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An Unfavorable Situation: NATO and the Conventional Balance

James A. Thomson

November 1988

40 Years 1948-1988

RAND

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PREFACE

Too often one hears statements to the effect that, "I think the balance is better than other people think." Obviously, such statements are analytically without content. This Note lays out as succinctly as possible the essential features of the balance of conventional forces in Central Europe and states the author's views of the consequences of an analysis of these features. The work is not based upon any single specific analysis, but rather a series of analyses that the author has done himself, participated in, or observed at close hand since 1974, when he joined the Office of the Secretary of Defense.

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I. INTRODUCTION

The view, long and widely held, that NATO conventional military forces are inferior to Warsaw Pact forces is one of the most important factors shaping postwar history. It influenced the size and nature of the American military commitment to Europe. It is at the heart of the "extended deterrence" strategy, in which the U.S. commitment to use nuclear weapons in the defense of Europe offsets the Warsaw Pact's perceived conventional superiority. The notion of Western inferiority runs through much of today's public debate on security policy—the INF Treaty, the future of nuclear and conventional arms control, U.S. and Allied defense programs, the burden-sharing debate, and so forth. These debates have spawned a new round of discussions on the nature of the conventional military balance in Europe and will affect U.S. and Western policies.

The term "balance" conjures up the image of a scale, with the Warsaw Pact's military power placed on one side and NATO's on the other. This reflects the normal "bean count" approach to the military balance: Total number of tanks, artillery, combat aircraft, etc. is the surrogate for military power. The image of the scale conveys a deeper meaning, however: If the Warsaw Pact were militarily superior or the balance were unfavorable to NATO, NATO would, by implication, lose a military conflict in Central Europe fought with purely conventional weapons. That perception is the one that has shaped the broader Western policy debate.

Because the ultimate use of balance assessments is to understand what sort of defense and arms control policies are needed to repair the balance, the scale image (and the bean count approach) is not especially useful: It would produce policies aimed at equality in numbers, something the West has not sought through its defense policy. Instead, policies are needed that will avoid a NATO defeat in the event of conflict or—in more sophisticated terms—would reduce the likelihood of such defeat and thereby enhance deterrence. The approach here is to assess the military balance in Central Europe in terms of a potential military conflict and thus to provide a basis for the development of policies that would reduce the chances of a defeat.

The term "defeat" requires some explanation. NATO's strategy of flexible response is ambiguous about the objectives it expects its conventional forces to meet. From a maximalist view, it implies that NATO forces ought to provide an unyielding

defense and that any loss of territory would be a defeat. A minimalist view would imply that only an initial defense is needed to give NATO enough time to make the momentous decision to escalate to nuclear war. Clearly, therefore, a judgment of what would constitute a defeat in a conventional war depends on one's view of the role and credibility of NATO's nuclear escalation strategy. This Note does not seek to provide that judgment, but rather to assess the probable outcome of a conflict fought purely with conventional weapons. In this sense, for the purpose of the analysis, it leans toward the maximalist view.

The issue must always be approached in terms of probable outcomes. A war in Central Europe would be a massive undertaking. Military operations on a continental scale are shaped by factors too numerous even to begin to list. Some of these factors can be estimated (or guessed at) in advance, but many simply cannot be. Unfortunately, among the latter set are many of the factors that, history suggests, shape war outcomes, such as the quality of military leadership or the national will of the nations at war. In the face of the extreme complexities and the myriad unknowables, it is tempting to say that it is pointless (or hopeless) to attempt to assess potential war outcomes. But the perception of a probable NATO defeat will continue to pervade the Western security debate, and policies will be developed in the defense and arms control realms. Better that the policy debate be informed by analysis than be conducted in a factual vacuum. The analysis needs to account for as many factors as can be reasonably included. The best that can be said about such analyses is that they project the probable outcome of conflict, if all other things are held equal (e.g., military leadership).

Central Europe is not the only place that a war for Europe could be decided. Some analysts argue, on the one hand, that Central Europe cannot be held if the flanks are lost or, on the other hand, that the flanks cannot be protected without holding the center. Rather than get into this issue and the underlying strategic choices implied by it, this Note will concentrate on the probable outcome of a potential battle for the center of Europe—more precisely the Federal Republic of Germany (FRG). The division of Germany is the essential feature of postwar security in Europe. Across the dividing line, East and West confront each other with the largest peacetime concentration of military forces in history. Were Germany to be lost as a result of conflict, postwar security would be undone, and NATO—an Alliance whose purpose is to protect that order—would be decisively defeated.

II. THE GEOGRAPHY AND THE FORCES

From the Baltic Sea to the Austrian border, the eastern frontier of the Federal Republic spans some 650 to 750 km, depending on how one accounts for variations in the border. NATO forces need to be deployed to defend this frontier. If the frontier with Austria must also be defended (to protect against a potential Warsaw Pact invasion up the Danube corridor), the frontier could be as long as 900 km. Of course, the longer the frontier, the more difficult the defense problem, because larger forces must be deployed to protect it. Whether the Soviet Union and its Warsaw Pact allies would violate Austrian neutrality is one of the many unknowables. The military advantages would be substantial, despite Austrian resistance. There would be political costs, including the potential animus of such other neutrals as Sweden, but some assumptions are necessary. Generally, Western analysts have assumed that Austrian neutrality would not be violated and that NATO would have to defend only the frontier opposite East Germany and Czechoslovakia. That is the assumption made here—an optimistic one from the NATO viewpoint.

This frontier's terrain is varied. The southern region, the area to be defended by NATO's Central Army Group (CENTAG), is fairly hilly, thus potentially channelizing the movement of attacking Warsaw Pact forces and providing traditional advantages to the defense. The hills taper off to the north where the frontier lies across the north German plain, a historically well-traveled invasion route. The defensive problem of NATO's Northern Army Group (NORTHAG) is generally viewed as more difficult. However, the softness of the soil (especially in marshy areas), increasing urbanization, and the need for modern armies to exploit the road network limit large-scale maneuver and provide some opportunities for the defense. There are still some 14 invasion corridors across the frontier, requiring NATO to spread its forces and complicating the defensive task.

Germany's strategic depth is shallow compared with the length of its frontier. The Rhine is only 150–200 km from the frontier. Other important military objectives, such as Hamburg and Bremen, are close to the border. The CENTAG region is somewhat deeper, but behind the largely hilly frontier the terrain opens up, facilitating westward movement.

The long frontier and the shallow depth of the Federal Republic have shaped NATO's strategy for defending Germany. Yielding land to buy time, either for the arrival of reinforcements or for negotiating a favorable settlement, has been ruled out on military grounds: The danger of rapid defeat is too high. It would also be politically infeasible, because maintaining Germany's territorial integrity is critical to its participation in NATO. NATO's strategy of forward defense, therefore, will defend the Federal Republic as far forward as possible.[1]

In brief, NATO plans to establish a heavily defended line in the best available defensive terrain near the frontier. Forward of that line, NATO forces would fight a "covering force" battle, designed to delay and weaken advancing Warsaw Pact forces before they met the main NATO resistance in the main defensive zone. The zone would be defended by national corps, four as part of the NORTHAG (Dutch, German, Belgian, and British), and four as part of CENTAG (two each American and German), each assigned a sector along the frontier. The northernmost region of Germany would be defended by the equivalent of a corps formation consisting of German and Danish troops.[2] The essence of this plan—the establishment of a forward defensive line and the layer-cake arrangement of national corps sectors—has often been criticized on military grounds. The linear defense is viewed as too vulnerable to penetration and envelopment. The layer cake invites operations designed to split the defense along the seams created by corps boundaries. But whatever the validity of these criticisms, the forward defense strategy is a political fact of life and unlikely to be changed. There is considerable scope for altering the tactics used to conduct the defense; doctrinal innovations have been introduced in Allied armies over the years, such as the recent shift of U.S. Army doctrine to the so-called "AirLand Battle" doctrine.

