

The recent changes in Eastern Europe would reduce the total Pact air forces that could be used against NATO, although these reductions are much less far-reaching than those that affect ground forces. The unilateral reductions recently initiated by the Pact involved about 1,000 aircraft out of the total available force of 10,400, or 10 percent, as opposed to a total reduction (involving all Pact countries) of 12,300 tanks out of a total force of almost 60,000, or more than 20 percent. The aircraft eliminated would probably be older, less capable models that might be due for retirement. Because they are less far-reaching, these unilateral cuts are not analyzed separately in this paper.

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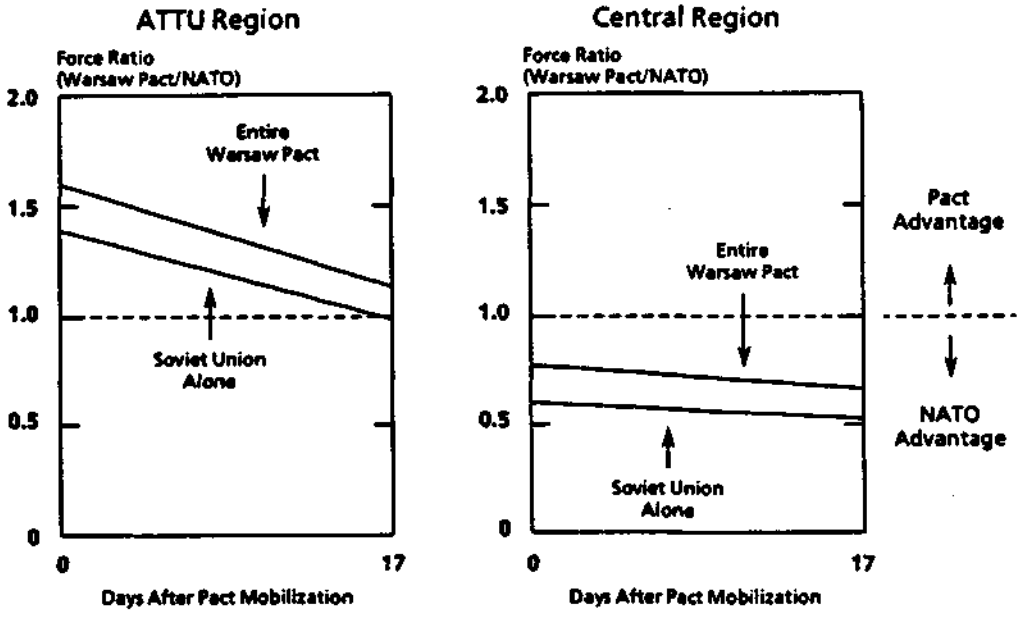
7. The Analytic Sciences Corporation, *The TASCFORM Methodology: A Technique for Assessing Comparative Force Modernization* (Arlington, Va.: TASC, January 1984). TASCFORM scores are also discussed in Appendix B and in Congressional Budget Office, *Tactical Combat Forces of the United States Air Force: Issues and Alternatives* (April 1985).

8. NATO probably would not start to mobilize its forces until it observed that the Pact was doing so. For this analysis, CBO assumed that NATO would start to mobilize seven days after the Pact started to mobilize. All reinforcing aircraft, therefore, would arrive in theater by 17 days after the Pact begins mobilization. The exact arrival schedules for U.S. and Soviet reinforcing aircraft are uncertain. Thus, CBO's analysis assumes that none is in Europe when mobilization starts and that all are in place 17 days later. For purposes of illustration, the ratios of Pact to NATO air combat capability depicted in Figure 5 between these two days (M-day and M+17) are shown as linear interpolations. This does not imply any actual detailed knowledge of what the ratios would be during this 17-day period, although the trend would obviously be the same as that depicted in the figure. It is only this trend--the effect of reinforcements on the force ratios--that Figure 5 and others like it are meant to illustrate.

A more serious blow to the Pact's air forces, however, would be the removal of all non-Soviet aircraft. Although Soviet aircraft account for roughly 70 percent of the total force, the loss of all allied aircraft would involve more than 3,000 airplanes, all of which would be based close to NATO countries in peacetime. Figure 5 shows the standing of Pact air forces relative to those of NATO if only Soviet aircraft were available. The largest impact would be on Pact air forces throughout the ATTU region. Here, before the arrival of NATO reinforcements from the continental United States, the Pact/NATO ratio would be reduced from 1.6 to 1.4, if NATO were opposed by the Soviet Union alone.

## Figure 5.
## Current Air Force Ratios in Europe




SOURCES: Compiled by the Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, Autumn 1989); The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base* (Arlington, Va.: TASC, April 1988); and The Analytic Sciences Corporation, *The TASCFORM Methodology: A Technique for Assessing Comparative Force Modernization* (Arlington, Va.: TASC, January 1984).

NOTE: The ATTU region extends from the Atlantic Ocean to the Ural Mountains. The analysis assumes that all reinforcing aircraft arrive in the ATTU region within 17 days of Pact mobilization. The ratios depicted between zero and 17 days after mobilization are not meant to imply detailed knowledge of the exact arrival schedule of reinforcements. They are presented here only to give an indication of the impact of reinforcements on the air force ratios.

### Pact and NATO Air Forces in the Central Region

Despite its large advantage in tactical aircraft throughout the ATTU region, the Pact is at a disadvantage when only those tactical aircraft based in the central region are considered. Although aircraft are more mobile than ground forces, the early stages of a conflict in a particular region might initially involve only the aircraft stationed there. The availability of ground facilities could also limit the number of additional aircraft that could be brought into the central region from the rest of Europe. Thus, the ratios of tactical air capability in the central region should be considered, especially in view of the relative capabilities of Pact and NATO air forces during the first few days of a conflict.

The analysis of air capability in the central region makes several assumptions. Reinforcing aircraft from the interior of the Soviet Union, as well as aircraft from the United States, are assumed not to be available initially. In addition, it is assumed that aircraft would be confined to the theaters of operation where they are located in peacetime. For example, aircraft from northern NATO countries, such as Norway, and the northern regions of the Soviet Union, such as the area near Leningrad, would remain in the northern theater and would not be available for missions in the central region as it is defined in this paper.

Under these assumptions, NATO air forces in the central region outscore Pact air forces before the arrival of reinforcements by a ratio of 1.3 to 1 using the TASCFORM system (see Figure 5). After the arrival of reinforcements from the United States and the Soviet Union, NATO outscores the Pact by a ratio of 1.5 to 1. If the Polish, Czech, and East German air forces are eliminated from the Pact totals (leaving the Soviet air forces alone), then NATO's advantage increases to 1.7 to 1 without reinforcements, and 1.9 to 1 after aircraft arrive from the United States.

## LIMITATIONS OF THE STUDY METHODS

Before using these ratios of air and ground capability to reach any conclusions, it is useful to understand their limitations. Like any analysis that attempts to quantify the many aspects that contribute to military capability, the two methods used to measure combat capability in this analysis, WEI/WUV and TASCFORM, suffer from several important drawbacks. (For a detailed discussion of the limitations of these models, see Appendix B.)

One obvious drawback, though a relatively unimportant one, is the lack of more recent values for the individual ground weapons currently in NATO and Warsaw Pact units. This analysis does not purport to be a precise evaluation of either alliance's military capability. Rather, it is an attempt to assess the relative position of the two sides under a wide range of assumptions. As such, it should be viewed as representing general trends and not absolute military capability.

A more important drawback is that these analytic methods ignore many attributes of a military unit--such as quality and training of personnel, support equipment, logistic capability, and the interplay of various weapons--that can determine the outcome of a particular battle. Unfortunately, despite their

importance, these factors do not lend themselves to quantification. Failure to take training and logistics into account may actually penalize NATO forces because they traditionally devote more resources to training and logistics than does the Pact.

Static comparisons like those using the WEI/WUV or TASCFORM method also ignore other decisive variables--such as strategy, maneuver, terrain, and combat attrition--that determine the conduct of war. Indeed, these methods are useful primarily for evaluating the forces that each side could have at its disposal before the onset of hostilities, or the total forces that each side had mustered at a point after mobilization. Such comparisons, therefore, are more useful for assessing the relative standing of opposing forces before a war starts and for evaluating the capability to deter rather than fight a war.

Together these various limitations suggest that assessments of the conventional balance using WEI/WUV and TASCFORM scores cannot predict the outcome of a confrontation between NATO and the Warsaw Pact. These methods are useful tools, however, for investigating the effects of various large changes in the forces available to either side, such as the changes caused by recent political events.

## WHAT THE RATIOS MEAN

The WEI/WUV method reveals that, as of 1988, the Pact had a clear advantage in ground forces in the central region of Europe. Would this advantage have been sufficient to ensure success if the Pact had decided to invade Western Europe? Many defense experts feel that, because the defender can choose the place to defend, an attacker must attain a ratio of ground forces of at least 3 to 1 in a local area in order to overwhelm the defender. There is less agreement, however, on what ratios are needed throughout the theater--in this case, the central region as a whole--in order to achieve the required local advantage while still providing enough forces elsewhere to prevent an enemy breakthrough. Although experts differ widely, theaterwide ratios ranging between 1.2 to 1 and 2 to 1 are commonly suggested as the minimum advantage that the Pact would need to be confident of succeeding in an attack.[9]

CBO's analysis suggested that, based on scenarios accepted before 1988, the ratio of Pact to NATO forces in the central region generally hovered around 1.6 to 1. This ratio is above the theaterwide advantage that some experts believe could have led to a Pact victory. Indeed, NATO military commanders argued that if the Pact had decided to attack NATO in 1988 or before, NATO would have had no choice but to resort quickly to the use of nuclear weapons to defend Western Europe. General Bernard Rogers, former Supreme Commander of NATO, said repeatedly that he would have been forced to seek permission to use tactical nuclear weapons within days of a Warsaw Pact invasion.

9. Andrew Hamilton, "Redressing the Conventional Balance," *International Security*, vol. 10, no. 1 (Summer 1985), pp. 111-136, cited in James A. Thomson, *An Unfavorable Situation: NATO and the Conventional Balance*, RAND Note N-2842-FF/RC (Santa Monica: RAND Corporation, November 1988), p. 21.

Other analysts argued, however, that the force ratios in 1988 were below the threshold that would give the Pact confidence that it could prevail in an attack. Thus, these analysts contended, the Pact would have faced great uncertainty about the military outcome of an invasion of Western Europe. That uncertainty has probably helped to maintain the peace in Europe for 40 years.

The advantage that Pact ground forces had over NATO ground forces has obviously been diminishing in the past couple of years. This trend has been the result of revisions in assumptions about Pact capability made by the U.S. intelligence community, the unilateral reductions in Pact forces, and a total dissolution of Soviet hegemony of the Warsaw Pact. The cumulative impact of all these changes could dramatically reduce the Pact's advantage on the ground. For example, if the Soviet Union has to fight without its Eastern European allies, it could face a ratio of forces that--rather than ranging as high as 1.6 to 1 in its favor--would actually be less than 1 to 1 for almost two months after mobilization and then would barely exceed that level.

Consequently, the Pact could not be confident of obtaining a military victory today. It might enjoy some advantage on the ground, but the advantage would probably not be enough to assure quick success. Moreover, any ground advantage may be offset somewhat by the superiority of NATO air forces in the central region.

Nevertheless, military commanders often make highly conservative assumptions in assessing the course of future wars. This is understandable because wars historically have not progressed as analysis would suggest. Following that trend, the current Supreme Commander of NATO, General Galvin, said in March 1990 that he would not feel confident of defending NATO with conventional forces, even at numerical parity with a potential invader.[10] The political situation in the Soviet Union and Eastern Europe also remains highly uncertain, which fosters uncertainty in any military assessment. Thus, there remains strong interest in negotiating reductions in the Pact's military advantage through a binding agreement that limits conventional arms. Recent political events have made reductions of conventional forces in Europe a real possibility in the near future.

10. David Fairhall, "The General's Strategy of Cut-and-Stay," *Manchester Guardian*, March 20, 1990, p. 3.

# CHAPTER III
# THE EFFECTS OF A CFE TREATY ON THE MILITARY BALANCE IN EUROPE AND ON THE U.S. DEFENSE BUDGET

Both NATO and the Warsaw Pact have submitted the outlines of their proposals for a treaty limiting conventional arms at the CFE negotiations in Vienna. Although the submissions are not identical, both propose limits in four broad categories: alliancewide holdings of weapons throughout Europe; weapons held by each alliance in zones within that larger region; weapons held by individual countries within each alliance; and weapons, and to some extent troops, stationed by alliance members in another member's territory. Most important, the Warsaw Pact has accepted NATO's longstanding position that the Pact must reduce its forces to a level equal to NATO's forces. The analysis that follows is based on NATO's proposed treaty. Major differences between the two proposals are noted, however, because those differences could well lead to revisions in NATO's proposal.

## NATO'S PROPOSAL

In general, NATO's proposal for a treaty limiting conventional forces in Europe would reduce to equal levels the number of weapons held by each alliance in various categories. The area covered by the treaty reaches from the Atlantic Ocean to the Ural Mountains (ATTU) in the Soviet Union (see Figure 6). The proposed ceilings are purposely set below current NATO levels (see Table 4). Although NATO would have to reduce its weapons holdings in various categories by between 7 percent and 15 percent, the Pact would have to make much larger reductions--as high as 67 percent. Proposed ceilings differ for various categories of equipment, as does the size of the reductions that would have to be made.

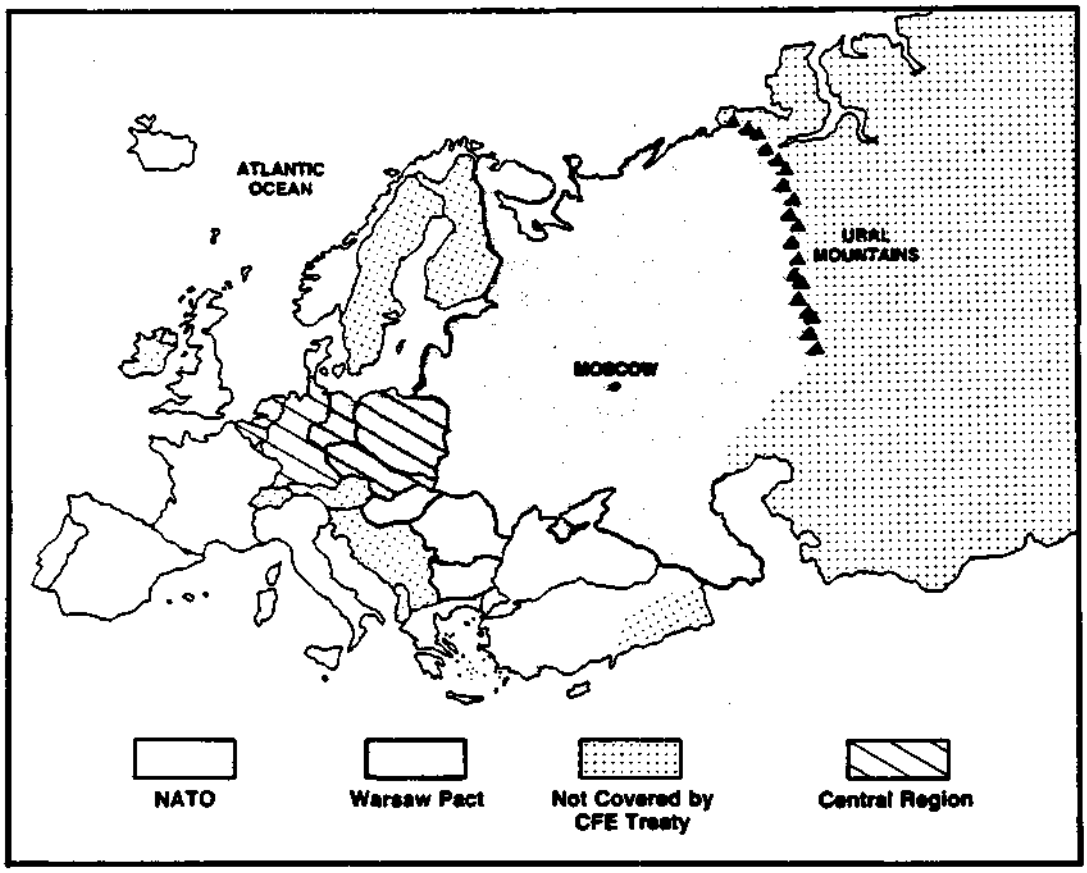
NATO has also proposed a limit on U.S. and Soviet troops stationed in the central region, and a separate ceiling on U.S. troops stationed elsewhere in Europe. As with NATO's proposed restrictions on weapons, the limits that NATO has recommended for U.S. and Soviet troops would require much larger reductions in Soviet forces than in U.S. forces.

### Restrictions on Weapons in the ATTU Region

The CFE treaty would limit five different categories of weapons: tanks, armored combat vehicles, artillery, helicopters, and high-performance aircraft. In addition to alliancewide ceilings, both NATO and the Pact propose limits on the numbers of weapons that can be controlled by any one country and that can be stationed on foreign soil. Each of these provisions would have a distinct impact on Pact and NATO forces and so will be discussed in turn.