We are, of course, not privy to Warsaw Pact plans for conducting military operations against NATO in Central Europe. At the political level, Soviet and other Warsaw Pact leaders assert that their strategy is defensive. But the structure of Soviet

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[1]The evolution and implementation of the forward defense strategy is discussed in Karber, 1984.

[2]CENTAG and NORTHAG are part of Allied Forces Central Europe (AFCENT). The Danish and German forces defending the approach to Jutland are part of Allied Forces Northern Europe (AFNORTH). The commanders of AFNORTH, AFCENT, and AFSOUTH report to the Supreme Allied Commander Europe (SACEUR). AFCENT's subordinate commands also include Allied Air Forces Central Europe (AAFCE), which provides air support to NORTHAG and CENTAG.

forces, plus their military writings and practices, show that the Soviets have been heavily infuenced by the lessons of World War II and believe, whatever the political rhetoric, that the best defensive strategy is one based upon large-scale offensive operations. In the Central European context, these operations would seek to establish several main attack axes to push through the NATO defensive line and thus open the way for armored and mechanized spearheads to move deep into German territory, envelop and destroy NATO forces, and seize key military objectives in the rear, bringing about a decisive defeat as rapidly as possible.[3] In the context of this analysis of a purely conventional war, a decisive military defeat means an outcome in which large portions of FRG territory have been overrun.

To conduct its forward defense, NATO would rely initially on existing forces in Central Europe. The most immediately available would be those in West Germany today, the 12 divisions of the Bundeswehr; the ten brigades of the German Territorial Forces (which require large numbers of reservists to bring them to full strength); three British divisions; and four divisions, two brigades, and two armored cavalry regiments from the United States. Small Belgian and Dutch contingents are also present in Germany in peacetime as the lead elements of their national corps. The remainder of the Belgian and Dutch forces (totaling five divisions) are nearby in their home countries. Three French divisions are in southwest Germany. All told, NATO would have the equivalent of roughly 34 divisions on the ground in Central Europe in peacetime, plus 1300 combat aircraft.[4] Those forces committed to NATO's defensive line would have to be moved from their peacetime position to their intended wartime deployment areas, a process that could take several days because of manpower mobilization and movement over long distances, especially for the Belgian and Dutch forces. If forces not committed to the NATO defensive line, such as the German territorial army and French forces, were made available to defend the central front, they would assume roles as rear security forces and as "operational reserve" forces to be committed to the battle when needed.

NATO's operational reserves would be increased by deployments from outside of the central region. To speed reinforcement, the United States already has in the region

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[3]Soviet operational strategy is detailed by Hines and Peterson, 1983.

[4]These figures are derived from *The Military Balance, 1987–1988*. To reach the total number of divisions, a brigade or regiment is equated to one-third of a division. Naturally, these "divisions" come in many sizes and shapes. French divisions in particular are far smaller than their American or German counterparts.

sets of equipment for six divisions called POMCUS (prepositioned overseas materiel configured in unit sets). Soldiers would be flown from the United States and draw this equipment out of storage so that a total of ten U.S. divisions could be in place fairly quickly, although the call for ten divisions in ten days is probably optimistic.[5] Additional reinforcements—active and reserve U.S. Army units—would be deployed by sea with their equipment. Britain also plans a modest reinforcement of the central front (roughly one division), and seven small divisions in France are potentially available to NATO. Reinforcements mainly from the United States, but also from the United Kingdom, would substantially increase the air forces available for the central region. This reinforcement could be done in several days and would be a crucial addition to NATO's overall capability.

NATO's 34 divisions in Germany, Belgium, and the Netherlands contrast with the Warsaw Pact's 57 in Poland, East Germany, and Czechoslovakia. The Soviet units are organized into "groups of forces"—the Northern Group of Forces in Poland, the Central Group of Forces in Czechoslovakia, and the Group of Soviet Forces in Germany, 26 divisions all told. The East Europeans in these three countries contribute another 31.

The Warsaw Pact can draw on Soviet forces deployed in the western USSR as reinforcements for a central battle. It is generally believed that the forces in the westernmost military districts—the Baltic, Belorussian, and Carpathian—would reinforce the central front as a second "strategic echelon" for Warsaw Pact operations in this military theater.[6] Forces from the Kiev military district could also be committed for this role. A major question revolves around the role of the forces deployed more to the rear, but still west of the Urals. These are generally considered to be the strategic reserves of the Soviet high command, and they could obviously form subsequent strategic echelons and be committed to a war for Germany. Thus, depending upon the allocation of the Kiev and strategic reserves, the Soviets would have 40 to 80 divisions available to reinforce the central front. If the Soviets decided to attack up the Danube corridor

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[5]The U.S. Rapid Reinforcement Program, which was part of the NATO Long-Term Defense Program (LTDP). See Komer, 1982.

[6]These second strategic echelon forces, plus the first strategic echelon, are considered to belong to the Soviets' Western Theater of Military Operations (the acronym in Russian is TVD), *Soviet Military Power*, 1988, p. 14.

through Austria, this presumably would involve some or all of the six Hungarian and four Soviet divisions based in Hungary.[7] Figure 1 depicts the Soviet military districts.[8]

This totaling of forces masks important political assumptions. The potential role of East European forces has been a topic of research and debate in the West for many years.[9] It is clear from the figures just cited that East European forces would contribute a substantial amount to a Warsaw Pact offensive, especially one launched with only the forces present in Central Europe in peacetime. Moreover, because Soviet reinforcements would be deployed to the forward area by rail and supplies would be moved forward by a combination of road and rail, security of the lines of communication in Eastern Europe would be essential. Hence, the Soviets depend heavily on the cooperation of their East European allies in any large-scale offensive against the West.

This cooperation cannot be assured. To a degree, Eastern Europe is under Soviet military occupation. Just as Soviet forces threaten the West with the potential for offensive action, they threaten to impose Soviet will on Eastern Europe through military suppression in the event that undesirable political trends emerge. Three times since the establishment of the Warsaw Pact the Soviets have used their forces to put down political uprisings. They invaded Hungary in 1956 and Czechoslovakia in 1968. Although they did not actually invade Poland during the height of the unrest there in 1980–81, they came to the brink,[10] and the show of force associated with these invasion preparations certainly affected the course of politics in Poland and the ultimate decision of General Jaruzelski to impose martial law in December 1981. The legacy of bitterness created by four decades of Soviet occupation of Eastern Europe raises the obvious questions of whether East Europeans would fight alongside their Soviet allies and of whether the lines of communications would remain secure. Poland is obviously the biggest problem for the Soviets: It makes the largest military contribution of the East European countries, the critical lines of communication run through Poland, and it has the most recent record of political unrest.

Soviet military planners are obviously aware of this problem and have taken steps to deal with it. At a military level, for example, the Warsaw Pact military structure is a

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[7]Figures drawn from Sadykiewicz, 1988a.

[8]"NATO and the Warsaw Pact: Force Comparisons," NATO Information Service, 1984.

[9]Herspring and Volgyes, 1980.

[10]Brzezinski, 1988b.

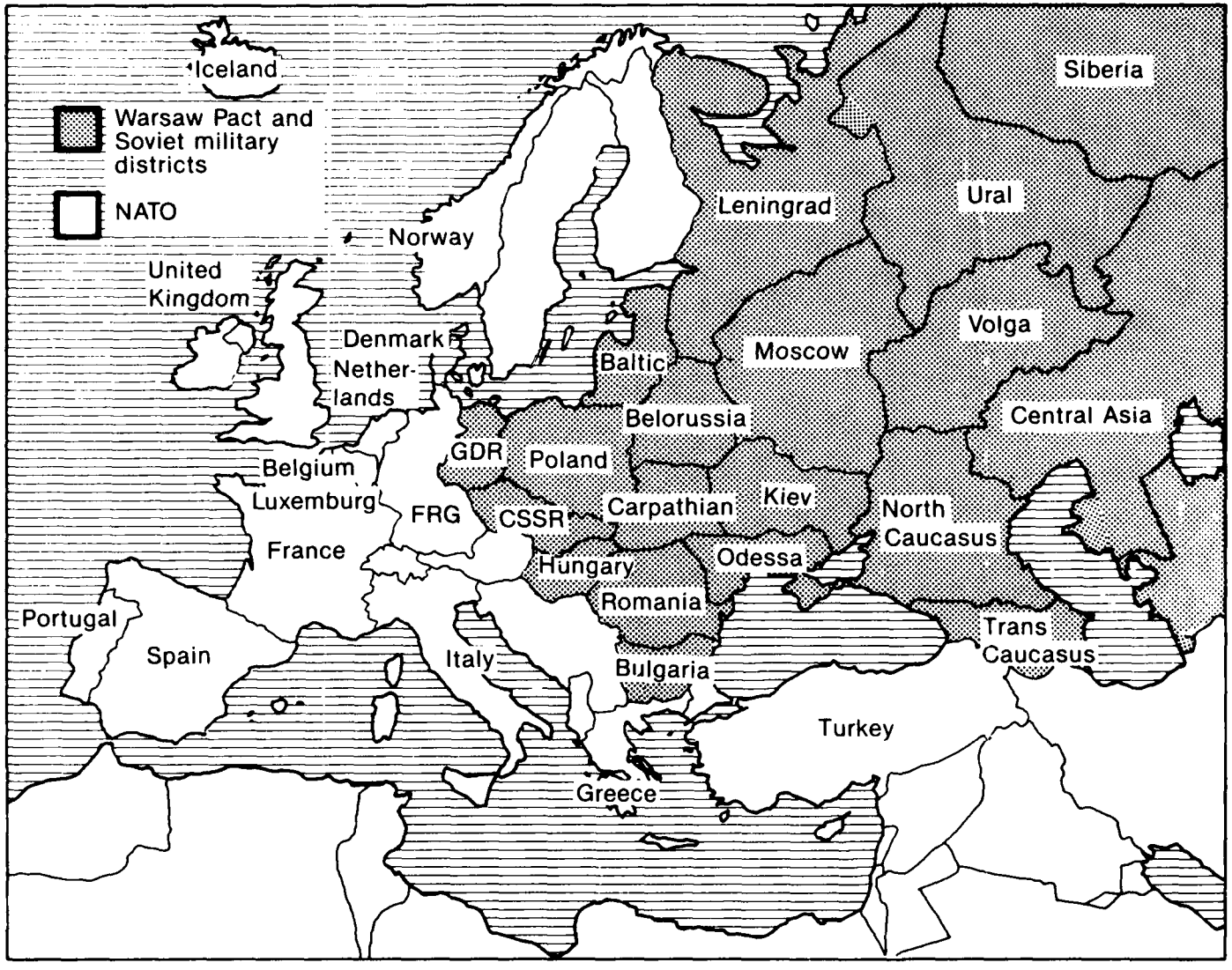

Fig. 1—NATO and Warsaw Pact countries in Europe and Soviet military districts

thoroughly Soviet organization with Soviet officers in key command positions throughout.[11] Soviet control extends into the East European armed forces: At the beginning of the 1980s, the Soviets "already controlled virtually everything that was connected to the defense of Poland and the functioning of the Polish armed forces."[12]

The Soviets would obviously also seek to ensure popular support in Eastern Europe for any offensive against the West. How this would be done would depend critically on the conditions that had brought on the crisis and possibility of war. The Soviets would almost certainly seek to portray the West as the aggressor and claim that the survival of the East European nations was at stake. Outside of East Germany, they would seek to play on long-standing latent anti-German sentiment.

What then should be done with East European forces in assessing the military balance? If their efforts to ensure the full participation of their East European allies appear to the Soviets to have failed or to have had uncertain results, the Soviet leaders would have to question the military feasibility of war against the West. East European unreliability would probably deter the Soviets from undertaking such an adventure in the first place; this factor is no doubt an important part of the deterrence equation today. By the same token, therefore, a Warsaw Pact offensive against the West, when deterrence has broken down, would almost certainly involve the full participation of East European allies at the outset. However, East European participation could come into question if the offensive bogged down and the possibility of a stalemate or a NATO victory increased.

From the standpoint of a balance assessment designed to help shape Western defense and arms control policy, the full participation of East European forces ought to be assumed. Whatever steps can be taken to increase Soviet concerns about the reliability of their East European allies would obviously enhance deterrence. But the most productive step in this regard would be the creation of a balance of forces in which the East Europeans were quite dubious about Soviet success. The less they believe Soviet victory is assured, the more likely they will be to hesitate.

The problem of potentially unreliable allies is not unique to the Warsaw Pact. History is full of examples of hesitating allies, even those on good terms before the crisis.

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[11]Sadykiewicz, 1988b. Brzezinski, 1988a.

[12]The testimony of Colonel Ryszard Kuklinski in the Polish language journal *Kultura*, Paris, April 1987, pp. 3–57, cited in Sadykiewicz, 1988b, and Brzezinski 1988a. Kuklinski was a deputy head of the Operations Directorate of the Polish General Staff and chief of Strategic-Defense Planning before November 1981.

Crises are loaded with ambiguity: Some signals point toward war and others away. Sovereign nations make independent judgments of their national interest, of the portents of the crisis, and of its probable course. NATO is an alliance of 16 sovereign nations, of which 13 belong to the integrated command structure. In any crisis leading to war, there would certainly be differences among them as to the appropriate course of action. On the crucial question of the decision to prepare military forces for war, it would not be surprising if one or more nations hesitated. In a crisis, Soviet political strategy would certainly be aimed at bringing about a fractionation of the alliance because of the potential for a Soviet victory without military action.

What should be done about this uncertainty in balance assessments? Since balance assessments are intended to shape defense and arms control policy, our standard assessments must assume that all NATO allies act in concert, as they have committed themselves to do. To assume otherwise would create a fractious political debate within the alliance (opening the question of which ally or allies are unreliable) and would require compensation for such unreliability, either by building up larger NATO forces or in arms control negotiations. Neither course seems politically acceptable.

In this regard, however, France poses a special problem. Since 1967, she has not been part of the NATO integrated command structure. French leaders have repeatedly stressed the independent role of France in defense affairs, creating uncertainty as to the potential timing and nature of any French military commitment to the defense of Germany. Another uncertainty surrounds the potential wartime role of French forces, particularly whether they would operate under the NATO command structure if and when France did commit. In wartime, operations independent of the integrated command structure could be ineffective, especially because French forces are needed as operational reserves for SACEUR, to be committed to the battle at crucial times and locations. SACEUR and his subordinates must take such decisions. Similarly, the operations of French air forces need to be well-coordinated with those of NATO forces and would optimally operate directly under a NATO command.