Limits on Ground Equipment. NATO proposes that each side have stationed in the ATTU region no more than 20,000 tanks, 30,000 armored combat vehicles, and 16,500 pieces of artillery. The Pact has proposed similar ceilings for these three categories of equipment--20,000 tanks, 30,000 armored combat vehicles, and 20,000

Figure 6.
Region Covered by NATO's Proposed Treaty Limiting Conventional Forces in Europe




SOURCE: Congressional Budget Office based on Institute for Defense and Disarmament Studies, *Cutting Conventional Forces 1: An Analysis of the Official Mandate, Statistics, and Proposals in the NATO-WTO Talks on Reducing Conventional Forces in Europe* (Brookline, Mass.: Institute for Defense and Disarmament Studies, July 1989), p. 20.

pieces of artillery. Because the Pact starts with large numerical advantages in ground equipment, it would have to make much larger reductions than NATO. For example, based on NATO's estimates and proposed ceilings, the Pact would have to eliminate 39,800 tanks compared with only about 3,000 for NATO.

The Pact and NATO have agreed on definitions of what would be counted toward the ceilings on ground equipment. Specifically, the inventory of 20,000 tanks would include all vehicles with guns of at least 75mm caliber that weigh more than 16.5 metric tons. The types of artillery to be limited include any field artillery piece, multiple-rocket launcher, or mortar that has a caliber of 100mm or greater, but the ceilings differ by 3,500 pieces (16,500 in the NATO proposal and 20,000 in the Pact's).

TABLE 4. PROVISIONS OF NATO'S PROPOSED TREATY LIMITING CONVENTIONAL FORCES IN EUROPE

| | Proposed Ceiling | Proposed Reductions | | | | Ratio |
|---|---|---|---|---|---|---|
| | | NATO | | Warsaw Pact | | |
| | | Number | Percent | Number | Percent | Pact/NATO |
| Tanks | 20,000 | 3,000 | 13 | 39,800 | 67 | 13 |
| Armored Combat Vehicles | 30,000 | 4,025 | 12 | 44,000 | 59 | 11 |
| Artillery | 16,500 | 1,200 | 7 | 29,770 | 64 | 25 |
| Aircraft | 5,200 | 500 | 9 | 5,200 | 45 | 10 |
| Helicopters | 1,900 | 335 | 15 | 1,600 | 46 | 5 |
| Troops[a] | | | | | | |
| Central Region | 195,000 | 65,000 | 2 | 405,000 | 10 | 6 |
| Other | 30,000 | 15,000 | 1 | n.a. | n.a. | n.a. |
| Total | 225,000 | 80,000 | 3 | 405,000 | 10 | 5 |

SOURCES: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990); British American Security Information Council, *Basic Reports from Vienna* (Washington, D.C.: BASIC, February 22, 1990); "Ambassador R. James Woolsey: Closing in on a CFE Treaty," *Arms Control Today* (April 1990), p. 3; and Ton Frinking and Douglas Bereuter, *Special Committee on Alliance Strategy and Arms Control, Interim Report* (Brussels: North Atlantic Assembly, October 1989).

NOTE: n.a. = not applicable.

a. U.S. and Soviet troops only. NATO's proposal would allow an additional 30,000 U.S. troops to be stationed outside the central region, but does not contain the same provision for Soviet troops.

The two alliances have agreed to a complex provision covering the category of armored combat vehicles, which includes personnel carriers, infantry fighting vehicles, and heavy combat vehicles. That provision would set an overall limit of 30,000 armored combat vehicles, with sublimits on armored infantry fighting vehicles and heavy armored combat vehicles. Armored personnel carriers (APCs) are lightly armored vehicles for transporting combat troops, and NATO's proposal would allow each alliance up to 30,000 APCs. NATO defines an armored infantry fighting vehicle (AIFV) as a lightly armored vehicle with a cannon of at least 20mm caliber and would limit each alliance to 18,000 AIFVs. Finally, a heavy armored combat vehicle (HACV) is one that weighs more than seven metric tons, has a cannon with a caliber of 75mm or greater, and does not meet the requirements of a tank. Under NATO's proposal, each alliance would be permitted to have 3,000 HACVs.

Limits on Aircraft. NATO did not include limits on aircraft in its initial proposal for the CFE treaty. It was only after President Bush's speech to the NATO ministers in May 1989 that NATO modified its treaty proposal to include limits on both high-performance tactical aircraft and helicopters. The Pact, however, has proposed limiting aircraft from the very beginning of the CFE negotiations.

NATO proposes a limit of 5,200 on all land-based combat aircraft, including combat aircraft used for training. However, "primary" trainers--aircraft unlike any combat aircraft--would not be subject to the ceiling. This limit includes two separate categories: the first caps interceptors, such as those that the Soviet Union claims would be used primarily to defend its homeland, at 500; the second would cap at 4,700 all other combat aircraft. These limits would require NATO to reduce its inventory of aircraft by 9 percent and the Pact by 45 percent.

Disagreements between NATO and the Warsaw Pact about aircraft are much more significant than those regarding ground equipment. The Pact would exclude some of the combat trainers and more of the interceptor aircraft from the negotiations. In addition, the Pact's proposal would exclude the land-based naval aircraft covered by NATO's proposal.

NATO has also proposed a limit of 1,900 on two types of land-based combat helicopters: attack helicopters that carry weapons for use against targets on the ground or in the air, and combat support helicopters that do not meet the definition of an attack helicopter but may be armed with weapons for self-defense and can be used to find targets for attack helicopters. The Pact's proposed ceiling on combat helicopters is also 1,900, but would include helicopters on ships in waters adjacent to Europe. In addition, the Pact would limit helicopters used to carry troops and for radio electronic warfare. Under either side's definition, the Pact would again have to make much bigger reductions in its inventories than would NATO. Using NATO's definition, the Pact would be forced to eliminate almost half of its combat helicopters, compared with a reduction of 15 percent in NATO's helicopter fleet (see Table 4).

## Zonal Restrictions on Ground Equipment

Both NATO and the Warsaw Pact would impose sublimits on the number of ground weapons held by each alliance within certain areas of the ATTU region. These zonal restrictions are complicated to describe, but they deserve mention because they could significantly affect the balance of forces in a post-CFE environment.

The stated rationale for establishing smaller zones within the ATTU region is to prevent either alliance from concentrating weapons close to the border between the two alliances, thereby making less likely an attack by either side on short warning. As with the weapons restrictions that apply to the ATTU region, the specific definitions of zones and the subceilings proposed by NATO and the Pact differ in some respects.

NATO has proposed four zones that are roughly concentric, with the smaller zones being included in the larger ones (see Figure 7). These zones are defined as follows:

- Zone 1 is the ATTU region. It also includes all the European island territories of the members of the two alliances. For the Soviet Union, the area west of the Ural Mountains, the Ural River, and the Caspian Sea is included. Approximately half of Turkey is included in this zone.

- Zone 2 excludes from the ATTU region the Leningrad, Odessa, Kiev, Trans-Caucasus, and North Caucasus military districts (MDs) in the Soviet Union, as well as Romania and Bulgaria. Greece, Iceland, Norway, and Turkey would also be excluded.

- Zone 3 consists of the central region (zone 4) plus Hungary and the Soviet Union's western MDs--the Baltic, Byelorussian, and Carpathian MDs--as well as Denmark, France, Italy, and the United Kingdom.

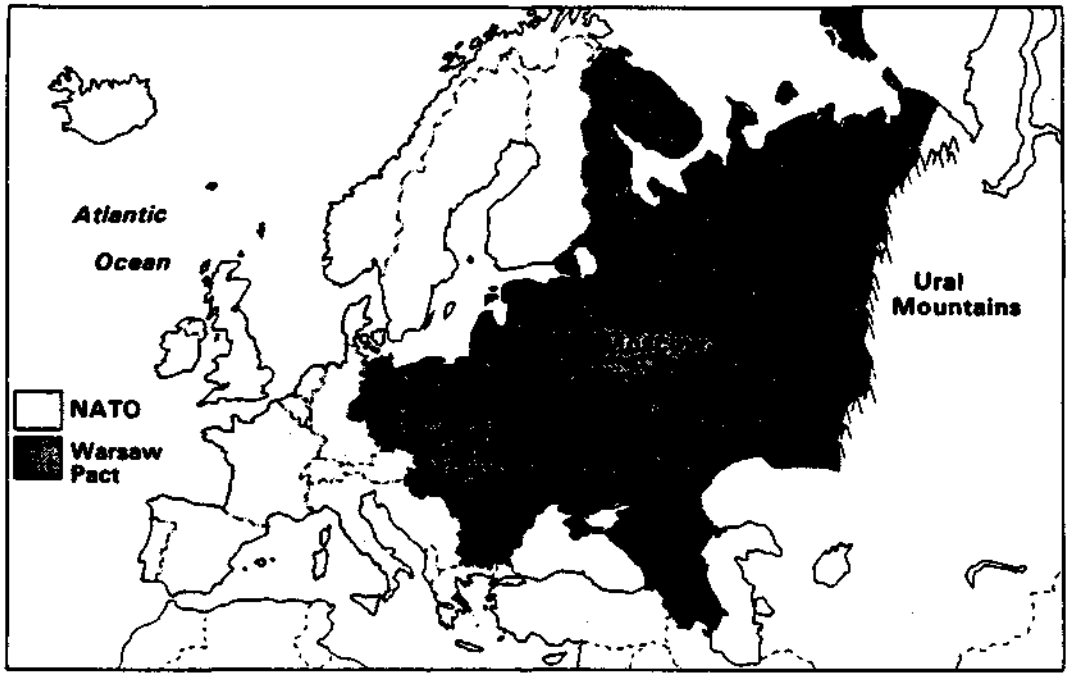
- Zone 4 consists of the central region--Czechoslovakia, East Germany, Poland, Belgium, West Germany, Luxembourg, and the Netherlands.

The Pact has proposed three zones that are not concentric but cover areas progressively more removed from the central region. The zone closest to the inter-German border would be similar to NATO's zone 3 but would exclude Italy from NATO's region and include the Kiev MD in the Soviet Union. The Pact's second zone--called the "rear area"--would include the NATO countries of Iceland, Portugal, and Spain and the corresponding Pact territory in the southern part of the Leningrad MD, and the Moscow, Ural, and Volga MDs. The parts of the ATTU region not included in the previous zones would be included in the "northern and southern flanks."

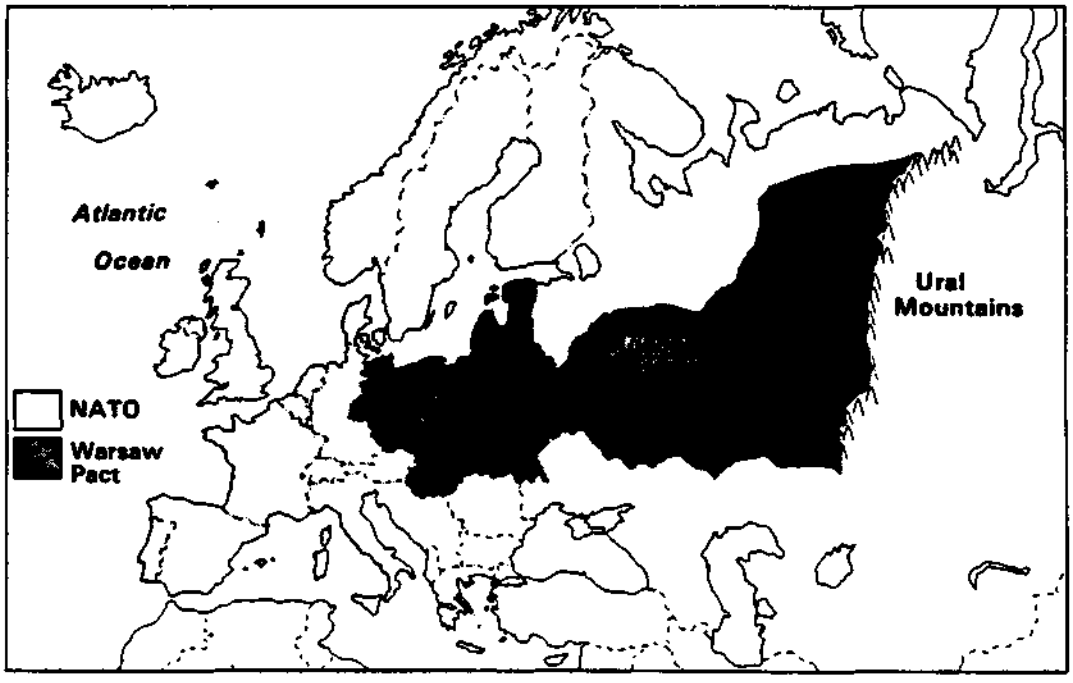
NATO has proposed ceilings for the three zones within the ATTU region applicable to all ground weapons that would be limited by the treaty (see Table 5). Unlike the limits proposed for the ATTU region, these limits would apply only to weapons in active units, not to stored equipment. Thus, all NATO weapons in war reserve stocks or prepositioned units would be exempt from these ceilings, as would all Pact--primarily Soviet--equipment in forward storage in Eastern Europe. NATO's zonal ceilings seem designed with two purposes in mind: to limit Pact weapons in those regions most likely to provide forces to fight in the central region, and to allow NATO to maintain large numbers of stored weapons, particularly in the central region where the United States maintains stocks of more than 4,000 tanks, 1,000 pieces of artillery, and 850 armored combat vehicles.

For the Pact, NATO's proposed zonal limits would result in proportionately larger reductions in tank and artillery inventories in the western and central military districts in the Soviet Union (which are in zones 3 and 2, respectively) than in the ATTU region (zone 1) as a whole (see Table 6). The reductions in tanks and artillery for both NATO and the Pact in the central region (zone 4) itself, however, would be proportionately smaller than the reductions required throughout the ATTU region, or zone 1. Thus, both sides would be able to retain substantial arsenals of weapons for ground combat in the region surrounding the two Germanys.

Figure 7.
NATO's Proposed Arms Control Zones



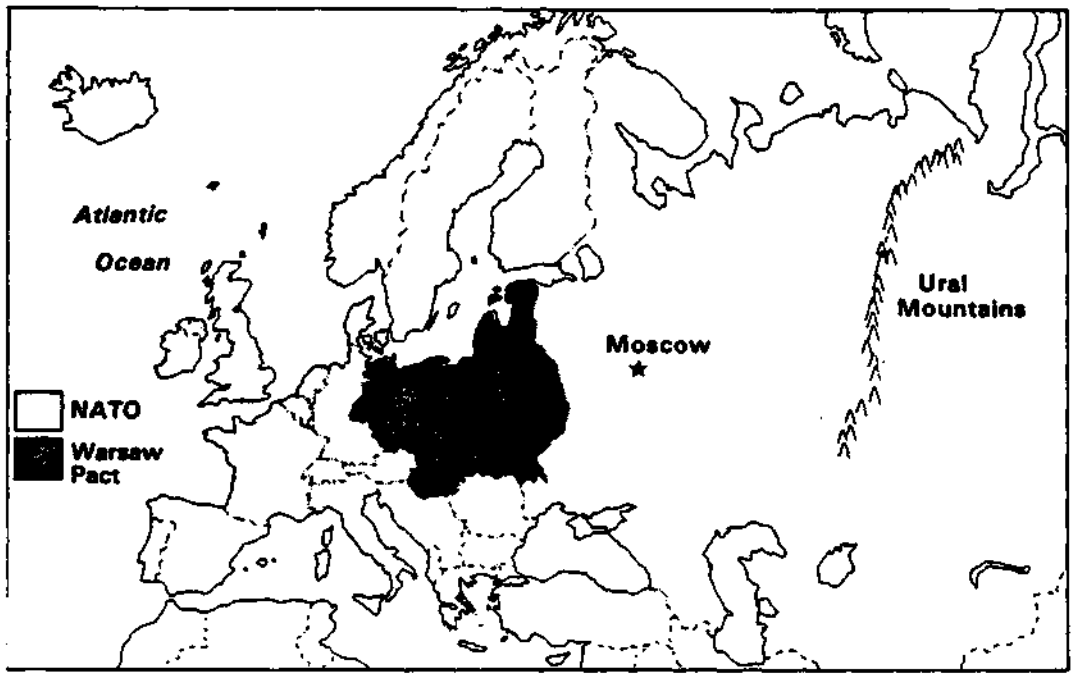

Zone 1 (ATTU)



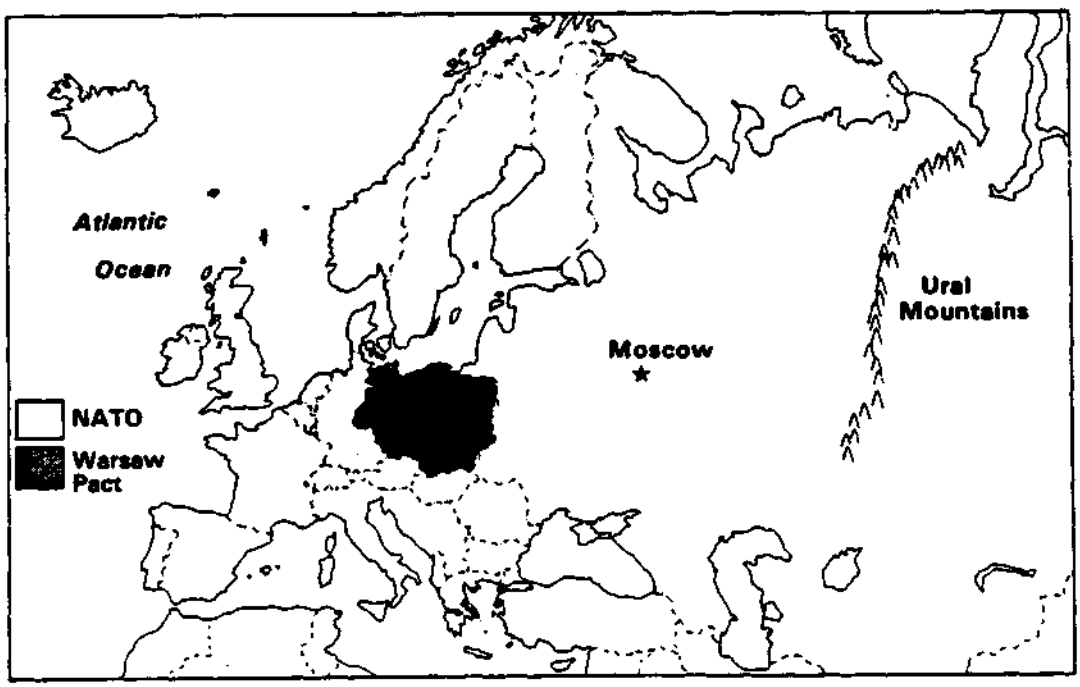

Zone 2

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures,* Congressional Research Service (March 14, 1990).