France has recently inched closer to NATO in military affairs. French leaders have been increasingly forthcoming concerning France's determination to participate in

the defense of Germany, especially in the past few years.[13] These are obviously positive developments, but the absence of France from the integrated command structure still leaves troubling uncertainties from a military standpoint.

In summary, Table 1 indicates the raw resources available to the two sides in the event of a conflict in Central Europe. In NATO, the range of uncertainty associated with the reinforcing divisions indicates, on the low side, those U.S. and British forces immediately available for rapid reinforcement and, on the high side, adds further American and French forces. The Warsaw Pact figures reflect the uncertainty about the commitment to a central front battle of the forces in the Kiev military district and of the strategic reserves of the high command. On both sides, the uncertainties about reinforcements are compounded by the possibility that these forces would be needed in other theaters.

Although divisions are widely understood military entities and are commonly discussed as a measure of military capability, they are actually not particularly useful for that purpose. In the West, especially, divisions come in a range of sizes, with varied organization and weaponry. Analysts seek to overcome this problem by totaling the number of weapons available to the two sides, but such bean counts fail to account for weapon quality. In the early 1970s, the U.S. Department of Defense began using a scoring system that accounted to some extent for quality. This so-called WEI/WUV system assigned scores to individual weapons and summed the scores of all the weapons

Table 1

FORCES POTENTIALLY AVAILABLE FOR CONFLICT IN CENTRAL EUROPE

	Divisions		Aircraft	
Forces	NATO	WP	NATO	WP
In Central Europe	34	57	1300	3300
Additional forces	6–20	40–80	2000	700

[13]For example, on December 12, 1987, the French Prime Minister said that "there cannot be a battle for Germany and a battle for France," and that if West Germany were attacked, "France's commitment would be immediate and unreserved." (Reported in the NATO Report, December 21, 1987.)

in a military formation to reach a total score. For simplicity, these totals are usually expressed in terms of the score of a U.S. armored division, which counts as one equivalent division (ED).[14] With the WEI/WUV system, the total of NATO EDs in Central Europe is 27 and those of the Warsaw Pact 40—a force ratio of about 1.5:1 in favor of the Warsaw Pact. Compared with the actual numbers of 34 and 57 divisions, on average NATO divisions are somewhat stronger than their Warsaw Pact counterparts.

Similar problems exist for air forces, because aircraft have widely varying qualities. A scoring scheme could, in theory, be constructed to account for the contribution of air forces in the close air support mission—providing additional firepower to assist frontline forces. But the principal advantage of aircraft is the ability to concentrate them rapidly in specific locations, not their overall firepower per se. Moreover, air forces play more roles than close air support, such as air defense and interdiction strikes behind the front line. Many aircraft, especially on the NATO side, have multi-role capabilities in that they can be used for ground attack or air defense, depending upon the situation. For these reasons, a simple scoring scheme is not appropriate; the value of airpower must be estimated through a simulation (discussed later).

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[14]WEI/WUV stands for Weapons Effectiveness Indicator/Weighted Unit Value. The WEI score combines estimates of the firepower, mobility, and survivability; these estimates are based upon a combination of physical data and military judgments. Judgments are also made about the relative importance of various categories of weapons, such as tanks or antitank weapons in offensive and defensive operations. With these category weights, the scores are combined into the overall WUV score. William Mako (1983) provides the best description of this system. Unfortunately, as discussed by Posen (1988), Mako's data are based upon older scores (1976). (See footnote 12 in particular.) To account for the modernization of armories, the WEI/WUV system has been updated since that time. The WEI/WUVs used in the analysis in this Note reflect contemporary scores.

The WEI/WUV system has been criticized over the years and does indeed have important failings. For example, it does not account for the effect of "combined arms"—the value of an infantry unit does not depend solely on its weaponry, but also the quality of supporting armor, artillery, and other forces. Despite admitted problems, however, there is currently no better system for accounting for the differences in quality among weapons.

III. THE TIME ISSUE

In addition to the force totals, a crucial determining factor in balance assessments is the time available to the two sides to prepare those forces for combat, which dictates the availability of forces at or near the front line (and therefore available for combat), the readiness of those forces (and thus their effectiveness), and, on the NATO side, the time to prepare defensive positions. Seeking to estimate this time leads to the question of the scenario for war.

In political-military war games, it is nearly impossible to get a war started in Central Europe. In the 1950s and 1960s, it was fashionable to write scenarios around a crisis in Eastern Europe, which would then spill over into a broader East-West confrontation. Crises outside Europe, in the Middle East or Persian Gulf, have been the object of more recent scenario writing. Any political scenario is easily subject to ridicule. For this reason, most balance assessments simply set this question aside, make fairly simple assumptions about preparation time: For whatever reason, the Warsaw Pact begins to prepare its forces for combat (on M-day). After a period of time, NATO detects these preparations, assesses them as preparations for war, and begins its own preparations for the defense. At some later point, the Warsaw Pact opens hostilities. For example, in a "10/5" scenario, Warsaw Pact forces prepare for ten days, NATO detects these preparations and begins its own five days later; and five days after that hostilities begin. As discussed later, the choice of specific scenario is one of the most important assumptions of any balance assessment.

The forces of the two sides are at varying levels of readiness in peacetime. Generally, the forces on both sides in the forward areas—in West Germany, East Germany, and Western Czechoslovakia—are at fairly high levels of readiness; they have their full complement of equipment and of manpower. The equipment is maintained and the soldiers are trained according to standards set by the military authorities for individual, small unit, and large unit training. Even in the forward area, not all NATO and Pact units meet high readiness standards. Many units, even fairly ready ones, require a modest amount of augmentation with mobilized reserve manpower. On the NATO side, others require major mobilization, especially the units of the German Territorial Army, and the American Army's Reserve and National Guard units in the United States. Belgian, Dutch, and French forces are at intermediate levels of peacetime readiness.

But the readiness issue commonly concerns Soviet and East European forces. Soviet forces are often characterized in three categories: Category I—fully ready; Category II—intermediate levels of readiness, requiring mobilization of up to half of the units' manpower complement; and Category III—low readiness units that require the bulk of their manpower to be mobilized and perhaps also maintenance of its equipment.[1] Soviet units in Eastern Europe are Category I, while those in the western USSR fall mainly into Categories II and III.[2] East European forces cover all three readiness categories. Thus, the Warsaw Pact will have to mobilize substantial numbers of men to bring its units to wartime posture.[3] Because these men will not have been recently trained, refresher training will be necessary to improve the training readiness standards of the units in basic soldier skills, as well as in maneuvering in units.

Lack of training readiness would obviously affect the combat capability of military units, but analysts have differed over how to account for this problem. Three approaches have been used: First, the problem has been ignored. Military units move forward as soon as the time needed to mobilize (gather the manpower in garrison) has elapsed (a few days); the units are then considered as fully ready.[4] The second approach assumes that it takes time not only to mobilize, but also to bring the units to full training readiness before they can be moved out of garrison. Estimates vary on the time required for this. One estimate uses 30 days for a Category II unit and 60 days for a Category III;[5] another suggests 30 and 130 days.[6] Obviously, lower peacetime readiness units would not figure in the balance assessment for short preparation time scenarios under this approach. The third approach, and the one I favor, is to degrade the capability of units to

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[1]East European units are categorized by the same scheme but are at somewhat lower peacetime manning levels than Soviet units in the same category. See *The Military Balance*, 1983–1984, p. 19.

[2]The U.S. Department of Defense categorizes Soviet forces as ready, not ready (cadre), and not ready (mobilization). See *Soviet Military Power*, 1988, p. 89. According to Shilling, 1988, pp. 126–127 and footnote 9, the ready units correspond to Categories I and II and the cadre units to Category III.

[3]To give a rough estimate, assuming an average manning level of 40–50 percent and a total threat of 100–140 divisions, between 600,000 and 1,000,000 would be needed to flesh out the divisions alone, not to speak of nondivisional support structure.

[4]According to *Soviet Military Power* (1988, p. 89), the ready divisions (Category I and II) require only a "brief" period of time; the cadre divisions, about a week, and the mobilization divisions, more.

[5]Posen, 1988.

[6]*The Military Balance*, 1987–1988, p. 228.

account for their lack of training readiness. As time passes and the units train in garrison or in the field, training readiness grows until it reaches a threshold, at which point the unit would be permitted to move forward. If it entered conflict, its capability would be degraded to account for lack of training readiness. This third approach is preferred over the second because it seems foolish to assume that units would be withheld from battle in order to make some marginal gains in training readiness. Better that they fire their weapons at the enemy than at targets.[7]

The readiness categorization schemes have been designed for combat units. Yet the support structure must also be made ready. Training requirements for support units are not as stringent as for combat, but training is still necessary. Moreover, because training needs are not as demanding, support units are often held at lower readiness than combat units and thus rely on mobilization to a greater degree. This entire issue is often ignored in balance assessments, but it is unclear whether this omission is a NATO-favorable or Pact-favorable assumption.[8]

The peacetime active support structures of the two sides differ markedly. For example, in Central Europe, Warsaw Pact tanks outnumber NATO's by 2.14:1 and, according to the ED measure shown in Table 1, the combat superiority of the Warsaw Pact is 1.6:1. Yet the Warsaw Pact has only a 1.2:1 advantage in active duty manpower.[9] Therefore, in peacetime, NATO has a larger support structure for its combat forces than does the Warsaw Pact. Why? One possible explanation is that this will be changed upon mobilization—the Warsaw Pact is postulated to rely more heavily than NATO on mobilization to flesh out its support structure and to draw heavily on the civilian economy for some aspects of support, such as motor transport. Another possible explanation is that the Pact relies on a lower level of support because of its doctrine. Maneuver warfare doctrine, which analysts ascribe to the Warsaw Pact, requires a smaller support structure—"the more elegant the tactics, the smaller the staffs, the

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[7]Clearly the choice of the threshold is a matter of judgment, because a commander's judgment on whether to send less than fully ready troops to combat would depend on his needs. These will vary during the course of a conflict. For simplicity, I have chosen 70 percent for this analysis—a figure that splits the difference between the first and second approaches.

[8]Some aspects of support are replicated in the simulations that are discussed below, specifically supplies and maintenance.

[9]Figures taken from Cordesman, 1988.

simpler the C^3I and the smaller the logistics tail."[10] Whether the Warsaw Pact's doctrine is more "elegant" than NATO's, defensive doctrines seem to require larger support than offensive. The offense can pick the time and place of the attack and focus its support on the main axes, whereas defenders must be prepared for a strong defense over a broad front.[11]

In balance assessments, once combat units have been mobilized and trained to whatever readiness level is deemed necessary by military authorities, they must then be moved forward and positioned for combat. On both sides, those forces near the border would probably move under their own power over the road network to their assigned wartime positions. More distant forces would probably move by rail, because the movement of mechanized forces over distances greater than 100 km is likely to lead to maintenance problems. Soviet forces from the western USSR would presumably move forward by rail, unload, and then move to their wartime positions over roads. On the western side, POMCUS units would probably also move by a combination of road and rail once they have obtained their equipment. Forces currently based in the United States, without prepositioned equipment, would of course move by rail to seaports and then by sea to the theater.

Estimating the time required for these movements on both sides is no easy matter. Factors such as the time it takes to load, move over a crowded road or rail network, unload, and move forward again on road must be taken into account, as is the requirement for Soviet forces to "transload"—shift from the wide gauge Soviet railroad system to the narrower (standard) gauges in Eastern Europe. Always hovering in the background of such estimates is Murphy's Law, which certainly applies to the conduct of large-scale movements.

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[10]Canby, 1986.

[11]Barry Posen (1988) argues that NATO's larger support effort must have some value in combat. Accordingly, he increases the ED strength of NATO units by 50 percent in his analysis. This is the equivalent of adding roughly 13 EDs to NATO's existing force structure in Central Europe, with an equivalent percentage increase for reinforcing forces. It is no surprise, therefore, that Posen would find that the conventional balance is in equilibrium (if not in NATO's favor). Although Posen has raised an important point about the importance of the support structures, a more careful analysis needs to examine the alternative explanations mentioned in the text. Moreover, it would be preferable to treat the issues of the support structure directly in the analysis, rather than simply multiplying by a factor. Using simulations, to be discussed below, analysts currently seek to account for supplies and maintenance. Command, Control, Communications, and Intelligence are less well addressed.

By most estimates, the Warsaw Pact would be able to move most of its forces into position in one to two weeks.[12] Given the optimistic nature of transportation calculations, it would be wise to err toward the latter figure. NATO forces would obviously take longer: In less than a week, most of the forces in Central Europe could also be in position. The U.S. POMCUS units and reinforcing divisions from France would take longer, perhaps as long as three weeks. Only after several weeks would forces deployed from the United States by sealift begin to arrive in the theater.[13]

Time is also especially important to NATO as the defender. In a few days, the combat units and combat engineers can provide hastily prepared defensive positions that would provide added benefits to the defense—forces could be dug in, mines laid, tank traps dug, bridges blown, etc. The longer the time the units have to prepare their positions, the more strongly they will be entrenched and the more difficult they will be for Warsaw Pact attackers to dislodge. This important advantage to the defense, which of course depends heavily on the war scenario, needs to be considered carefully in analyses of the central front battle.

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[12]The actual time of travel would be much shorter. Assuming a conservative 40 km/hr for rail travel and an average trip of 1500 km from the Western USSR, rail travel time would be about two days. Combining this with other fairly conservative factors—a day each to load, transload, and unload; a day to travel by road to the jumping-off position; and a day to organize for combat—leads to an estimate of a week. Harold Brown (1982, p. 69) provided a two-week estimate, which presumably includes time to mobilize and allowance for rail and road capacity constraints.

[13]As with the Warsaw Pact times, the NATO figures can be derived from simple transportation planning figures. Forces in Central Europe must travel only a few hundred km at most. Allowing a day each to load, move, unload, and organize yields four days. The Rapid Reinforcement Program (POMCUS) is supposed to be implemented in ten days (see Komer, 1982), but this is based on such optimistic assumptions as the complete availability of divisions' equipment in POMCUS, clockwork operations by the European reserves supporting the effort, etc. More conservative assumptions would yield two to three weeks. Forces moving from the United States by sealift require additional time for mobilization and movement in the United States, as well as by sea, and face rail, sealift, and port capacity constraints.