Figure 7. (continued)




Zone 3




Zone 4

## TABLE 5. NATO'S PROPOSED ZONAL CEILINGS FOR GROUND EQUIPMENT

| | Zone | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Tanks | 20,000 | 11,300 | 10,300 | 8,000 |
| Armored Combat Vehicles | 30,000 | 20,000 | 18,000 | 11,000 |
| Artillery Pieces | 16,500 | 9,000 | 7,600 | 4,500 |

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures,* Congressional Research Service (March 14, 1990).

NOTES: Zone 1 corresponds to the region between the Atlantic Ocean and the Ural Mountains.

Ceilings for zones 2, 3, and 4 apply only to equipment in active units.

## TABLE 6. REDUCTIONS REQUIRED TO COMPLY WITH NATO'S PROPOSED ZONAL CEILINGS FOR GROUND EQUIPMENT

| | Percentage Reduction from Current Holdings in Zone | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Tanks | | | | |
| NATO | 13 | 9 | 11 | 7 |
| Warsaw Pact | 67 | 69 | 67 | 60 |
| Artillery Pieces | | | | |
| NATO | 7 | 4 | 6 | 3 |
| Warsaw Pact | 64 | 66 | 67 | 63 |

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures,* Congressional Research Service (March 14, 1990).

NOTES: Zone 1 corresponds to the region between the Atlantic Ocean and the Ural Mountains.

Reductions for zones 2, 3, and 4 apply only to equipment in active units.

Reductions for armored combat vehicles could not be calculated because of recent changes in how NATO defines them.

The limits proposed by the Pact would apply to three zones that would be completely separate, thereby limiting weapons held in the flanking and rear areas as well as in the central region. The ceilings proposed by the Pact, however, would have very different effects on current tank holdings in these three zones (see Table 7). For example, the Pact's tank holdings in the Pact's extended central zone would have to be reduced by only 19 percent, much less than the reduction required in the Pact's tank holdings overall. The limits placed on the rear area and flanks, however, would require cuts of 78 percent and 58 percent, respectively, in Pact tank inventories in these two zones.

The impact on NATO tank holdings would be somewhat different, however, particularly since the Pact would apply its zonal limits to stored equipment as well as to that in active units. The countries on NATO's flanks and in its rear area have substantial tank holdings--Turkey, for example, has more than 1,300 tanks in the European portion of the country. There are no tanks stationed by allied countries in these areas, however, and NATO has large stores in the central region. As a result, the Pact proposal would actually allow NATO to increase its tank holdings in the rear area by 35 percent. But NATO would be required to cut its tank inventories in the extended central region by 17 percent, slightly more than the overall reduction of 13 percent required in NATO tank holdings.

The effects of the two alliance's proposals are obviously different, when the zonal limits proposed by each side are taken into account. Although it is impossible to predict which of the two positions will ultimately be incorporated into the treaty, the rest of the analysis of the treaty's impact on ground forces is based on NATO's proposal.

### Limits on Weapons Held by a Single Country

Both NATO and the Warsaw Pact propose to limit the fraction of each alliance's total holdings that any one member of that alliance may control. This principle, referred to as the sufficiency rule, is designed to allow each country enough assets for its own defense, but to prevent one country from controlling so many weapons that it could, by itself, pose a threat to the opposing alliance. NATO's proposal would limit any individual country to no more than 60 percent of the alliance's total assets. This would mean, for example, that of the Pact's 20,000 tanks remaining after implementation of the CFE treaty, at most 12,000 could belong to any one member. This proportion applies to all weapons categories in NATO's proposal. In the Pact's proposal, however, the sufficiency limit varies from a low of 64 percent for armored combat vehicles to a high of 85 percent for artillery. These varying percentages may reflect the Soviet Union's concern for its large artillery holdings and its belief that artillery is important to its own defensive strategy. In practice, the sufficiency rule would limit only Soviet holdings, since the Soviet Union is the only country in the Pact or NATO with sufficiently large holdings to be affected by the rule.

### Limits on Weapons Based in Allied Territory

Another principle to which both alliances adhere is the limiting of weapons stationed by alliance members on another member's soil. Limits have been proposed on the

TABLE 7. REDUCTIONS REQUIRED TO COMPLY WITH THE PACT'S PROPOSED ZONAL CEILINGS FOR TANKS

| | Northern and Southern Flanks | Rear Area | Extended Central Region |
|---|---|---|---|
| Proposed Zonal Ceiling | 5,400 | 1,300 | 13,300 |
| Reductions Required to Meet Zonal Ceiling (Percent) | | | |
| NATO | 2 | -35 | 17 |
| Warsaw Pact | 58 | 78 | 19 |

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: Negative numbers represent an allowed increase in tanks in the specified region.

number of tanks that the United States could station in European countries, or that the Soviet Union could maintain in Eastern Europe outside the Soviet Union. Again, NATO would limit only those systems in active units on foreign soil, thus excluding the large stores of U.S. equipment in West Germany, Belgium, and the Netherlands.

NATO's proposal would limit foreign-based ground weapons only and would set the ceilings at levels from 10 percent to 20 percent of alliance totals (see Table 8). The Pact's proposal would limit foreign-based aircraft as well as ground weapons and would set the ceilings at a higher level--from 20 percent to 32 percent of alliance totals. This proposal again may reflect the larger numbers of Soviet weapons stationed in its allies' territories in Eastern Europe. Also, as with the sufficiency rule, NATO's limits would force larger reductions for the Pact, and the reductions would affect only Soviet forces stationed in Eastern Europe. As a result of pressure from its own allies, however, the Soviet Union is withdrawing some of its forces from its allies' territory. Therefore, the estimated reductions shown in Table 8, which are based in part on estimates as of April 1988, may be somewhat larger than those that would result from carrying out the treaty.

## Proposed Limits on Troops

In addition to limiting weapons, NATO would also limit the number of U.S. and Soviet troops stationed in the ATTU region but outside their home territory. NATO's proposed ceiling of 195,000 on air and ground personnel stationed in central Europe would require the withdrawal of 65,000 U.S. and 405,000 Soviet troops from this region. The United States would be allowed an additional 30,000 troops in the European countries outside this region and would have to withdraw an additional 15,000 troops to meet this limit, for a total withdrawal of 80,000 U.S.

TABLE 8. NATO'S PROPOSED CEILINGS ON FOREIGN-BASED WEAPONS

| | Ceiling | | Reductions | |
|---|---|---|---|---|
| | ATTU Region | Foreign-Based[a] | NATO | Pact[b] |
| Tanks | 20,000 | 3,200 | 300 | 7,400 |
| Armored Combat Vehicles | 30,000 | 6,000 | c | c |
| Artillery Pieces | 16,500 | 1,700 | 0 | 5,500 |

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: The ATTU region extends from the Alantic Ocean to the Ural Mountains.

a. Applies only to equipment in active units.

b. Pertains only to forces of the Soviet Union because it is the only Pact member to have foreign-based weapons.

c. Could not be calculated because of recent changes in NATO's definition of armored combat vehicles.

troops. The Pact proposal would allow a larger number of troops in central Europe, but would limit all NATO and Pact troops to between 700,000 and 750,000 for each alliance.

### Other Provisions

NATO has proposed extensive verification procedures, including the right of both sides to inspect the other's military forces. NATO also proposes that all eliminated weapons be destroyed and has, in various past proposals, requested that troops that are removed in order to meet treaty constraints be demobilized. Finally, NATO asks that a treaty be signed in 1990 and be fully carried out by 1993, although doubts remain about the feasibility of this schedule.

## THE IMPLICATIONS OF A CFE TREATY FOR THE MILITARY BALANCE

The large reductions in the number of Warsaw Pact weapons required by NATO's proposed CFE treaty would have profound effects on the relative combat capability of both sides. The proposal would greatly reduce the concentration of arms in Europe, although each alliance would retain large military forces. In fact, even after the treaty is implemented and more than 40,000 tanks have been destroyed, the 40,000 tanks remaining in Europe would still exceed the number deployed there during World War II. Thus, each side would still have considerable capability to wage war.

Ground Forces

The military impact of the CFE treaty can be determined only by making many assumptions concerning how each alliance would carry out the treaty. The simplest assumption is that each country reduces its weapons inventories in proportion to the overall reduction required in the alliance total. Thus, if NATO must reduce its tank holdings by 13 percent to meet the treaty's ceilings on tanks, then each NATO member would be assumed to reduce its tank holdings by 13 percent. In this way, each member of each alliance would share equally in the burdens and benefits resulting from the treaty.

Countries that have weapons stationed in more than one country within the ATTU region--primarily the Soviet Union--have the additional problem of how to distribute reductions among weapons inventories located in various regions. Again, the simplest assumption is to reduce inventories within a given country or military district by the same proportion that the alliance total must be reduced. Under this assumption, Soviet tank holdings in East Germany, Poland, and Czechoslovakia, as well as the inventories in each of the military districts, would be reduced by 67 percent, the overall reduction in tanks required of the Pact. Recent events in Czechoslovakia have made it unlikely that Soviet forces will remain there for much longer, however. CBO therefore assumed that all Soviet ground forces will have left Czechoslovakia by the time the CFE treaty is carried out. A reduction in the number of combat units that would be available to NATO and the Pact in the central region could then be calculated, based on the reduced amount of weapons available to equip them. Throughout this paper, analyses of the impact of the CFE treaty assume proportional reductions by region, except for Soviet forces in Czechoslovakia and when zonal limits demand varying reductions.

The impact on forces available to NATO and the Pact based on these assumptions is, of course, as asymmetric as the reductions in weapons called for by the treaty. NATO might be forced to eliminate fewer than four division equivalents from the central region (for more details, see Appendix A). This would result in a reduction in NATO ground combat capability of about 7 percent. The Pact could lose 33 division equivalents overall. Most (almost 27) of these division equivalents would be Soviet forces, thus cutting Pact ground combat capability almost in half (see Table 9).

Force Ratios Under the Treaty. Once the treaty has been carried out, the ratio of Warsaw Pact to NATO forces, as measured by the WEI/WUV method, would almost never exceed 1.0; that is, NATO would almost always have greater ground combat capability than the Warsaw Pact (see Figure 8). NATO would enjoy a modest advantage during most of the 90-day period after the Pact starts to mobilize for several reasons: the higher quality of its weapons, the time that the Soviet Union would need to prepare its less-ready units and transport them to the region near the border between the two alliances, and the arrival of reinforcements for NATO from the continental United States--reinforcements that are not constrained by the treaty.

This situation contrasts sharply with the current balance of forces. Assuming the longer mobilization time discussed in Chapter II but no CFE treaty, the Pact's ground combat capability sometimes exceeds that of NATO by 60 percent or more

## TABLE 9. REDUCTIONS IN WARSAW PACT GROUND FORCES UNDER NATO'S PROPOSED CFE TREATY

| | Proportional Reductions by Zones | | Reductions Based on Zonal Ceilings | |
|---|---|---|---|---|
| | Divisions | ADEs[a] | Divisions | ADEs[a] |
| Czechoslovakia | 4 | 2 | 4 | 2 |
| East Germany | 2 | 1 | 2 | 1 |
| Poland | 6 | 3 | 6 | 3 |
| Soviet Forces in: | | | | |
| Eastern Europe[b] | 17 | 13 | 17 | 13 |
| Western Soviet Union[c] | 11 | 9 | 17 | 12 |
| Central Soviet Union[d] | 5 | 5 | 11 | 8 |
| Total Soviet Forces | 33 | 27 | 45 | 33 |
| Total Pact Forces | 45 | 33 | 57 | 39 |

SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures* (October 30, 1989; March 14, 1990).

a. Values for the armored division equivalents (ADEs) are based on the assumption that all Soviet divisions have been restructured to include fewer tanks.

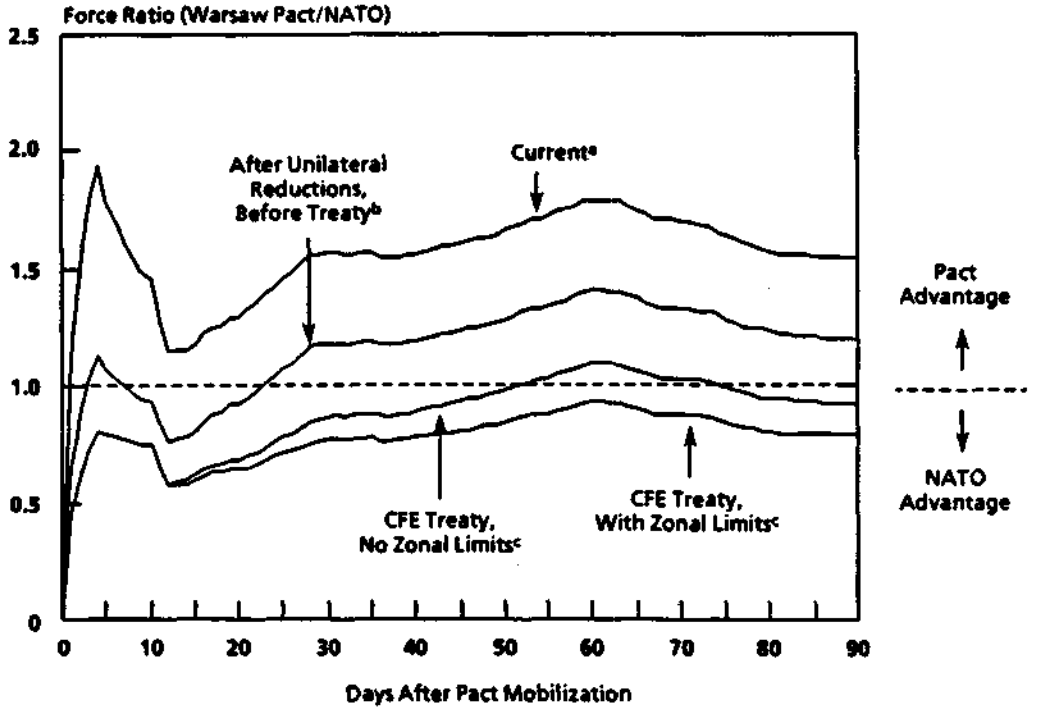
b. Includes Soviet forces in Czechoslovakia, East Germany, and Poland (located in zone 4).

c. Includes Soviet forces in the Baltic, Byelorussian, and Carpathian military districts (located in zone 3).

d. Includes Soviet forces in the Moscow, Ural, and Volga military districts (located in zone 2); the Kiev military district (located in zone 1); and the Central Asian military district (outside the region covered by the treaty).

(see Figure 8). Nor would the unilateral reductions promised by the Soviet Union and other Pact members redress the military imbalance in Europe to the same degree as would the proposed CFE treaty. Even after those unilateral reductions are fully carried out, the Pact's ground combat capability would still sometimes exceed NATO's by 40 percent instead of the relative parity of capability offered by the CFE treaty (see Figure 8). Perhaps even more important is the fact that reductions undertaken unilaterally by Pact members can also be reversed unilaterally, without fear of international sanction. Thus, the Pact could, in the future, reactivate the units currently being eliminated. For this reason, all future discussions of the impact of the treaty will use as a reference the balance between NATO and Pact forces assuming no unilateral reductions by Pact members.

## Figure 8.
## Ground Force Ratios in the European Central Region Under NATO's Proposed CFE Treaty




SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTES: Based on revised mobilization schedule. Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

a. Does not reflect unilateral Soviet withdrawals from Eastern Europe.

b. Assumes that all announced unilateral reductions in Pact forces have been made.

c. Based on withdrawal of combat units to meet the treaty's ceilings on weapons.

Effects of Zonal Limits. The effects of the limits on ground equipment on the balance in the central region would be even more pronounced when NATO's proposed zonal limits are taken into account. The previous analysis assumed that Pact and NATO forces would be reduced at most locations in proportion to the overall reduction in the alliance total. Meeting the zonal limits included in NATO's proposal would force a redistribution of Pact assets, however. As a result, fewer Soviet forces would be stationed in those military districts located in zones 2 and 3 that would reinforce the central region (see notes c and d, Table 9). With fewer Pact forces to oppose NATO forces in the central region, the balance there would actually swing sharply in NATO's favor (see Figure 8). At some points after mobilization begins, NATO would enjoy an advantage of more than 1.5 to 1 over the Pact in terms of ground combat capability.

Of course, if the Pact decided to invade NATO and to mobilize for such an invasion, it would probably not feel constrained by the provisions of a treaty with NATO. Once the decision to abrogate the treaty had been made, it would certainly be possible to bring Soviet units stationed in the northern and southern regions in peacetime into the central region during a 90-day mobilization period. Thus, in subsequent discussion of the effects of the CFE treaty, the zonal limits are disregarded and reductions in ground forces are proportional across all zones. Nevertheless, these forces would arrive in theater somewhat later than they would have arrived in the absence of restrictions on peacetime stationing.

### Air Forces

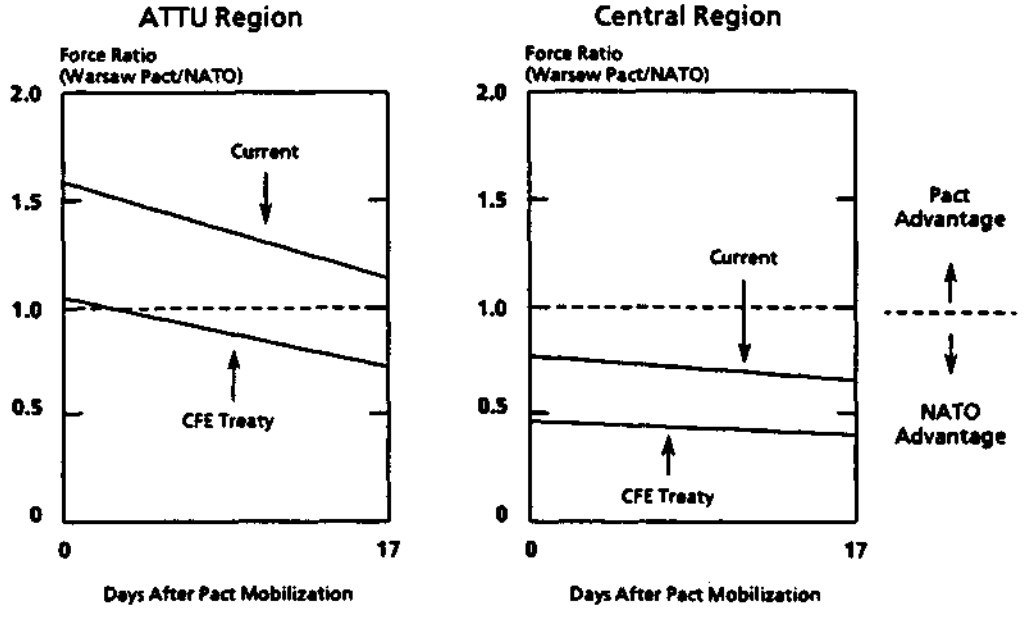
The effects of NATO's proposed CFE treaty on air forces would be even more favorable to NATO than those on ground forces. The proposal would permit each alliance to have 4,700 combat aircraft, plus 500 interceptors, stationed in the ATTU region during peacetime. But aircraft stationed in the continental United States would not be limited by the treaty and would add significantly to NATO's air capability during a crisis. After these reinforcements arrived in Europe, NATO would have 31 percent more aircraft and, because its aircraft are of higher average quality, a 40 percent advantage in capability as measured by TASCFORM scores (see Figure 9). In contrast, the Pact currently enjoys an advantage in both numbers and capability in the ATTU region.

NATO's advantage could be even more pronounced in the central region of Europe. After reinforcements arrive from the United States, NATO could enjoy an advantage of 2.5 to 1 in capability based on the TASCFORM method (see Figure 9). This large advantage results in part because of the simplifying assumptions used in this paper. CBO's analysis is based on the assumption that, in complying with NATO's proposal, each Warsaw Pact member reduces its total holdings by the same proportion; that within broad types of aircraft, such as fighter-bombers, reductions are made proportionately; that the least capable aircraft are eliminated first; and that the remaining Soviet aircraft would not be redistributed from their current location. These assumptions permit analysis of the effects of the treaty, but the Pact's disadvantage in air capability in the central region would be minimized if the Pact accommodated the proposed limits in a different manner. Nevertheless, NATO's proposal would almost certainly leave NATO with some advantage in air forces, both in the central region and in the entire ATTU region.

## BUDGETARY SAVINGS RESULTING FROM A CFE TREATY

NATO's proposed CFE treaty would require it to reduce its inventory of selected weapons by as much as 18 percent. Assuming that all members of the alliance reduced their inventories proportionately, the United States would have to remove from Europe and destroy 780 tanks, 888 armored combat vehicles, 156 pieces of artillery, 105 helicopters, and 63 aircraft. To reduce the number of U.S. Air Force and Army personnel stationed in Europe to the proposed ceiling of 225,000, about 80,000 U.S. troops would have to be brought back from Europe.

## Figure 9.
## Air Force Ratios in Europe Under NATO's Proposed CFE Treaty




SOURCE: Congressional Budget Office based on Michael D. Scanlan, *Conventional Armed Forces in Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: The ATTU region extends from the Atlantic Ocean to the Ural Mountains. The analysis assumes that all reinforcing aircraft arrive in the ATTU region within 17 days of Pact mobilization. The ratios depicted between zero and 17 days after mobilization are not meant to imply detailed knowledge of the exact arrival schedule of reinforcements. They are presented here only to give an indication of the impact of reinforcements on the air force ratios.

## Force Reductions and Savings

There are, of course, many ways to accommodate these limits. In order to estimate potential budgetary savings, CBO constructed an illustrative withdrawal that included two Army "heavy" divisions and two wings of F-16 fighter aircraft.[1] The troops assigned to these units, and those that support them, would total 82,900--76,400

1. An Army division of the "heavy" type that would be withdrawn consists of about 16,000 personnel directly assigned to the division and associated equipment. The heavy designation means that the division contains tanks and other heavy equipment. Divisions usually include three brigades. A wing of aircraft typically consists of 72 aircraft plus backups and is usually made up of three squadrons, each with 24 aircraft.

TABLE 10. EFFECT OF NATO'S PROPOSED CFE TREATY ON THE ARMY AND AIR FORCE

| | 1990 Level[a] | | Reductions Resulting from Treaty[b] |
|---|---|---|---|
| | Total | Based in Europe | |
| | **ARMY** | | |
| Active Military Personnel | 764,000 | 222,243 | 76,400 |
| Active Divisions | 18 | 4 2/3 | 2 |
| | **AIR FORCE** | | |
| Active Military Personnel | 567,500 | 86,722 | 6,500 |
| Active Tactical Wings | 24 | 8 | 2 |

SOURCE: Congressional Budget Office based on Department of Defense data.

a. Based on Congressionally authorized end strengths for 1990.

b. All reductions except for 2,900 personnel are assumed to come from Europe.

Army and 6,500 Air Force personnel--with all but 2,900 of the troops being currently stationed in Europe (see Table 10).

The operating savings associated with eliminating these units and personnel from the military would total $5.1 billion a year in 1990 dollars (see Table 11).[2] These savings include money for military pay and benefits, operation and maintenance of equipment associated with the units, procurement of spare and replacement parts, and some military construction. These savings, measured from the 1990 budget, would not be fully realized until the reductions associated with the treaty were made. Based on the current schedule for implementing the treaty, the cuts may not be completed until 1993.

2. Budgetary savings could be even more modest because of recent Congressional action. In its 1990 authorization bill for the Department of Defense, the Congress directed the Army and Air Force to reduce their personnel in Europe by a total of 14,600 to reflect the removal of units associated with intermediate-range nuclear forces (INF) under the recent treaty. Since NATO's proposed CFE treaty would establish a ceiling of 225,000 for U.S. forces in Europe, removing the 14,600 INF-related troops might mean that only 65,400 other troops would have to be demobilized in order to comply with CFE treaty. Demobilizing fewer troops could reduce annual savings by about $550 million.

TABLE 11. POTENTIAL ANNUAL SAVINGS ASSOCIATED WITH NATO'S PROPOSED CFE TREATY (In billions of 1990 dollars)

| Number of Divisions or Wings | Operating and Support (O&S) | | | Long-Term Procurement[c] | Total (O&S and Procurement) |
|---|---|---|---|---|---|
| | Direct[a] | Indirect[b] | Total | | |
| Two Army Divisions | 2.1 | 2.5 | 4.6 | 0.7 | 5.3 |
| Two Tactical Air Force Wings | 0.3 | 0.2 | 0.5 | 0.5 | 1.0 |
| Total Savings (Army and Air Force) | 2.4 | 2.7 | 5.1 | 1.2 | 6.3 |

SOURCE: Congressional Budget Office based on Department of Defense data.

a. Direct O&S costs are those tied to individual units. Examples include civilian and military pay, fuel, some supplies and spare parts, modifications, and munitions.

b. Indirect O&S costs pay for items that are necessary to support units, but are not linked as closely to particular units. Examples include funds for operating bases, depot maintenance, training, management support, medical care, personnel support, logistics, and other centralized support functions.

c. Based on proportional reductions in procurement budgets for the Army and the tactical Air Force.

Further savings would also be achieved in procurement funding, because the smaller number of remaining units would not need as much modern equipment. The treaty could save billions of dollars in procurement funds over 10 to 20 years. Translating this potential long-term savings in procurement funds to savings in a particular year, however, is not easy. The Army and the Air Force may not need to buy replacement equipment for their European forces in the next few years. In fact, the services currently have enough tanks, fighting vehicles, and fighter-bombers for their European forces, and may not need any more for at least a decade. Moreover, the procurement budgets of the Army and Air Force buy many more items besides tanks and fighter-bombers. Indeed, much of the procurement budget is used to buy such mundane things as ammunition, trucks, and radios.

CBO did not attempt the highly detailed--and inevitably somewhat arbitrary--analysis of changes that the CFE treaty could cause in procurement budgets. Instead, in order to reflect the reduced size of the Army and tactical Air Force, CBO assumed that the annual procurement budgets for the Army and tactical Air Force could be reduced by the same proportion as the force structure. Thus, for example, the elimination of two Army divisions was assumed to reduce total Army procurement funds by about 7 percent (2 divisions divided by the 28 active and

reserve divisions currently in the Army force structure). Procurement funds for the tactical Air Force were assumed to be reduced in proportion to the reduction in active and reserve tactical fighter wings. In this way, more than a billion dollars could be added to the annual savings in an average year. These procurement savings would bring total savings under the treaty to $6.3 billion a year.

These savings would be a small percentage of the total defense dollars spent each year for the Army and tactical Air Force. In 1990, funds for these forces accounted for about $103 billion, or approximately 35 percent of the total budget for the Department of Defense. The estimated annual savings of $6.3 billion amounts to about 6 percent of the combined Army and tactical Air Force budgets for 1990, and about 2 percent of the entire DoD budget for that year.

### Costs of Verification

The savings of $6.3 billion a year do not reflect any added costs associated with verifying the treaty because those costs are difficult to estimate. History provides no guidance because the United States has not been involved recently in such a treaty. Moreover, basic decisions that will greatly affect the costs of verification, such as the frequency of inspections at military installations and production facilities, have yet to be made.

The added costs of most approaches to verifying the CFE treaty, however, would probably not significantly reduce the annual savings. The United States will not have to pay to destroy large numbers of weapons under the treaty. Indeed, most U.S. equipment eliminated under the treaty may be given to allies, which would avoid all destruction costs. Nor is it likely that the CFE treaty will involve much, if any, of the most expensive type of verification--continuous monitoring of plants or bases, a technique that probably will be used to verify a treaty limiting strategic arms. Moreover, a portion of the costs of verifying the CFE treaty will be borne by the U.S. allies, which will further reduce costs to this country.

The CFE treaty, especially when coupled with a treaty limiting strategic arms, may cause the United States to enhance its ability to monitor treaty compliance using satellites or other of the so-called national technical means. Additional satellites would be quite expensive, and the bill for a lot more of them could substantially reduce the projected annual savings of $6.3 billion. However, because it is not clear that the United States must increase its satellite monitoring in order to verify the CFE treaty adequately, this paper does not assume any added costs for satellite monitoring.

## OVERALL ASSESSMENT OF THE IMPACT OF NATO'S CFE PROPOSAL

NATO would enjoy substantial benefits if its proposed CFE treaty were carried out. The Warsaw Pact would have to make much larger reductions in its personnel and inventories of weapons than would the NATO allies, leaving NATO in a much better military position--both on the ground and in the air--than it enjoys today. As a result, a CFE treaty would enhance NATO's conventional deterrence and reduce

the risk of NATO's having to resort to nuclear weapons in response to a Pact attack. In short, military risk would be sharply reduced.

While the reduction in risk is substantial, budgetary savings would be modest. If larger budgetary savings are to be achieved under the treaty, then NATO will have to consider forgoing some of the reduction in military risk offered by the treaty.

# CHAPTER IV
# OPTIONS FOR FURTHER U.S. FORCE REDUCTIONS

The proposed CFE treaty would greatly reduce the military risks to NATO. Coupled with political changes that have virtually destroyed the Warsaw Pact as a military alliance, the reduced risks under the treaty could allow NATO to cut its military forces beyond the minimum reductions required to accommodate the treaty.

To illustrate the possible effects on costs and capability, this chapter examines two such large reductions. The first would make reductions in U.S. forces based on the proposals that may be submitted next year by the Administration. These possible Administration plans were outlined in Congressional testimony presented by Defense Secretary Cheney in early 1990. The proposed reductions of roughly 16 percent would leave sufficient NATO forces for adequate geographic coverage while still producing moderately larger budgetary savings than those associated solely with the treaty. The second option would reduce NATO's air and ground forces by 40 percent and 50 percent--in proportion to reductions that would be made by the Warsaw Pact under the treaty--and would produce even larger budgetary savings. Both options would reduce U.S. forces stationed in Europe as well as those forces that are stationed in the United States during peacetime but are intended as reinforcements for NATO in time of war.

Since this paper focuses on changes in the U.S. military that might occur as a result of the completion of a treaty limiting conventional forces in Europe, the options were constructed with the same limitations in mind. Only those forces that would be limited by a CFE treaty--forces of the U.S. Army and the tactical Air Force--were considered as candidates for elimination from the U.S. military. The options that CBO analyzed, therefore, do not include reductions in naval, marine, or strategic forces. Nor are any reductions assumed in the defense agencies that support the U.S. military as a whole, or in the research and development programs.

The options analyzed in this chapter would remove units and personnel completely from the Army and tactical Air Force, resulting in a smaller U.S. military. Using another approach, the United States could remove units from the active military and put some of them in the reserves. In this way, the United States would retain the flexibility to rebuild its forces more quickly than if active units are simply disbanded. Although not considered in this study, a separate analysis conducted by CBO did examine alternative approaches that would increase reliance on the reserves.[1] One approach would couple reductions in active forces with increases in the number of selected reserves. This approach has been used in the past and may be most appropriate if the United States wants to add only a few reserve units to its forces. Adding large numbers of selected reserve units, however, would be difficult because of the problems in recruiting enough people who have the required skills and live close enough to units to drill on weekends.

1. Testimony of Robert D. Reischauer before the Senate Committee on Armed Services, May 10, 1990.

A different approach that would be more appropriate if the United States wants to add large numbers of reserve units would rely more heavily on nondrilling or individual ready reserves. In a departure from past practices, during peacetime the Air Force would store planes in a status designed to permit reasonably rapid retrieval. In wartime, a combination of individual ready reserves, selected reserves, and active-duty personnel would be assigned to the aircraft. The Army would establish cadre divisions that would include about 3,000 active-duty personnel in peacetime and would be filled out with individual ready reserves in wartime.

The flexibility of rebuilding with additional reserve units would, of course, come at a price. Although adding reserves would probably not offset all of the savings available from reducing the active-duty forces--CBO estimates that, depending on the type of unit, typical Army and Air Force units in the selected reserves cost only about 20 percent to 60 percent as much to operate as similar units in the active forces--they are generally considered to be less well trained and prepared for combat than active forces. Converting active forces to reserve forces, rather than eliminating them from the force, entails both advantages and disadvantages. The issues associated with reserve and active forces are appropriate material for a complete study of their own and so are not examined here.

Although this study focuses on budgetary changes in the Army and the tactical portion of the Air Force, which account for 35 percent of the total defense budget, other portions of the defense budget could be affected indirectly. For example, if there are fewer Army divisions to support during a major European war, then fewer aircraft carriers and submarines may be needed to protect convoys headed for Europe. More important, if arms limitations of the sort in the proposed CFE treaty convince the United States that its national security is less threatened, then it may elect to reduce other defense forces, such as naval or strategic forces, even if they are not at all related to the treaty. Reductions in the 65 percent of the defense budget not addressed in this paper would obviously increase savings. Such reductions, although possible in the face of a reduced threat, cannot be directly attributed to a CFE treaty, however, and are therefore beyond the scope of this paper.

The estimates of the costs and effects of the options are long-run estimates that assume that each option has been fully carried out, which may not happen for a number of years. Both options assume reductions that go beyond those required by any treaty that is likely to be signed in the next few years. As such, they would most likely be considered as actions that would be taken after the provisions of a CFE treaty have been carried out. Thus, the process for making the reductions included in the options might not be initiated until 1993. Furthermore, the larger reductions associated with the options could take several years to complete if they are to be made without significant disruption to the armed services or to local economies. The full annual savings associated with each of the options, therefore, might not be realized until several years after 1993.