IV. METHODS OF ASSESSMENT

Thus far, we have considered the raw military resources available to the two sides, the problem of accounting for the different sizes of units and the quality of their weaponry, and the time issue. These sorts of data are the essential ingredients for an assessment of the conventional balance in Central Europe. But how should these be combined to provide an estimate of the probable outcome of a conflict? More to the point, how should war be replicated to determine the potential outcome given these input data? What is the model of conflict?

Essentially, three broad categories of models have been used. At one extreme is the simple theaterwide force ratio model. At the other extreme are combat simulations, which seek to model combat in considerable detail. In the middle are simple models that try to account for at least some of the details of war, albeit at an aggregate level.

The simplest model employs force buildup curves and theater force ratios. Figure 2 is an example of buildup curves:[1] On the Warsaw Pact side, the central front is reinforced by forces from the three western military districts, plus the Kiev military district, ultimately making available a total of roughly 80 EDs in the central region. The movement of low readiness forces is delayed until they reach a threshold of 70 percent training readiness. In the figure, their combat scores have not been degraded to account for this lack of training readiness, however. Similar rules have been applied to the NATO buildup curve, which represents a steady dribbling in of U.S. POMCUS and French units until U.S. sealift begins to arrive toward the end of the time period. Both curves depict a simultaneous start of preparations on both sides.

The effect of the Warsaw Pact readiness issue is depicted in Fig. 3. The second curve in this figure is taken from the Pact buildup curve in Fig. 2. The third curve degrades the combat capability of the forces to account for their lack of training readiness. The first and fourth curves represent the two extreme approaches to the Pact readiness issue discussed above. The first curve ignores the problem; the second curve assumes that Warsaw Pact forces are not moved forward until they have completed their training activities and been brought to full readiness—30 days for Category II units.

[1]These curves are based on the time estimates discussed above.

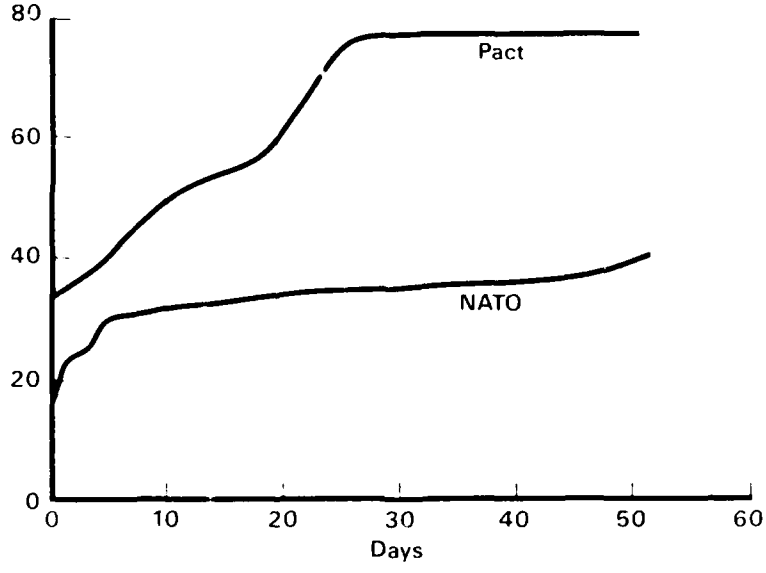

Fig. 2—Relative buildup rates (undegraded)

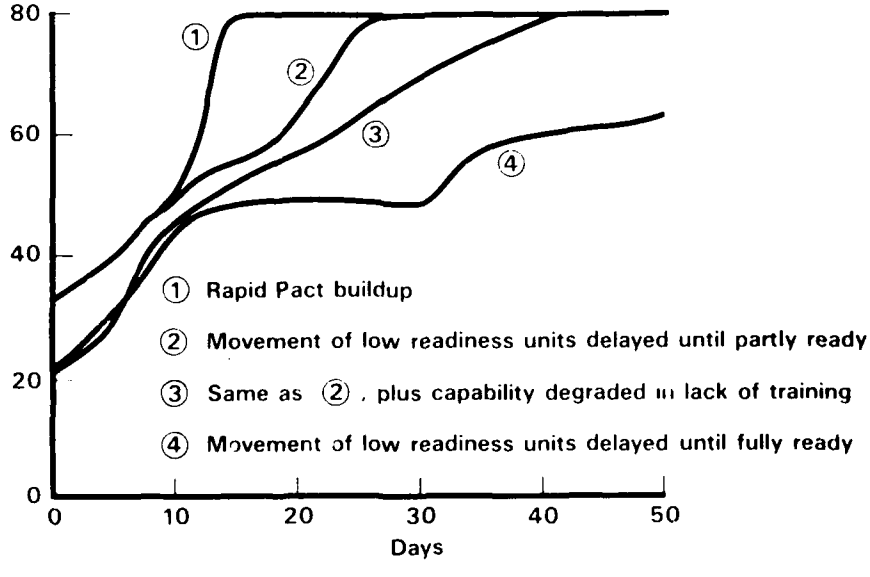

Fig. 3—The Pact readiness issue: Four views

With the simple force ratio model, such curves are used to generate theaterwide force ratios. Figure 4 demonstrates such force ratios for a 10/5 scenario—ten days of prewar preparation by the Warsaw Pact and five by NATO. The four curves correspond to the four sets of assumptions in Fig. 3.

In a force ratio model, analysts often simply use a threshold to resolve the question of the probable war outcome—force ratios below the threshold would imply reasonable confidence of NATO success. A threshold of 1.5:1 has become practically the standard. This number has been derived from an assumption that an attacker with less than a 1.5:1 theaterwide force ratio advantage would be unable to generate the local superiorities of 3:1 generally understood as needed for a successful attack in a narrow sector on the front. The origins of all these numbers are murky and dubious.[2]

Of course, none of these force ratios say anything about airpower. NATO's air forces are generally conceded to be superior because of superior aircraft, avionics,

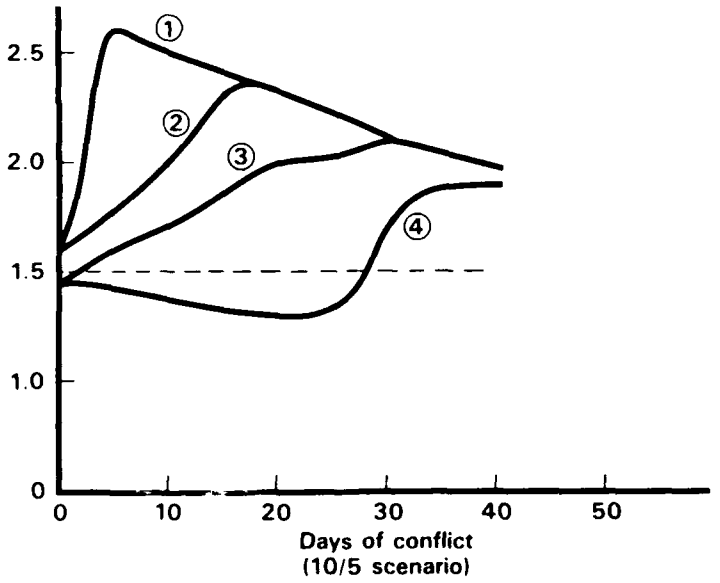

Fig. 4—Theater force ratios

[2]Steven Biddle (1988) shows that an attacker could gain a local superiority of 3:1 in one sector (out of a possible nine), with a force ratio as low as 1.25:1. The requirement for a 3:1 advantage for a successful attack also has obscure origins in military history, but it nevertheless seems widely accepted. A critique of this "rule" can be found in Epstein, 1988. See also Hamilton, 1985, especially footnote 7.

munitions, and pilot skill. To account for this superiority, the argument is occasionally made that NATO could be comfortable with force ratios in excess of 1.5:1. Figure 4, which is derived from Fig. 3 and the NATO buildup curve in Fig. 2, indicates that for a 10/5 scenario, NATO would be disadvantaged in all cases except when the lack of Warsaw Pact training readiness prevented the deployment of Category 2 forces for about 30 days. If NATO could accept 2:1 because of air superiority, then curve 3 would also be comfortable. But 2:1 is derived by adding an arbitrary number to a dubious number.[3]

Although, as indicated by Fig. 4, the force ratio model is a crude—far too crude—approach to assessing the balance, it does indicate some of the effects that assumptions can have on the balance. Depending on one's view of the readiness issue, the assessment can swing from pessimistic to optimistic. A very long warning scenario (not depicted in Fig. 4) in which NATO has, for example, two months to prepare and the Soviets did not commit their strategic reserve would have a positive outcome for NATO because of the arrival of U.S. Army units in Europe by sealift.