## OPTION I: FURTHER REDUCE U.S. FORCES FOR NATO BY IMPLEMENTING POSSIBLE ADMINISTRATION PROPOSALS

Secretary of Defense Cheney has said that if a CFE treaty has been signed and ratified and political changes in Europe are not reversed, the United States could eventually reduce its forces below 1990 levels by five Army divisions and five Air Force tactical fighter wings. These actions would reduce by about 16 percent the air and ground forces that would be provided by the United States to NATO in the event of a major war.

Army documents state that three of the five divisions that are to be eliminated would be active divisions. As a consequence, the active Army would shrink by roughly 126,000 personnel (see Table 12). This option assumes that two of the three active divisions are withdrawn from Europe to comply with the CFE treaty. The other two of the five divisions that are to be eliminated would be reserve divisions. In addition, the number of reserve nondivisional units would be reduced. The total reduction in reserve personnel would be smaller than that experienced by the active army--roughly 45,000 selected reserves (reserves who are paid to drill in peacetime).

TABLE 12. EFFECT OF NATO'S PROPOSED CFE TREATY AND OPTIONS ON THE ARMY AND AIR FORCE

| | 1990 Level[a] | Reductions | | |
|---|---|---|---|---|
| | | Treaty | Option I | Option II |
| **Army** | | | | |
| Active Military Personnel | 764,000 | 76,400 | 126,100 | 268,200 |
| Active Divisions | 18 | 2 | 3 | 7 |
| Reserve Divisions | 10 | 0 | 2 | 3 |
| **Air Force** | | | | |
| Active Military Personnel | 567,500 | 6,500 | 26,900 | 55,800 |
| Active Tactical Wings | 24 | 2 | 5 | 9 |
| Reserve Tactical Wings | 12 | 0 | 0 | 4 |

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: Option I would reduce forces based on possible Administration plans. Option II would reduce U.S. forces for NATO in proportion to reductions in Pact forces resulting from the treaty.

a. Based on Congressionally authorized end strengths for 1990.

Eliminating five Air Force wings would reduce the size of the tactical Air Force by about 27,000 active-duty personnel. In the absence of any firm information, this option assumes that all five wings would come out of the active Air Force. Two of the wings are assumed to be withdrawn from Europe.

## Budgetary Savings

Budgetary savings associated with these reductions could total about $16 billion a year, relative to the 1990 budget--roughly 15 percent of the funds for the Army and tactical Air Force and 5 percent of the total DoD budget. This figure compares with annual savings of about $6 billion if the United States makes only the cuts required by the proposed treaty (see Table 13). As noted above, none of these estimates reflects the costs of verifying the CFE treaty.

TABLE 13. SUMMARY OF ANNUAL BUDGETARY SAVINGS (In billions of 1990 dollars)

| | Operating and Support | Long-Term Procurement[a] | Total Annual Savings | Percentage Reductions: Army and Tactical Air Force Budgets | Percentage Reductions: Total DoD Budget |
|---|---|---|---|---|---|
| Reductions Required by NATO's Proposed CFE Treaty | 5 | 1 | 6 | 6 | 2 |
| Option I: Make Reductions in U.S. Forces for NATO Based on Possible Administration Plans | 13[b] | 3 | 16 | 15 | 5 |
| Option II: Make Reductions in U.S. Forces for NATO Proportional to Pact Reductions | 25[b] | 7 | 32 | 30 | 11 |

SOURCE: Congressional Budget Office based on Department of Defense (DoD) data.

a. Long-term procurement savings are based on proportional reductions in procurement budgets for the Army and tactical Air Force.

b. Includes share of overhead.

Approximately $7 billion of the $16 billion in potential savings stems from reductions in operating and support costs that are associated directly or indirectly with the units that would be eliminated (see Table 14). Direct costs pay for the operation of the unit itself. Indirect costs pay for combat support (for example, a portion of an artillery unit that provides firepower for several Army divisions, but is not part of any division, would be included in indirect costs for an Army division) and combat service support (for example, truck companies not assigned to any particular division that provide logistic support). Indirect costs also include portions of the costs of training, medical care, repair facilities, and other support necessary to ensure the proper functioning of the unit.

Another $5 billion of the $16 billion in savings could be realized through reductions in what this study labels overhead--categories of support that are commonly assumed not to vary in size as the number of operating units changes, especially if such changes are small. Examples of overhead include costs of operating headquarters and providing military support to other nations as well as portions of training and medical care. Overhead costs might vary significantly, however, with large changes such as those assumed under this option. To illustrate the potential for savings in this category, CBO assumed that overhead costs are reduced in proportion to the number of units that are eliminated. Thus, for example, if the Army cuts 10 percent of its divisions, overhead costs are assumed to be reduced by 10 percent.

Finally, because the Army and the Air Force would have a smaller force to equip and modernize, this option could eventually save $3 billion a year in procurement costs. As with the procurement savings associated with the treaty, this estimate assumes that procurement costs are reduced in proportion to the reduction in the number of operating units.[2] The full amount of these reductions in procurement might not be realized for many years. For example, if a military unit had recently been modernized with a new weapon, it might be many years before another, newer version of the weapon would be required.

### Military Consequences

Although this option would negate some of the military benefits afforded by the CFE treaty, most would be retained. The analysis of the military consequences of this option assumes that, if the United States reduced its forces below those allowed by the treaty, its allies in NATO would follow suit with proportional reductions.

Ground Forces. Under the 16 percent reduction assumed in this option, the balance of ground forces shifts from the rough parity of forces that would be allowed by the CFE treaty to one that modestly favors the Warsaw Pact (see Figure 10). The Pact advantage, however, never exceeds about 20 percent.

2. Only the tactical portion of the Air Force procurement budget was included and was reduced by the same proportion as the number of tactical wings (5 out of 36 wings, or 14 percent). The entire Army procurement budget was reduced by 18 percent--5 divisions out of 28 total, including the reserve divisions, because the Army must equip both active and reserve units.

## TABLE 14. POTENTIAL ANNUAL SAVINGS ASSOCIATED WITH OPTION I (In billions of 1990 dollars)

| Location and Status | Number of Divisions/ Tactical Wings | Operating and Support (O&S) | | | | | Long-Term Procurement[d] | Total (O&S and Procurement) |
|---|---|---|---|---|---|---|---|---|
| | | Direct[a] | Indirect[b] | Subtotal | Overhead[c] | Total | | |
| | | | | **Army** | | | | |
| Active | | | | | | | | |
| Europe | 2 Heavy | 2.1 | 2.5 | 4.6 | 3.2 | 7.8 | 0.7 | 8.6 |
| CONUS | 1 Motorized | 0.5 | 0.6 | 1.1 | 0.8 | 1.9 | 0.4 | 2.2 |
| Reserve | 1 Heavy | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.4 | 0.7 |
| | 1 Infantry | 0.1 | e | 0.1 | 0.1 | 0.2 | 0.3 | 0.5 |
| Total | 5 | 2.8 | 3.2 | 6.0 | 4.2 | 10.2 | 1.8 | 12.0 |
| | | | | **Air Force** | | | | |
| Active | | | | | | | | |
| Europe | 2 | 0.3 | 0.2 | 0.5 | 0.4 | 0.9 | 0.5 | 1.4 |
| CONUS | 3 | 0.4 | 0.3 | 0.8 | 0.6 | 1.4 | 0.7 | 2.2 |
| Total | 5 | 0.7 | 0.5 | 1.3 | 1.0 | 2.3 | 1.2 | 3.5 |
| Total Savings (Army and Air Force) | | 3.5 | 3.7 | 7.3 | 5.2 | 12.5 | 3.0 | 15.6 |

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Option I would further reduce U.S. forces for NATO by implementing possible Administration proposals. CONUS = continental United States.

a. Direct O&S costs are those tied to individual units. Examples include civilian and military pay, fuel, some supplies and spare parts, modifications, and munitions.

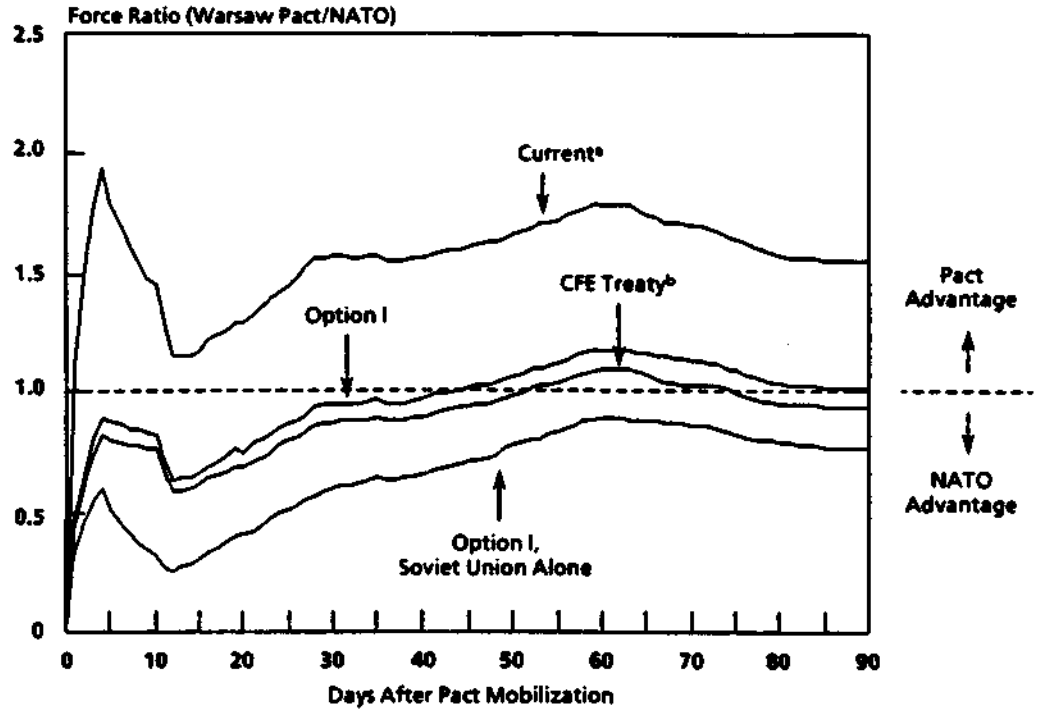
b. Indirect O&S costs pay for items that are necessary to support units, but are not linked as closely to particular units. Examples include funds for operating bases, depot maintenance, training, management support, medical care, personnel support, logistics, and other centralized support functions.

c. Represents a proportional reduction in that portion of the service's budget for military personnel and for operation and maintenance not covered by direct and indirect factors. The proportion is based on a ratio of O&S costs for the units eliminated to the total estimated O&S costs for combat units.

d. Based on proportional reductions in procurement budgets for the Army and the tactical Air Force.

e. Less than $50 million.

## Figure 10.
## Ground Force Ratios in the European Central Region Under Option I




SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Based on revised mobilization schedule.

Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

Option I would reduce U.S. forces for NATO based on possible Administration plans.

a. Does not reflect unilateral Soviet withdrawals from Eastern Europe.

b. Based on withdrawal of combat units to meet the treaty's ceilings on weapons.

NATO would be at a disadvantage under this option only if it must oppose the forces of the entire Warsaw Pact, however. If the Soviet forces must fight alone, they would be less capable than those available to NATO, even after NATO carries out this option (see Figure 10). In contrast, the Pact today enjoys an advantage that generally exceeds 50 percent.

The reductions under this option should also still permit NATO to meet minimum requirements for geographic coverage. Some analysts have argued that, regardless of the threat from the Warsaw Pact, a minimum number of ground combat units would be required in the central region to cover adequately the entire 750-kilometer border between NATO and the Warsaw Pact countries. They claim that a minimum force is required to provide adequate firepower along the border and to provide enough personnel to maintain communications. Adequate geographic coverage is particularly important if NATO is to mount a forward defense near the inter-German border, rather than withdraw to better defensive positions deep within West Germany. A forward defense has been NATO's strategy since the 1960s.

A recent RAND analysis proposes an illustrative minimum force required for adequate geographic coverage in the central region.[3] That force would consist of 27 ground combat divisions equivalent in firepower to a U.S. armored division. Providing enough personnel to ensure adequate communications would require 32 divisions, each containing 16,500 troops--roughly the number in a heavy U.S. division--or an equivalent number of divisions containing a total of 528,000 combat personnel.[4] Finally, in addition to these minimum forces, RAND argues that NATO would need to field forces sufficient to match the total capability of Pact forces that would be available in the central region.

CBO's analysis suggests that NATO forces under this option would meet most of RAND's criteria for minimum geographic coverage. Specifically, the reduction of five U.S. Army divisions and the proportional reductions on the part of the NATO allies leave NATO with capability that meets RAND's criteria after 15 days of mobilization. During the 1980s, the commonly accepted scenario for war in central Europe assumed that the Pact was capable of invading NATO with as little as 15 days of preparation. Recent press articles have indicated, however, that DoD has revised its estimate of how much preparation time the Pact might need before it could attack NATO. The longer times suggested by the articles (up to several months) would mean more delay before war began and so would provide NATO with more time to gather its forces. Thus, longer preparation time would allow NATO to have more than enough forces in place to provide adequate geographic coverage, even after the cuts envisioned in this option.

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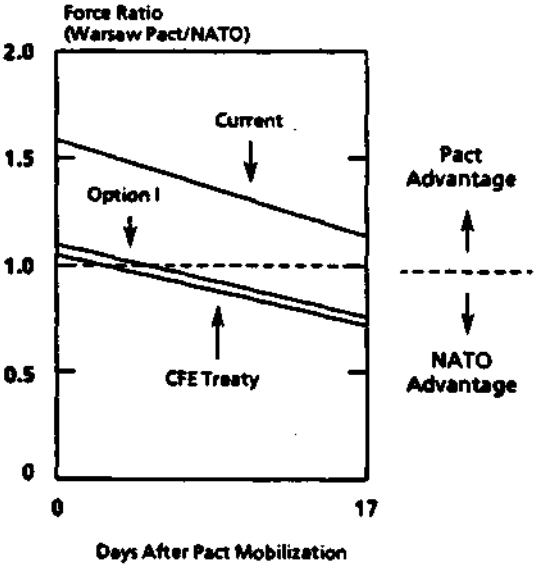
3. Paul Davis, Robert Howe, Richard Kugler, and William Wild, Jr., *Variables Affecting the Central Region Stability: The "Operational Minimum" and Other Issues at Low Force Levels,* RAND Note N-2976-USDP (Santa Monica: RAND Corporation, September 1989).

4. The RAND report stresses that this estimate is highly uncertain and depends on many assumptions. In addition, reducing NATO's forces to this minimum might require NATO to adopt new tactics in order to maintain a forward defense.

**Figure 11.**
**Air Force Ratios in the ATTU Region Under Option I**




SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: The ATTU region extends from the Atlantic Ocean to the Ural Mountains. The analysis assumes that all reinforcing aircraft arrive in the ATTU region within 17 days of Pact mobilization. The ratios depicted between zero and 17 days after mobilization are not meant to imply detailed knowledge of the exact arrival schedule of reinforcements. They are presented here only to give an indication of the impact of reinforcements on the air force ratios.

Air Forces. Under this option, the situation is even more favorable for NATO air forces than it is for ground forces (see Figure 11). Even with the 16 percent reduction assumed in this option for the air forces of all NATO members, NATO would continue to enjoy a modest advantage in air combat capability over the forces of the entire Pact, once reinforcing units had arrived from the United States.

In sum, this option would give up the parity of military forces that NATO could achieve with the Pact under the proposed treaty but would still retain much of the treaty's beneficial reduction in force ratios and so in military risk. The option would enable the United States to save approximately $16 billion a year--a 15 percent reduction in the budgets for the Army and tactical Air Force.

## OPTION II: MAKE REDUCTIONS IN U.S. FORCES FOR NATO PROPORTIONAL TO PACT REDUCTIONS

This second option would reduce U.S. forces committed to NATO by roughly the same proportions as those imposed on the Warsaw Pact's ground and air forces under the proposed CFE treaty. Reductions would apply to forces in the active and reserve components of the Army and the tactical Air Force. This approach would result in a reduction of 40 percent to 50 percent in U.S. air and ground forces committed to NATO. In view of the strong pressure for military reductions in NATO countries, this option assumes that the NATO allies also reduce their air and ground forces by 40 percent and 50 percent, respectively.

Under this approach, the U.S. Army would eliminate 7 of its 18 active divisions--including half of the 4 2/3 divisions currently stationed in Europe, and 5 divisions stationed in the United States that are intended as reinforcements for European forces in the event of war. As a result of these reductions, the Army

would need 212,400 fewer full-time soldiers, counting only those directly or indirectly involved with the disbanded units. If proportional reductions were also made in Army overhead, another 55,800 active-duty personnel could be demobilized. Thus, the total reduction in active-duty personnel could be as large as 268,200--leaving the active Army about one-third smaller than it is today.

In addition, three reserve divisions could be eliminated from the Army Reserve and National Guard, for a total reduction of 61,600 reserve personnel. This option makes proportionally smaller reductions in Army reserve forces because they are relatively less expensive to maintain and because they help offset the capability provided by late-arriving Soviet units.

U.S. tactical air forces would be reduced by 40 percent. Because operating costs for active and reserve units are more similar for air forces than for ground forces, reductions in air units are assumed to affect both active and reserve units for NATO by the same proportion. Specifically, this option would reduce the size of the tactical air forces by nine active wings and four reserve wings (see Table 12). Counting only personnel directly or indirectly associated with the disbanded units, the Air Force would be smaller by about 29,800 personnel. Assuming a proportional reduction in overhead would bring the total to 55,800, which would mean roughly a 30 percent reduction in the tactical Air Force but only a 10 percent reduction in the size of the total active Air Force.

### Budgetary Savings

Once fully implemented, possibly several years after 1993, this option could reduce U.S. defense spending from the 1990 level by as much as $32 billion a year--a reduction of 30 percent in the combined Army and tactical Air Force budgets and an 11 percent reduction in the total DoD budget (see Table 13). Almost three-quarters of the total savings would represent reduced funding for the Army; the remainder would come out of funds for the tactical Air Force.

Considering the Army and Air Force together, about $15 billion of the total savings of $32 billion would stem from operating costs directly and indirectly associated with the units that are eliminated (see Table 15). Another $11 billion would be saved if overhead costs were reduced in proportion to the number of units eliminated. The remaining savings--about $7 billion--would result from reductions in funds for procurement.

### Military Consequences

If the United States and its NATO allies made cuts proportional to those imposed on the Warsaw Pact, then the balance of military forces would remain roughly at today's levels. On the ground, the Warsaw Pact as a whole would enjoy a substantial advantage in conventional forces, as it does today (see Figure 12). At some points after mobilization begins, the ground capability of the Warsaw Pact--as measured by WEI/WUV scores--would exceed NATO's capability by 50 percent or more.

## TABLE 15. POTENTIAL ANNUAL SAVINGS ASSOCIATED WITH OPTION II (In billions of 1990 dollars)

| Location and Status | Number of Divisions/ Tactical Wings | Operating and Support (O&S) | | | | | Long-Term Procurement[d] | Total (O&S and Procurement) |
|---|---|---|---|---|---|---|---|---|
| | | Direct[a] | Indirect[b] | Subtotal | Overhead[c] | Total | | |
| **Army** | | | | | | | | |
| Active | | | | | | | | |
| Europe | 2 1/3 Heavy | 2.6 | 3.3 | 5.9 | 4.1 | 10.0 | 1.0 | 11.0 |
| CONUS | 3 2/3 Heavy | 2.0 | 2.4 | 4.3 | 3.0 | 7.3 | 0.9 | 8.3 |
| | 1 Motorized | 0.5 | 0.6 | 1.1 | 0.8 | 1.9 | 0.4 | 2.2 |
| Reserve | 1 Heavy | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 | 0.4 | 0.7 |
| | 2 Infantry | 0.1 | 0.1 | 0.3 | 0.3 | 0.6 | 0.7 | 1.3 |
| Total | 10 | 5.4 | 6.5 | 11.8 | 8.3 | 20.1 | 3.4 | 23.5 |
| **Air Force** | | | | | | | | |
| Active | | | | | | | | |
| Europe | 4 | 0.6 | 0.5 | 1.1 | 0.9 | 2.0 | 1.0 | 2.9 |
| CONUS | 5 | 0.8 | 0.6 | 1.3 | 1.0 | 2.3 | 1.2 | 3.5 |
| Reserve | 4 | 0.3 | 0.2 | 0.5 | 0.4 | 0.9 | 1.0 | 1.9 |
| Total | 13 | 1.7 | 1.3 | 2.9 | 2.3 | 5.2 | 3.2 | 8.3 |
| Total Savings (Army and Air Force) | | 7.1 | 7.8 | 14.7 | 10.6 | 25.3 | 6.6 | 31.8 |

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Option II would reduce U.S. forces for NATO in proportion to the Pact's reductions under the treaty. CONUS = continental United States.

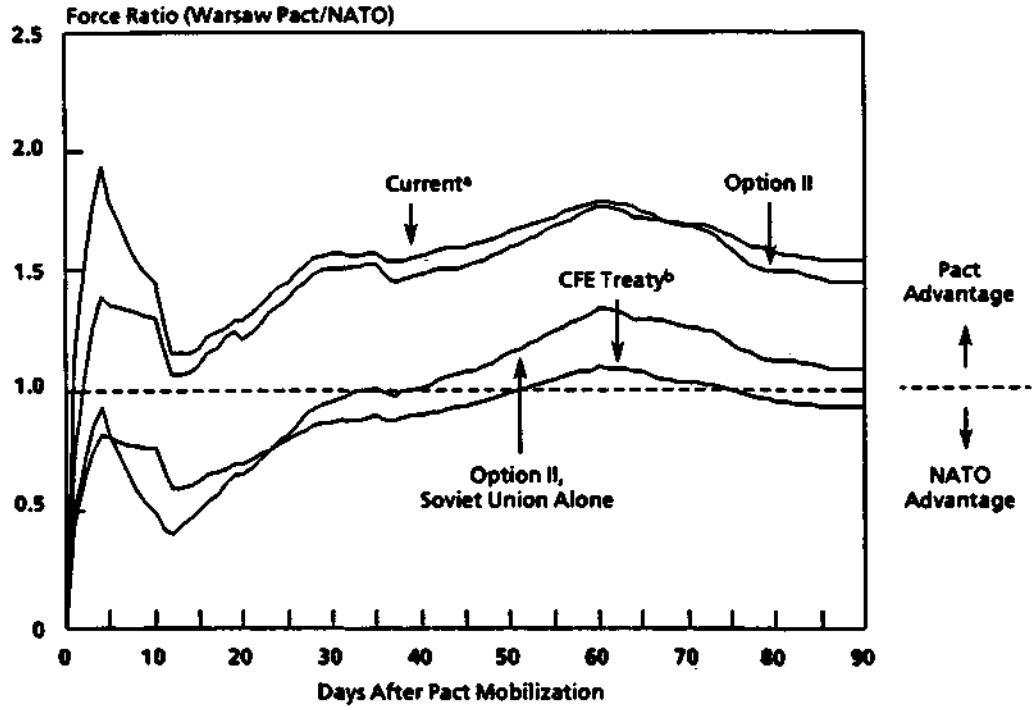
a. Direct O&S costs are those tied to individual units. Examples include civilian and military pay, fuel, some supplies and spare parts, modifications, and munitions.

b. Indirect O&S costs pay for items that are necessary to support units, but are not linked as closely to particular units. Examples include funds for operating bases, depot maintenance, training, management support, medical care, personnel support, logistics, and other centralized support functions.

c. Represents a proportional reduction in that portion of the service's budget for military personnel and for operation and maintenance not covered by direct and indirect factors. The proportion is based on a ratio of O&S costs for the units eliminated to the total estimated O&S costs for combat units.

d. Based on proportional reductions in procurement budgets for the Army and the tactical Air Force.

## Figure 12.
## Ground Force Ratios in the European Central Region Under Option II




SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Based on revised mobilization schedule.

Warsaw Pact forces include those from the Soviet Union, East Germany, Czechoslovakia, and Poland.

Option II would make reductions in U.S. forces for NATO proportional to reductions in Pact forces resulting from the CFE treaty.

a. Does not reflect unilateral Soviet withdrawals from Eastern Europe.

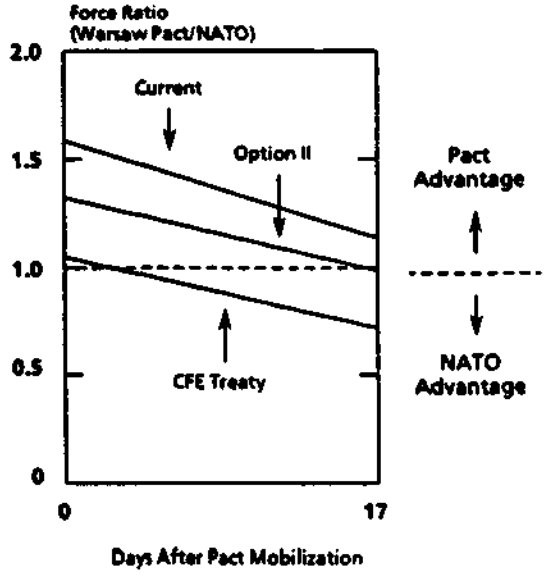
b. Based on withdrawal of combat units to meet the treaty's ceilings on weapons.

In the air, reductions in NATO air forces would mean that NATO would have significantly fewer aircraft; in fact, the Pact would have 75 percent more aircraft than NATO. Because of the technical superiority of NATO's aircraft as reflected in TASCFORM scores, however, NATO would suffer only a 32 percent disadvantage in capability before reinforcements arrive from the continental United States (see Figure 13).

Geographic Coverage Could Be Inadequate. Even though the balance of ground forces under this option would be similar to today's balance, NATO might be worse off than it is today. As was noted above, some analysts maintain that a minimum level of military forces is needed to provide adequate geographic coverage of the long border between NATO and Warsaw Pact countries. This coverage is particularly important if NATO is to defend forward, near the inter-German border.

Given the force reductions under this option, NATO would probably not be able to provide the geographic coverage necessary for a forward defense early in the mobilization process. Fifteen days after the Pact begins to mobilize, NATO would be able to field only 17 divisions equivalent in combat capability to a U.S. armored division. Analysis cited earlier suggested that at least 27 such divisions would be needed to provide the necessary firepower. Nor, under this option, would NATO be able to field the equivalent of 32 divisions with 16,500 troops, one estimate of the minimum force required in order to have sufficient personnel available to maintain communications along the entire inter-German border. NATO would not have the necessary forces in place until 75 days after the Pact starts to mobilize. Considering recent intelligence reports that it could take the Pact several months to prepare for an invasion, however, NATO might be able to muster the necessary forces in time, even with the large cuts considered in this option.

**Figure 13.**
**Air Force Ratios in the ATTU Region Under Option II**




SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: The ATTU region extends from the Atlantic Ocean to the Ural Mountains. The analysis assumes that all reinforcing aircraft arrive in the ATTU region within 17 days of Pact mobilization. The ratios depicted between zero and 17 days after mobilization are not meant to imply detailed knowledge of the exact arrival schedule of reinforcements. They are presented here only to give an indication of the impact of reinforcements on the air force ratios.

A forward defense would be more feasible if the United States cut its forces by 50 percent but the NATO allies made only modest cuts in their forces. Such asymmetric changes might be justified considering the strong interest the United States' NATO allies have shown in a forward defense during past discussions. Asymmetric changes would also reduce the U.S. share of the costs to maintain NATO defenses. But such changes seem highly unlikely in view of the political pressure for military reductions in Western Europe and in view of the sharp declines in the number of young people available for military service, particularly in West Germany.

Pact Advantage May Be Irrelevant. Under this option, NATO would forgo most of the military benefits afforded by the proposed treaty. The resulting balance of forces may be acceptable, however, because of political changes.

NATO's disadvantage in ground forces that would result from this option would be of much less concern if the Soviet Union cannot count on the military capability of its allies. If the Soviet forces must fight alone, then--even after the large cuts in NATO forces assumed under this option--NATO would face a force that could be at most 33 percent more capable than NATO's (see Figure 12). Although the resulting balance would be less desirable from NATO's perspective than if NATO simply implemented the CFE treaty, such force ratios may well be acceptable to a defensive alliance like NATO. Moreover, the Soviet Union's advantage in ground forces would totally evaporate if it were forced to fight throughEastern Europe or to leave 14 or more divisions to secure its lines through Poland, East Germany, and Czechoslovakia.

The risks inherent in the military balance that would result from this option must also be weighed against the likelihood of war. The recent political changes in Eastern Europe, coupled with a Soviet Union that seems much more concerned with its own political changes and improving its faltering economy than it does about intimidating or attacking Western Europe, seem to have greatly reduced the chance of a war in Europe. If the chance of war reaches a sufficiently low level, then the added risk inherent in a large reduction in NATO forces may be deemed acceptable to a defensive alliance like NATO.

# APPENDIX A
# GROUND FORCES AND TACTICAL AIRCRAFT IN EUROPE

The countries included in the NATO and Warsaw Pact alliances encompass essentially all of Europe and maintain large arsenals of modern weapons. In addition to the forces it maintains in Europe during peacetime, the United States is committed to provide large numbers of ground forces and aircraft to reinforce NATO in the event of a crisis. Those forces stationed in Europe would be subject to the constraints included in a treaty limiting conventional forces in Europe (CFE) and are examined in more detail in this appendix.

## GROUND FORCES

The discussion of the balance of ground forces in this study focused on those forces that would be involved in a conflict in the central region of Europe. This area includes most of the inter-German border and specifically comprises the Federal Republic of Germany (also referred to as West Germany), Belgium, the Netherlands, Luxembourg, the German Democratic Republic (also known as East Germany), Poland, and Czechoslovakia. Many other countries currently have forces stationed in the central region, including several NATO members--the United States, the United Kingdom, France, and Canada--and the Soviet Union.

In addition to the many ground combat units permanently stationed in the central region (see Tables A-1 and A-2), countries in each alliance, most notably the United States for NATO and the Soviet Union for the Warsaw Pact, can provide large numbers of reinforcing units. The time at which these reinforcing units could be available to either side is a function of many variables, including combat readiness, peacetime location, and the rapidity with which each side starts to mobilize.

### Warsaw Pact

Although the Warsaw Pact has the potential for amassing 121 divisions in the central region, not all of these divisions are maintained at the same level of readiness. Pact divisions are typically divided into three categories, with only Category I divisions actually being kept in "ready" condition. The International Institute for Strategic Studies defines the categories as follows:[1]

- Category I. Can attain full personnel strength after 24 hours' notice and is fully equipped.

1. International Institute for Strategic Studies, *The Military Balance, 1987-1988* (London: IISS, 1987), p. 34.

## TABLE A-1. WARSAW PACT COMBAT UNITS AVAILABLE FOR A CONFLICT IN THE CENTRAL REGION

| National Army and Location in Peacetime | Category I Divisions | | | Category II Divisions | | | Category III Divisions[a] | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Tank | MRD | Air-borne | Tank | MRD | Air-borne | Tank | MRD | |
| East Germany | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| Czechoslovakia | 3 | 3 | 0 | 0 | 0 | 0 | 2 | 2 | 10 |
| Poland | 5 | 3 | 0 | 0 | 2 | 2 | 0 | 3 | 15 |
| Soviet Forces in: | | | | | | | | | |
| East Germany | 11 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 19 |
| Czechoslovakia | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Poland | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Soviet Union | | | | | | | | | |
| Baltic MD | 0 | 0 | 2 | 1 | 3 | 0 | 2 | 2 | 10 |
| Byelorussian MD | 0 | 1 | 1 | 3 | 1 | 0 | 6 | 0 | 12 |
| Carpathian MD | 1 | 0 | 0 | 1 | 6 | 0 | 0 | 3 | 11 |
| Kiev MD | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 4 | 11 |
| Moscow MD | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 4 | 7 |
| Ural MD | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| Volga MD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| Central Asian MD | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 5 | 7 |
| Total | 26 | 22 | 4 | 6 | 13 | 2 | 20 | 28 | 121 |

SOURCES: Congressional Budget Office based on data from William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983), p. 44; and Gunter Lippert, "GSFG, Spearhead of the Red Army," *International Defense Review* (May 1987), p. 559.

NOTE: MRD = motorized rifle division; MD = military district.

a. The Warsaw Pact has no Category III airborne divisions in these locations.

- Category II. Typically at 50 percent to 75 percent personnel strength with a complete set of fighting vehicles.
- Category III. Cadre divisions maintained at 20 percent personnel strength, possibly with a complete set of combat equipment though typically of older vintage.

The amount of time needed to bring divisions in Categories II and III up to combat-ready status is a much-debated topic. Estimates range from 7 to 30 days

## TABLE A-2. NATO COMBAT UNITS AVAILABLE FOR A CONFLICT IN THE CENTRAL REGION

| | Divisions[a] | | | |
|---|---|---|---|---|
| | | Reinforcements | | |
| | In Place[b] | Active[c] | Reserved[d] | Total |
| United States | 5 1/3 | 10 | 15 | 30 1/3 |
| West Germany | 12 | 0 | 3 1/3 | 15 1/3 |
| Belgium | 2/3 | 2/3 | 2/3 | 2 |
| Canada | 1/3 | 0 | 0 | 1/3 |
| Denmark | 0 | 2 | 0 | 2 |
| France[e] | 3 | 12 | 0 | 15 |
| Netherlands | 1/3 | 1 2/3 | 1 1/3 | 3 1/3 |
| United Kingdom | 3 | 2/3 | 0 | 3 2/3 |
| Total | 24 2/3 | 27 | 20 1/3 | 72 |

SOURCES: Congressional Budget Office based on data from William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); International Institute for Strategic Studies, *The Military Balance, 1987-1988* (London: IISS, 1987); Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979); Diego A. Ruiz Palmer, "Between the Rhine and the Elbe: France and the Conventional Defense of Central Europe," *Comparative Strategy*, vol. 6, no. 4 (1987), pp. 489 and 490; and Association of the U.S. Army, "The Total Army at a Glance," *Army* (May 1988).

a. Includes separate brigades and armored cavalry regiments (ACRs). Three brigades or three ACRs are considered equivalent to one division.

b. All of these forces could be available within one to three days after NATO starts to mobilize. A small fraction (about one-eighth) are on constant alert, however, and would be available immediately.

c. All of these forces, except those from the United States, could be available within a week after NATO starts to mobilize. Six of the U.S. divisions would be available within 10 days of NATO's mobilization.

d. The European reserves could be available within one week after NATO starts to mobilize. The last U.S. reserve unit included here would arrive 79 days after mobilization.

e. France, though not a military member of NATO, does have bilateral agreements with West Germany stating that France will come to West Germany's aid if the latter is attacked.

for Category II divisions and from 15 to 120 days for Category III divisions.[2] All of the Soviet units stationed in Eastern Europe outside the Soviet Union, however, are maintained at the highest level of readiness. These troops would most likely spearhead any Soviet invasion of central Europe.