Recognizing the fact that the simple force ratio model is far too crude, many analysts, mainly American academics, have published models that account for other important military factors, especially space and attrition rates.[4]

Space, the length of the frontier, and force-to-space ratios can come into play in two ways.[5] Defenders are able to provide a stalwart defense if they can create a minimum linear force density, such as 25 km per division. Attackers, however, are only able to concentrate their divisions so much, say 12.5 km per division. This so-called "shoulder space" constraint arises because units need to move in march formations and over passable terrain, especially roads. It also can depend on the attacker's need to spread his forces to reduce vulnerability to nuclear attack. If the defender can continue to maintain a sufficient force density, the shoulder space constraint will prevent the attacker from gaining the 3:1 advantage supposedly needed for a breakthrough, and the defense will remain coherent, even if it is pushed back.

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[3]Hamilton (1985, footnote 9) points out that support has been mustered for theaterwide force ratio thresholds ranging from 1.2 to 2.0.

[4]Mako, 1983; Posen, 1985/1986 and 1988. Mearshimer, 1982; Epstein, 1988; Kaufmann, 1983; Hamilton, 1985.

[5]The models of Posen (1985/1986) and Hamilton (1985), for example, seek to account for force-to-space, although in different ways and with different results.

Obviously, the degree to which attacking and defending forces are destroyed would have an important effect on such a calculation. Often these "attrition rates" have been calculated according to the Lanchester equations.[6] In essence, these laws seek to account for the fact that the superior force can concentrate fire on the inferior one with greater effect than the converse. The inferior force is ultimately destroyed and the superior one will prevail. The validity of these laws have been the subject of hot debate, with heavy criticism and proposed alternatives.[7]

The academics have also sought to account for such other factors as advance rates during combat, the advantages of prepared defenses, air support, the expanding character of the front as bulges occur, and C^3I.

In general, the academics have provided more optimistic assessments of the balance than implied by the widespread perception that NATO is seriously deficient. This optimism results more from the input assumptions—the raw forces available, their readiness, and the war scenarios—than from the models themselves. One recent article, perhaps the most optimistic assessment of all,[8] combines all of the critical assumptions needed for an optimistic assessment of the balance. These include slow reinforcement rates for the Category II and III Warsaw Pact units, akin to the rates shown in curve 4 of Fig. 3; arrival rates for U.S. reinforcements, especially U.S. Reserve and National Guard units, similar to those of the Warsaw Pact Category II and III units, even though these forces must move over long distances inside the United States and by sea; additional credit to NATO for its assumed superior C^3I and logistics support structure; a war scenario that implies a simultaneous start to the preparations for NATO and the Warsaw Pact and that stretches out as long as three months. Almost regardless of the model used to evaluate the outcome of conflict, such input assumptions would almost certainly lead to a favorable result for NATO.

These models have taken the analysis of the balance in important directions. It is virtually impossible to understand the military problem faced by the West without taking into account the frontier of West Germany, its terrain features, requirements to provide a defense over that frontier, the advantages that NATO would have in a prepared defense position, and so forth. Some analysts have usefully sought to account for the ability of

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[6]Kaufmann, 1983.

[7]Epstein, 1988.

[8]Posen, 1988.

the Warsaw Pact to concentrate its attacks along a few selected axes and to predict the rates of movement to understand the effect on territorial loss for NATO; and they have engaged the question of the rates of attrition on the two sides. Although the results have often been skewed by the input assumptions, all these issues ought to be accounted for in analyses of the central front battle.

Experience with combat simulations shows that at least three other factors must be treated carefully in any model—theater and operational strategy, the breakthrough phenomenon, and air power. Theater and operational strategy guide the initial decisions of the two sides on the allocation of forces—the choice of main attack axes, defensive postures, the withholding of reserves, the operational posture of all the forces—and on the conduct of operations thereafter. The Warsaw Pact theater commander in particular seeks to exploit breakthroughs and conduct large-scale maneuvers in NATO's rear. The NATO commander, by the same token, wants to avoid that and deploys his forces both to deny such success and potentially to mount counterblows. Such decisionmaking needs to be replicated in a model of conflict. Breakthroughs are a principal feature of Warsaw Pact operational strategy. In modern warfare, breakthrough attacks are the tried-and-true way to defeat an opponent.[9]

War has been characterized by a sequence of battles, at all levels of warfare. Attackers sometimes succeed and sometimes fail. Military leaders seek to reinforce successes to create opportunities for new ones, hoping that one success will increase chances for success in the next battle, leading to a cascading of successes and a complete collapse of the defense in one or more key sectors. This would permit breakthroughs, rapid advances in the defense's rear area, and envelopments of major defense forces. Many models fail to capture these phenomena. They often implicitly treat the war as a single continuous battle and model the movement of the front *on the average*.[10] But war is not an average phenomenon. The result of each battle is uncertain. If the model treats the battle across the front as an average phenomenon, there would be high attrition and slow movement, but perhaps not breakthroughs. Those could occur when the conflict is examined in a series of battles, creating opportunities for rapid movement and reduced attrition. Detailed combat simulations are needed to account for such discontinuous phenomena.

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[9]Kugler, 1986.

[10]Davis, 1988.

The role of air power is difficult to model. The close air support mission is the easiest because it can be treated essentially as flying artillery. But air plays more roles, even in ground attack. Added to the close air support mission is interdiction behind the front lines, against both lines of communications and military units moving forward on them. History suggests that interdiction can play a crucial role in the outcome of the battle, not only by destroying forces but also by disrupting the attacker's plans, slowing the rate of reinforcement, and requiring readjustments, including even the halting of offensives. But the amount of air power available for ground attack depends on the result of an air war. Recognizing NATO's superiority in air power, the Warsaw Pact will seek to destroy NATO's air forces at their bases and, if that is not possible, in the air. By the same reasoning, NATO air force commanders will seek to protect their bases, to destroy Pact air power at its home bases if possible (offensive counterair), and if not, in the air (defensive counterair). Once this is accomplished, NATO air forces can devote the bulk of their multi-role aircraft (those with ground attack and air defense capabilities) to ground attack missions. Combat models also should account for this complex air battle and capture the effect of air forces on the ground battle.