## NATO

NATO units would also need time to prepare for combat. Of the units permanently stationed in Europe, only a few--primarily reconnaissance battalions and cavalry regiments--are maintained on 24-hour alert. The remaining 20 or so divisions would need one to three days to reach full strength and to move from their peacetime locations to positions appropriate for impeding a Pact advance. The European nations could quickly provide 17 reinforcing divisions (within three to seven days), and the United States could provide another six divisions rapidly. These six divisions, though stationed in the United States during peacetime, maintain an extra set of equipment in Europe through a program that prepositions combat equipment in West Germany. This arrangement allows the personnel to be flown to Europe, pick up their equipment from special warehouses (a process that takes about a day), and be ready for combat.

The United States can provide an additional four active divisions within 30 days, and 15 reserve divisions theoretically within 79 days after mobilization. During the United States' last experience with a large-scale mobilization of reserves--in the Korean War--however, mobilization delays were much longer than 79 days. During that conflict, seven months were required to mobilize, equip, and train each reserve division or brigade before it could be sent overseas.[3]

Another factor that will affect the Pact/NATO force balance is the rapidity with which NATO responds to a Pact mobilization. Once Western sources have detected the Pact's movement toward a war status, each NATO country must begin to mobilize its defenses. The time lag between initiation of Pact mobilization and NATO's response to it would affect force ratios early in the mobilization process.

The scenario widely used through the 1980s by defense analysts, particularly those associated with the Department of Defense, assumed that the Warsaw Pact could have about 90 divisions ready and available for combat in the central region within two weeks after mobilization. The potential for such a rapid buildup by the Pact called for an equally rapid response by NATO, and so this scenario also assumed a short delay (four days) by NATO before it began its own mobilization (see Table A-3).

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2. William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983), p. 60; Tom Gervasi, *The Myth of Soviet Military Supremacy* (New York: Harper and Row, 1986); Department of Defense, *Soviet Military Power, 1987* (1987); Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979), p. I-6; and Secretary of Defense, *Annual Report to the Congress, Fiscal Year 1982* (1981), p. 69.

3. Congressional Budget Office, *Improving the Army Reserves* (November 1985), p. 2.

TABLE A-3. ASSUMPTIONS MADE IN GENERATING TWO SCENARIOS FOR CONFRONTATION IN THE CENTRAL REGION BETWEEN NATO AND THE WARSAW PACT

| | Mobilization Schedule (Days after mobilization) | |
|---|---|---|
| | 1988 | Revised |
| **NATO** | | |
| Delay Between Initiation of Warsaw Pact Mobilization and Start of NATO Mobilization | 4 | 7 |
| **Warsaw Pact** | | |
| Arrival of Last Unit in Theater | | |
| Soviet forces in: | | |
| East Germany | 4 | 4 |
| Czechoslovakia | 4 | 4 |
| Poland | 4 | 11 |
| East German forces | 4 | 4 |
| Czech forces | 4, 8[a] | 11 |
| Polish forces | 8 | 11 |
| Soviet forces | | |
| Western military districts | 15 | 28 |
| Central military districts | 60 | 60 |

SOURCES: Congressional Budget Office based on data from William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); and Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979).

a. Six of the ten Czech divisions would be available for combat four days after mobilization; the remaining four, four days later.

More recent intelligence estimates have called these assumptions into question, however. Indeed, the time needed to generate and transport a force of 90 Warsaw Pact divisions is now assumed to be on the order of several weeks. Thus, a revised scenario that assumes a four-week period to ready and transport forces from the Soviet western military districts seems more likely. With longer Pact mobilization times required before an attack, NATO might not feel compelled to react as quickly to a Pact call to arms. Thus, a longer delay (seven days) between the initiation of Pact and NATO mobilizations seems reasonable (see Table A-3).

## Impact of the CFE Treaty

The CFE treaty could require Pact and NATO forces to reduce their ground combat weapons by as much as 67 percent and 15 percent, respectively. In combination with limits on troops, this requirement could result in significant reductions in the

## TABLE A-4. REDUCTIONS IN NATO TANK HOLDINGS AND COMBAT UNITS UNDER NATO'S PROPOSED CFE TREATY

| | Tank Reductions | | | Units Eliminated | |
|---|---|---|---|---|---|
| | From Storage | From Active Units | Total[a] | Divisions[b] | ADEs |
| United States | 142 | 638 | 780 | 2 | 2.0 |
| Belgium | 18 | 43 | 61 | 1/9 | 0.1 |
| Canada | 10 | 0 | 10 | 0 | 0.0 |
| Denmark | 0 | 34 | 34 | 1/9 | 0.1 |
| France | 0 | 204 | 204 | 1 | 0.4 |
| Netherlands | 120 | 0 | 120 | 0 | 0.0 |
| United Kingdom | 0 | 203 | 203 | 2/3 | 0.6 |
| West Germany | 651 | 0 | 651 | 3 1/3[c] | 0.3 |
| Total | 941 | 1,122 | 2,063 | 7 2/9 | 3.5 |

SOURCES: Congressional Budget Office based on data from William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Washington, D.C.: Brookings Institution, 1983); International Institute for Strategic Studies, *The Military Balance 1989-1990* (London: IISS, 1989); Department of Defense, Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *NATO Center Region Military Balance Study, 1978-1984* (July 1979); Diego A. Ruiz Palmer, "Between the Rhine and the Elbe: France and the Conventional Defense of Central Europe," *Comparative Strategy*, vol. 6, no. 4 (1987), pp. 489 and 490; Association of the U.S. Army, "The Total Army at a Glance," *Army* (May 1988); and Michael D. Scanlan, *Conventional Armed Forces Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: ADE = armored division equivalent.

a. For countries other than the United States, assumes that each member reduces tank holdings by 13 percent--the same percentage reduction in tanks required of NATO as a whole.

b. Includes separate brigades and armored cavalry regiments (ACRs). Three brigades or three ACRs are considered equivalent to one divison. One battalion is considered equivalent to 1/9 of a division.

c. Reserve divisions of the Territorial Army.

ground forces that each alliance could field, particularly the Pact. Details of how the CFE treaty would affect Pact forces are presented in Chapter III. The potential impact of the treaty is much smaller on NATO forces than on Pact forces because of the smaller percentage reductions in weapons required of NATO. In fact, of the 47 NATO divisions available for combat in the central region that are based in Europe and therefore subject to treaty limitations, only slightly more than 7 would be eliminated under the treaty, according to CBO's analysis (see Table A-4). Almost half of these divisions are assumed to be from the West German reserve Territorial Army and of lesser effectiveness. As a consequence, NATO might lose only about 12 percent of its European-based ground combat effectiveness (3.5 armored division equivalents out of a total of 28.8 ADEs before the treaty). When U.S. reinforcements from the continental United States are included in NATO's total force in the central region, units eliminated to comply with the treaty might reduce NATO's total ground force capability from 48.7 ADEs to 45.2 ADEs, or by 7 percent.

## TACTICAL AIR FORCES

In a European conflict, both sides would have large numbers of tactical aircraft at their command. Unlike ground forces, aircraft can be readied quickly and transported rapidly from one place to another. Indeed, reinforcing aircraft for both NATO and the Pact should be available within 10 days after mobilization.

### Central Region

All U.S. aircraft would presumably be used in the central region. These aircraft include those stationed in Europe in peacetime and 60 U.S. tactical aircraft squadrons based in the continental United States. Table A-5 lists the additional NATO aircraft that would be available for use in the central region.

Tallies of the Warsaw Pact aircraft include those permanently stationed in the central region and those assigned to the western and central military districts of the Soviet Union (see Table A-6). Soviet interceptor aircraft assigned to these regions are also included. Although these aircraft would probably not take part in Pact offensive operations into NATO territory, they could be used to counter NATO air strikes in East Germany, Czechoslovakia, or Poland. Soviet reinforcing aircraft from the central military districts are assumed to be available for use in the central region 10 days after mobilization.

### Additional Aircraft in the ATTU Region

Because aircraft are so mobile, either alliance could bring aircraft stationed elsewhere in Europe into the central region in the event of a conflict. It is useful, therefore, to compare the total air force assets available to each alliance. Aircraft available to NATO and the Pact, but not included in tallies for the central region,

## TABLE A-5. NATO TACTICAL AIRCRAFT IN THE CENTRAL REGION, AT MOBILIZATION AND TEN DAYS LATER

| | Fighter-Bombers | | | Fighters | | |
|---|---|---|---|---|---|---|
| | Aircraft | M-Day | M+10 | Aircraft | M-Day | M+10 |
| NATO Total | | 1,615 | 2,691 | | 715 | 1,051 |
| United States | F-111 | 140 | 212 | F-16A/B | 19 | 19 |
| | A-10 | 108 | 444 | F-15 | 96 | 432 |
| | F-16 | 228 | 632 | | | |
| | A-7 | 0 | 96 | | | |
| | F-4 | 36 | 204 | | | |
| Total | | 512 | 1,588 | | 115 | 451 |
| Belgium | Mirage 5BA | 18 | 18 | F-16A/B | 36 | 36 |
| | F-16A/B | 72 | 72 | | | |
| Total | | 90 | 90 | | 36 | 36 |
| Canada | CF-18 | 54 | 54 | n.a. | n.a. | n.a. |
| Denmark | F-16A/B | 28 | 28 | F-16A/B | 29 | 29 |
| | Draken | 8 | 8 | Draken | 8 | 8 |
| Total | | 36 | 36 | | 37 | 37 |
| France | Mirage F-IIIE | 60 | 60 | Mirage F-1C | 121 | 121 |
| | Mirage F-5F | 30 | 30 | Mirage F-200 | 75 | 75 |
| | Jaguar-A | 100 | 100 | | | |
| Total | | 190 | 190 | | 196 | 196 |
| Netherlands | F-16A/B | 36 | 36 | F-16A/B | 73 | 73 |
| | F-5 | 46 | 46 | | | |
| Total | | 82 | 82 | | 73 | 73 |
| United Kingdom | Buccaneer | 34 | 34 | Tornado | 66 | 66 |
| | Tornado | 108 | 108 | Lightning | 12 | 12 |
| | Harrier | 51 | 51 | F-4 | 108 | 108 |
| | Jaguar | 63 | 63 | | | |
| Total | | 256 | 256 | | 186 | 186 |
| West Germany | F-4F | 72 | 72 | F-4F | 72 | 72 |
| | Tornado | 176 | 176 | | | |
| | Alphajet | 147 | 147 | | | |
| Total | | 395 | 395 | | 72 | 72 |

SOURCES: Congressional Budget Office using data from Secretary of Defense, *Annual Report to the Congress, Fiscal Year 1983* (1982); International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989).

NOTE: n.a. = not applicable.

TABLE A-6. WARSAW PACT AIRCRAFT IN THE CENTRAL REGION, AT MOBILIZATION AND TEN DAYS LATER

| | Fighter-Bombers | | | Fighters | | | Interceptors | | |
|---|---|---|---|---|---|---|---|---|---|
| | Aircraft | M-Day | M+10 | Aircraft | M-Day | M+10 | Aircraft | M-Day | M+10 |
| Warsaw Pact Total | | 1,337 | 1,827 | | 1,550 | 1,640 | | 270 | 420 |
| Soviet Union | MiG-21 | 45 | 45 | MiG-21 | 135 | 135 | MiG-23 | 225 | 360 |
| | MiG-27 | 405 | 405 | MiG-23 | 355 | 400 | MiG-25 | 45 | 45 |
| | Su-17 | 225 | 270 | MiG-25 | 25 | 25 | Su-27 | 0 | 15 |
| | Su-24 | 165 | 610 | MiG-29 | 150 | 195 | | | |
| | Su-25 | 150 | 150 | | | | | | |
| Total | | 990 | 1,480 | | 665 | 755 | | 270 | 420 |
| Czechoslovakia | MiG-21 | 20 | 20 | MiG-21 | 200 | 200 | | | |
| | MiG-23 | 40 | 40 | MiG-23 | 45 | 45 | | | |
| | Su-22 | 32 | 32 | | | | | | |
| | Su-25 | 40 | 40 | | | | | | |
| Total | | 132 | 132 | | 245 | 245 | | | |
| East Germany | MiG-23 | 25 | 25 | MiG-21 | 210 | 210 | | | |
| | Su-22 | 35 | 35 | MiG-23 | 45 | 45 | | | |
| | | | | MiG-29 | 20 | 20 | | | |
| Total | | 60 | 60 | | 275 | 275 | | | |
| Poland | Su-7 | 30 | 30 | MiG-21 | 325 | 325 | | | |
| | Su-20 | 50 | 50 | MiG-23 | 40 | 40 | | | |
| | Su-22 | 75 | 75 | | | | | | |
| Total | | 155 | 155 | | 365 | 365 | | | |

SOURCES: Congressional Budget Office based on data in International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); and The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base*, (April 1988).

are listed in Tables A-7 and A-8. More aircraft are allotted to the central region by each alliance than to the northern and southern flanks combined.[4]

## Impact of the CFE Treaty on Air Forces

As with ground forces, NATO's proposed CFE treaty would require much larger reductions in Pact air forces than in NATO air forces. Tables A-9 through A-12 enumerate the reduction in aircraft that CBO assumed in assessing the impact of the CFE treaty on the air combat capability of the Pact and NATO.

4. The northern flank would include NATO forces from Iceland and Norway and Soviet forces from the Leningrad military district. Aircraft on the southern flank would be those from Greece, Turkey, Portugal, and Spain in NATO, and Pact forces from Hungary, Bulgaria, Romania, and the Odessa, North, and Trans-Caucasus military districts of the Soviet Union.

## TABLE A-7. NATO TACTICAL AIRCRAFT IN THE ATTU REGION BUT OUTSIDE THE CENTRAL REGION

| | Fighter-Bombers | | Fighters | |
|---|---|---|---|---|
| | Aircraft | Number | Aircraft | Number |
| NATO Total | | 894 | | 351 |
| Greece | F-104G | 68 | F-5A/B | 28 |
| | A-7H | 49 | F-4G | 15 |
| | F-5A/B | 40 | Mirage F-1CG | 36 |
| | F-4E | 30 | | |
| Total | | 187 | | 79 |
| Iceland | | | F-15A/B | 18 |
| Italy | Tornado | 54 | F-104S | 84 |
| | F-104S | 18 | | |
| | G-91 | 71 | | |
| Total | | 143 | | 84 |
| Norway | F-16A/B | 65 | | |
| Portugal | A-7P | 34 | | |
| | G-91 | 43 | | |
| Total | | 77 | | |
| Spain | Mirage F-1CE | 36 | EF-18 | 55 |
| | F-5A/B | 39 | F-4C | 32 |
| | | | Mirage F-1B/C | 24 |
| | | | Mirage F-III | 23 |
| Total | | 75 | | 134 |
| Turkey | F-5A/B | 84 | F-104S | 36 |
| | F-100D/F | 40 | | |
| | F-104G | 90 | | |
| | F-4E | 100 | | |
| | F-16C/D | 33 | | |
| Total | | 347 | | 36 |

SOURCE: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989).

NOTES: All aircraft are assumed to be available upon mobilization.

The ATTU region extends from the Atlantic Ocean to the Ural Mountains.

## TABLE A-8. WARSAW PACT AIRCRAFT IN THE ATTU REGION BUT OUTSIDE THE CENTRAL REGION

| | Fighter-Bombers | | Fighters | | Interceptors | |
|---|---|---|---|---|---|---|
| | Aircraft | Number | Aircraft | Number | Aircraft | Number |
| Warsaw Pact Total | | 1,055 | | 1,040 | | 1,460 |
| Soviet Union | MiG-21 | 135 | MiG-23 | 220 | Su-15 | 410 |
| | MiG-27 | 225 | MiG-29 | 305 | Su-27 | 255 |
| | Su-17 | 190 | | | Tu-128 | 20 |
| | Su-25 | 15 | | | MiG-23 | 355 |
| | Tu-16 | 90 | | | MiG-25 | 170 |
| | Tu-22 | 60 | | | MiG-31 | 250 |
| | Tu-26 | 115 | | | | |
| Total | | 830 | | 525 | | 1,460 |
| Bulgaria | MiG-17 | 15 | MiG-21 | 110 | | |
| | MiG-23 | 45 | MiG-23 | 40 | | |
| | Su-25 | 45 | | | | |
| Total | | 105 | | 150 | | |
| Hungary | | | MiG-21 | 90 | | |
| | | | MiG-23 | 45 | | |
| Total | | | | 135 | | |
| Romania | MiG-17 | 85 | MiG-21 | 185 | | |
| | IAR-93 | 35 | MiG-23 | 45 | | |
| Total | | 120 | | 230 | | |

SOURCES: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); and The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base* (Arlington, Va.: TASC, April 1988).

NOTES: All aircraft are assumed to be available upon mobilization.

The ATTU region extends from the Atlantic Ocean to the Ural Mountains.

Air force reductions were made based on several guidelines established by CBO. Although the guidelines are arbitrary, they are as reasonable as any others in the absence of alliancewide agreements concerning required force reductions. All national air forces within each alliance--except for those of the United States and the Soviet Union, each of which has extensive holdings outside the area covered by the treaty--were reduced by the same proportion as that required in total alliance aircraft holdings. These reductions equalled 9 percent for NATO and 45 percent for Pact combat aircraft, excluding interceptors (see Chapter III). Within each national air force, individual categories of aircraft such as fighters and fighter-bombers were reduced by the same percentage as the national air force overall. (Soviet interceptors are an exception to this guideline, since they are covered by a separate limit in the treaty.) Within each category of aircraft, individual aircraft were eliminated starting with the oldest or least capable models (as measured by TASCFORM scores) until the required reduction was achieved. Finally, for the air forces of the Soviet Union that are stationed in several different locations in peacetime, inventories of specific aircraft models (for example, the MiG-27) were reduced by the same proportion at all locations.

As with the comparison of current air force capability of the two alliances, NATO's and the Pact's post-treaty air capability was assessed both within the central region and throughout the ATTU region. The aircraft reductions assumed in this analysis to bring each alliance into compliance with the treaty are listed in Tables A-9 and A-10 for aircraft assigned to the central region. Reductions assumed for all other air assests in the ATTU region are listed in Tables A-11 and A-12.

TABLE A-9. REDUCTIONS IN NATO TACTICAL AIRCRAFT OUTSIDE THE CENTRAL REGION UNDER NATO'S PROPOSED CFE TREATY

| | Fighter-Bombers | | Fighters | |
|---|---|---|---|---|
| | Aircraft | Number | Aircraft | Number |
| NATO Total | | 78 | | 31 |
| Greece | F-5A/B | 16 | F-5A/B | 7 |
| Iceland | | | F-15A/B | 2 |
| Italy | G-91 | 12 | F-104S | 7 |
| Norway | F-16A/B | 6 | | |
| Portugal | G-91 | 7 | | |
| Spain | F-5A/B | 7 | Mirage F-III | 12 |
| Turkey | F-5A/B | 30 | F-104S | 3 |

SOURCES: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); and Michael D. Scanlan, *Conventional Armed Forces Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

TABLE A-10. REDUCTIONS IN WARSAW PACT AIRCRAFT OUTSIDE THE CENTRAL REGION UNDER NATO'S PROPOSED CFE TREATY

| | Fighter-Bombers | | Fighters | | Interceptors | |
|---|---|---|---|---|---|---|
| | Air-craft | Num-ber | Air-craft | Num-ber | Air-craft | Num-ber |
| Warsaw Pact Total | | 650 | | 382 | | 975 |
| Soviet Union | MiG-21 | 135 | MiG-23 | 149 | Su-15 | 410 |
| | MiG-27 | 103 | | | Tu-128 | 20 |
| | Su-17 | 190 | | | MiG-23 | 355 |
| | Tu-16 | 90 | | | MiG-25 | 170 |
| | Tu-22 | 30 | | | MiG-31 | 20 |
| Total | | 548 | | 149 | | 975 |
| Bulgaria | MiG-17 | 15 | MiG-21 | 68 | | |
| | MiG-23 | 33 | | | | |
| Total | | 48 | | 68 | | |
| Hungary | | | MiG-21 | 61 | | |
| Romania | MiG-17 | 54 | MiG-21 | 104 | | |

SOURCES: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base* (Arlington, Va.: TASC, April 1988); and Michael D. Scanlan, *Conventional Armed Forces Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

## TABLE A-11. REDUCTIONS IN NATO TACTICAL AIRCRAFT IN THE CENTRAL REGION UNDER NATO'S PROPOSED CFE TREATY

| | Fighter-Bombers | | Fighters | |
|---|---|---|---|---|
| | Aircraft | Number | Aircraft | Number |
| NATO Total | | 241 | | 51 |
| United States | F-16 | 144 | | |
| Belgium | Mirage F-5 | 8 | F-16 | 3 |
| Canada | CF-18 | 5 | | |
| Denmark | Draken | 3 | Draken | 3 |
| France | Mirage F-III | 17 | Mirage F-1C | 17 |
| Netherlands | NF-5A | 7 | F-16 | 6 |
| United Kingdom | Harrier | 22 | Lightning and F-4 | 16 |
| West Germany | Alphajet | 35 | F-4 | 6 |

SOURCES: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); and Michael D. Scanlan, *Conventional Armed Forces Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: All aircraft that would be eliminated under the CFE treaty are currently based in the central region. They are assumed to be eliminated from those aircraft that would be available upon mobilization.

## TABLE A-12. REDUCTIONS IN WARSAW PACT AIRCRAFT IN THE CENTRAL REGION UNDER NATO'S PROPOSED TREATY

| | Fighter-Bombers | | Fighters | | Interceptors | |
|---|---|---|---|---|---|---|
| | Aircraft | Number | Aircraft | Number | Aircraft | Number |
| Warsaw Pact Total | | 657 | | 834 | | 405 |
| Soviet Union | MiG-21 | 45 | MiG-21 | 135 | MiG-23 | 360[a] |
| | MiG-27 | 185 | MiG-23 | 272[b] | MiG-25 | 45 |
| | Su-17 | 270[c] | MiG-25 | 25 | | |
| Total | | 500 | | 432 | | 405 |
| Czechoslovakia | MiG-21 | 20 | MiG-21 | 111 | | |
| | MiG-23 | 40 | | | | |
| Total | | 60 | | 111 | | |
| East Germany | Su-22 | 27 | MiG-21 | 125 | | |
| Poland | Su-7 | 30 | MiG-21 | 166 | | |
| | Su-20 | 40 | | | | |
| Total | | 70 | | 166 | | |

SOURCES: Congressional Budget Office based on data from International Institute for Strategic Studies, *The Military Balance, 1989-1990* (London: IISS, 1989); The Analytic Sciences Corporation, *Atlantic-to-the-Urals Unclassified Conventional Weapon Systems Data Base* (Arlington, Va.: TASC, April 1988); and Michael D. Scanlan, *Conventional Armed Forces Europe (CFE) Negotiations: Facts and Figures*, Congressional Research Service (March 14, 1990).

NOTE: Except where noted, all aircraft that would be eliminated under the CFE treaty are currently based in the central region. They are assumed to be eliminated from those aircraft that would be available upon mobilization.

a. One hundred thirty-five of these aircraft would not be available until 10 days after mobilization.

b. Thirty-one of these aircraft would not be available until 10 days after mobilization.

c. Forty-five of these aircraft would not be available until 10 days after mobilization.

# APPENDIX B
# STUDY METHODS

Rather than rely on simple counts, this study employs methods that not only reflect the quantity of weapons but also reflect their quality, the timeliness of their arrival in the battle areas, and other factors. In order to use methods that are relatively simple and easily understood, the study relies on "static" comparisons. Static methods consider only the total forces that are available to each side and so do not attempt to account for the progress of fighting or combat losses on either side. Such methods can, however, be used to examine the changes that result as mobilization progresses and more forces are available to each side.

## METHOD FOR EVALUATING GROUND FORCES

The method used to evaluate ground forces is based on weighted effectiveness indices (WEI) and weighted unit values (WUV). The WEI/WUV method avoids, as much as possible, subjective assumptions concerning the conduct of war. This technique first evaluates and ranks each type of ground weapon--such as a tank, a personnel carrier, or a howitzer--relative to other weapons of the same type. Weapons are typically evaluated on the basis of their firepower, mobility, and ability to survive an enemy attack. Thus, various tanks would receive differing scores and be ranked against a norm such as the U.S. M60A1 tank. For example, the M60A1, as the norm, would receive a WEI score of 1.00; the M60A3, an upgraded version of the M60A1, a score of 1.11 based on its improved fire control system and power train; and the M1A1, the newest U.S. tank, a score of 1.34 because of its overall superiority. Tanks of other nations would be scored relative to the M60A1 in the same way. Each category of weapons (for example, tanks and artillery) would then receive a relative weighting or WUV score based on its contribution to the unit's overall performance of its mission in either an offensive or defensive posture. As one would imagine, tanks receive a relatively high WUV weighting factor (94 for defensive operations in Europe) and weapons such as individual rifles a lesser weighting (3.7).

The score for an entire combat unit, such as a division, can be calculated using the factors discussed above. Each weapon's score is multiplied by the appropriate weighting factor and all the products are totaled. The scores for various units, such as a U.S. light infantry division and a Soviet motorized rifle division, are then normalized against a U.S. armored division, with the resulting value called an armored division equivalent (ADE). All NATO and Warsaw Pact divisions can then, theoretically, be compared and tallied based on their ADE score. Table B-1 shows a simplified example of such a calculation.

Specific values of the WEI scores are obtained from analytic assessments of the capability of each weapon. The weighting or WUV scores are arrived at subjectively, usually by pooling the opinions of military experts. The WEI and WUV

## TABLE B-1. SAMPLE WEI/WUV CALCULATION OF A COMBAT DIVISION

| Type of Weapon | Number in Unit | Weapon Effectiveness Index (WEI) | Product (Number x WEI) | Weighted Unit Value (WUV) | Total Score (Total product x WUV) |
|---|---|---|---|---|---|
| Tanks | | | | | |
| M60A3 | 150 | 1.11 | 166 | | |
| M1 | 150 | 1.31 | 197 | | |
| Total | | | 363 | 94 | 34,122 |
| Attack Helicopters | | | | | |
| AH-1S | 21 | 1.00 | 21 | | |
| AH-64 | 18 | 1.77 | 32 | | |
| Total | | | 53 | 109 | 5,777 |
| Air Defense Weapons | | | | | |
| Vulcan | 24 | 1.00 | 24 | 56 | 1,344 |
| Infantry Fighting Vehicles | | | | | |
| Bradley fighting vehicle | 228 | 1.00 | 228 | 71 | 16,188 |
| Antitank Weapons | | | | | |
| TOW missile launcher | 150 | 0.79 | 119 | | |
| Dragon launcher | 240 | 0.69 | 166 | | |
| LAW | 300 | 0.20 | 60 | | |
| Total | | | 344 | 73 | 25,112 |
| Artillery | | | | | |
| 155mm howitzer | 72 | 1.02 | 73 | | |
| 8-inch howitzer | 12 | 0.98 | 12 | | |
| MLRS | 9 | 1.16 | 10 | | |
| Total | | | 96 | 99 | 9,504 |
| Mortars | | | | | |
| 81mm | 45 | 0.97 | 44 | | |
| 107mm | 50 | 1.00 | 50 | | |
| Total | | | 94 | 55 | 5,170 |
| Armored Personnel Carriers | | | | | |
| M113 | 500 | 1.00 | 500 | 30 | 15,000 |
| Small Arms | | | | | |
| M16 rifle | 2,000 | 1.00 | 2,000 | | |
| Machine guns | 295 | 1.77 | 522 | | |
| Total | | | 2,522 | 4 | 10,088 |
| Division Total | | | | | 122,305 |

The division's score in terms of ADEs = division score/norm for U.S. armored division. For this example, the division score = 122,305. When it is divided by the norm for a U.S. armored division—130,458—it is converted into ADEs. In this case, the illustrative division would be worth 0.94 ADEs.

SOURCE: Compiled by Congressional Budget Office from data in Department of the Army, U.S. Army Concepts Analysis Agency, *Weapon Effectiveness Indices/Weighted Unit Values III (WEI/WUV III)* (November 1979).

NOTES: TOW = tube-launched, optically tracked, wire-guided; LAW = light antitank weapon; MLRS = multiple launch rocket system; ADE = armored division equivalent.

scores used in this study were taken from a 1979 study performed by the Army.[1] Because this study evaluated U.S. and foreign combat units and weapons that were expected to be fielded through 1986, scores for almost all existing weapons, and even those that will likely be fielded by 1995, are included in the report. These are the most recent data that are publicly available. More recent assessments performed by the Department of Defense either have used different methods or have been classified. However, the method for calculating individual WEIs is also explained in the 1979 study. Thus, CBO was able to determine WEIs for those few weapons not evaluated by the Army in its 1979 report.

Finally, this analysis does not purport to be a precise evaluation of either NATO's or the Warsaw Pact's military capability. Rather, it is an attempt to assess the relative position of the two sides under a wide range of assumptions. Thus, if the underlying numbers used to make the assessments err by a certain small percentage for each side, the relative error should cancel out. But if the numbers provided by the 1979 study and updated by CBO result in a bias in either NATO's or the Pact's favor, such a bias would be relatively small.

## METHOD FOR EVALUATING AIR FORCES

The potential capability of tactical air forces depends in part on the number of each type of aircraft in the force; each aircraft's performance characteristics, including airframe performance, avionics, and armament; and the importance of these performance characteristics in achieving the aircraft's designated missions, which include close air support, interdiction, and the fighter/interceptor mission.

To quantify the potential capability of tactical aircraft, CBO relied on the TASCFORM model developed by The Analytic Sciences Corporation (TASC) for the Office of the Secretary of Defense, Net Assessment. The TASCFORM model provides quantitative measures for the performance characteristics of each type of aircraft. The following is a discussion of how the TASC numbers were derived and how they were used.

First, TASCFORM computes each aircraft's airframe performance by comparing the capabilities inherent in its airframe and engines to those of the F-4B. The factors initially considered are payload, range, maneuverability, and speed. The factors are not equally important to all missions, and the TASC model weights them for different roles. More emphasis is placed on payload in close air support, for example, while characteristics like speed receive more emphasis in the fighter/interceptor mission.

Next, TASCFORM adjusts the aircraft's scores for improvements in its avionics equipment and the weapons systems it can carry, which enable the aircraft to find and destroy its target. Adjustments here, for example, would reward an aircraft for advances in missile capability or improvements in targeting pods. The

1. Department of the Army, U.S. Army Concepts Analysis Agency, *Weapon Effectiveness Indices/Weighted Unit Values III (WEI/WUV III)* (November 1979).

model also adjusts the scores for the aircraft's survivability, reflecting, for example, whether the plane carries countermeasures to decoy radar and infrared missiles. The result is an aircraft system performance figure for each mission.

The system performance figures are then adjusted to reflect the number of sorties the plane can fly. To derive a single performance figure for an aircraft, TASCFORM averages the mission scores, weighting each for the fraction of time the aircraft is to spend in each mission.

Finally, TASCFORM "depreciates" these total scores; the model successively reduces the score each year after the aircraft enters the inventory. Depreciation captures the deteriorating effect of age on aircraft performance. CBO multiplied the depreciated scores for 1992 by inventories in NATO's and the Warsaw Pact air forces to produce a capability figure for the alliances' air forces.

## LIMITATIONS OF THESE METHODS

Like any analysis that attempts to quantify the many aspects that contribute to military capability, the WEI/WUV and TASCFORM approaches suffer from several important drawbacks. In particular, these methods generally ignore many attributes of a military unit--such as quality and training of personnel, support equipment, logistics capability, and the interplay of various weapons--that can determine the outcome of a particular battle. Though important, many of these factors cannot be quantified easily. How do you count an American reserve soldier or pilot who receives annual training versus a Soviet reservist who does not train after a term of initial enlistment? Is an American reservist worth two Soviet reservists or 1.5? Does a tank driven or a plane piloted by a U.S. reservist count as more than one Soviet tank or plane also operated by a reservist? Such comparisons are obviously subjective and not as amenable to quantification as a weapon's range, accuracy, or speed. This drawback also applies to analysis of resupply and maintenance capability. Although efficient ammunition and fuel resupply are commonly acknowledged as being necessary for the effective operation of a combat unit, very few analysts have suggested ways to quantify such a capability. This shortcoming may be especially important because NATO devotes more of its resources to providing logistics support than does the Pact. NATO units do not receive credit for this effort in the WEI/WUV or TASCFORM analyses, however.

Static comparisons like those using the WEI/WUV and TASCFORM methods also ignore other decisive variables such as strategy, maneuver, terrain, weather, and combat attrition that determine the conduct of war. Indeed, the WEI/WUV and TASCFORM methods are useful only for evaluating the forces that each side could have at its disposal before the onset of hostilities or the total forces that each side had mustered at a point after mobilization. Such comparisons, therefore, are more valuable for assessing the relative standing of opposing forces before a war starts, and are more useful for evaluating the ability to deter rather than fight a war.

The WEI/WUV method assumes that the added benefit of additional weapons is linear; that is, more weapons of any kind continue to provide the same additional capability as the first such weapon. This reasoning assumes what is called

"constant marginal utility" in economic jargon and ignores the fact that, beyond a certain point, additional weapons of one kind might be redundant and therefore of no added utility. For this reason, the WEI/WUV scores should not be used by themselves to determine the optimal mix of weapons in a division. If this method were followed to its ultimate conclusion, a division would contain only those weapons that yielded the highest score for the least cost. Instead, these scores should be used to suggest how one mix of weapons deemed plausible by military experts might perform against another plausible mix.

The TASCFORM model is based on the subjective assessments of the individuals involved in the initial survey research project. Although TASC solicited the opinions of a wide variety of pilots and analysts, in a field as divisive as tactical air forces, individual assumptions about the relative importance of different performance aspects inevitably will be open to dispute.

Finally, TASCFORM combines scores for several performance aspects of many types of aircraft performing multiple roles, to produce a single score. This is, in part, a strength of the model in that it enables a fairly simple comparison. It is, however, also a weakness in that it oversimplifies the issues involved in aircraft capabilities--an inherently complex and situational area.