The assessment that follows is based upon a series of analyses employing a simulation of a theaterwide conflict along the central front. In brief, the model covers the following activities: Military units on both sides mobilize, conduct training activities, and move forward to assigned offensive or defensive positions. Theater commanders choose strategies for the offensive or defensive postures—major axes of attacks, various defense preparations, and so forth. Attacks occur; military units engage, advance, or retreat; they disengage, collapse, are annihilated, or withdraw to cover exposed flanks. An air war is conducted and the contribution of air forces to the ground battle is calculated. The rules adjudicating the results of combat are varied, favoring the defense in some situations (e.g., high defense density) and the offense in others (e.g., unprepared defenses). As the battle unfolds, reserves on both sides are committed to shore up major axes of attack or to continue to hold the line. Because the war is fought at a theater level, movement is depicted as the forward movement of the front line in nine sectors, corresponding to NATO's eight corps sectors and the Jutland sector in the north.[11]

[11]Many of the conclusions presented here are based upon insights on analyses gained with using the RAND Strategy Assessment System (RSAS), in particular the part dealing with the central region. The RSAS is described briefly in Davis, 1987. A fuller explanation of the theater combat model is reported in Bennett et al., 1988.

In the model, military units are tracked down to the brigade (for NATO) or division (for the Warsaw Pact) levels. The strength of each unit depends upon its ED score,

In addition to their more comprehensive coverage of important military factors, such simulations provide a finer-grained picture of the potential outcome of combat than do the simpler models outlined above. The outcome can be depicted in several ways relevant to traditional measures of military success—seizure (or defense) of territory and destruction of enemy forces. With respect to the first, the simulation depicts the outcome of the battle in terms of territory lost and held, not only on an aggregate level but also in geographic detail—the location of forces, their occupation of key strategic points (rivers, bridges, cities, and towns)—and their rates of movement. The simulation tracks overall attrition as an aggregate of the attrition suffered by individual combat units; individual units must withdraw from the battle when they have suffered too much attrition to continue to fight as a cohesive unit. Although the simulation is quite detailed, it can never be detailed enough. War is just too complex to model precisely.

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which is then adjusted to account for lack of training readiness, of "cohesion," and of supplies. "Cohesion" seeks to account for the ability of a unit to conduct operations after it has suffered attrition. Cohesion can be improved by a period of recovery. Units are resupplied; damaged equipment is replaced from war reserve stocks or by repair.

The movement of units accounts for the time required to prepare for deployment from garrison or, in the case of POMCUS units, to break equipment out of storage; for training to meet whatever minimum standards of training readiness the analyst chooses; and for movement along the rail or road network. Air interdiction can delay movement.

The analyst chooses the initial theater and operational strategies for both sides. Thereafter, the simulation itself makes decisions concerning the allocation of reserves along major axes or to defense sectors according to a set of rules built into the simulation. (However, the analyst can intervene at any point he chooses.)

To adjudicate the outcome of combat in any given sector over time periods (e.g., four hours) chosen by the analyst, a complex set of rules is used. The key factor is the ratio of strength of the units actually engaged in attack and defense in the sector. The total number of forces potentially in conflict is constrained by shoulder space, at a level chosen by the analyst. This force ratio is modified to account for the terrain and other potential advantages to the defender. A set of equations calculates the attrition to both sides in each of ten possible tactical situations. The equations are most favorable to the defense when the defense has had time to establish a prepared position. They are most unfavorable to the defense during periods of breakthrough. The rate of the movement of the front is similarly affected by the force ratio and the tactical situation; however, the movement rate is also strongly affected by the density of the defender: When the defense is strong, movement is slow. But when the defense slips below a threshold density set by the analyst, the movement rate will increase for a given force ratio and tactical situation. Again, during breakthroughs, movement rates are high. Air attacks also cause attrition and slow movement. Finally, the simulation conducts air operations—offensive counterair, defensive counterair, and so forth—essentially to compute the number of ground attack sorties that will be available to affect the outcome of the land battle.

Simulations are often used to assess the value of adding a specific capability to the NATO force structure rather than to predict the outcome of conflict per se. Such "marginal utility" analyses compare alternative programs to improve NATO's military situation—for example, the value of adding a new air-to-air missile to the NATO inventory compared with adding (at the same cost) aircraft equipped with older air-to-air missiles. Without a simulation, analysts would typically estimate the number of enemy aircraft lost in combat, or the relative rates of attrition on enemy and friendly aircraft. But a simulation that can depict the relative value of such air improvements in terms of the outcome of ground combat would be more valuable for this problem because it would account for the fact that the additional aircraft (but not the additional missiles) could also be used in ground attack missions.

Analysts are well aware of the sensitivity of the results of such analysis to assumptions, and therefore they conduct sensitivity analyses. So long as the simulation is easy to use, numerous sensitivity checks can be made. In the marginal utility analysis, of course, the important question is whether the assessed difference between the two programs is materially affected by the sensitivities.

Sensitivities are even more important when simulations are used to predict the outcome of a potential conflict. Analysts at RAND have made a detailed study of the sensitivity of simulation outcomes to uncertainties in the input assumptions,[12] revealing that there are two broad areas of uncertainty in the potential outcome of a war. The first and more important area surrounds the scenario assumptions discussed above—the national commitments, the readiness of forces, and the relative preparation times. In general, these input assumptions, not the technical details of the model, have the larger effect on the results. For example, for most simulations based on the readiness assumptions depicted by curve 1 in Figs. 3 and 4, NATO would be badly defeated. But for those based on the assumptions illustrated by curve 4, NATO forces would hold. And this only varies the assumptions concerning the treatment of readiness; changes in assumptions about national participation or in preparation time have similar large effects.

The second area of sensitivities surrounds the technical details of the simulation, especially the assumptions concerning the adjudication of combat. For example, a

[12]The following discussion draws heavily on research conducted at RAND, especially by Paul Davis and Robert Howe. Also see Davis, 1988.

change in the assumptions concerning the intensity of conflict can produce variations in the outcome. In general, greater intensity will lead to more rapid and decisive Warsaw Pact victories, whereas lower intensity will favor NATO. Similar sensitivities surround such factors as the assumed rates of advance, the force densities required to hold the front (the force-to-space ratio), and the assumed effectiveness of helicopters and air-to-ground munitions.

These uncertainties affect the scale of a probable NATO defeat but generally do not create a NATO victory. Only in scenarios where the Warsaw Pact fails to field the large or effective forces potentially available to it does NATO appear to have a substantial chance of holding most or all West German territory. The various technical uncertainties do not affect this basic point. Generally, NATO is successful in scenarios when the East Europeans fail to participate or perform very poorly. By the same token, NATO can hope for a successful forward defense when there is sufficient time available to deploy a large body of reinforcements from the United States, including those traveling by sea, and the Warsaw Pact does not deploy the strategic reserves of the high command.

A review of simulations in which NATO suffers varying degrees of defeat, ranging from catastrophic defeat to less decisive ones, in which some West German territory is lost but NATO forces are not completely overrun, indicates that the most important factor in the balance is the relative availability of operational reserves on the two sides. Operational reserves obviously provide attrition fillers on both sides—forces to be put into combat when front line forces have become exhausted. But Soviet operational strategy relies on operational reserves to nourish the main axes of attack, to build up large force ratios along those axes, to achieve breakthroughs and then exploit them. NATO's operational reserves need to be deployed in order to counteract this operational strategy.

In general, NATO forces suffer catastrophic defeats in the simulations when the NATO commander runs short of operational reserves and must begin to thin front line defenses. When the defense is unable to pose a sufficiently strong defense along one of the Pact attack main axes, a breakthrough occurs. As that breakthrough is exploited, NATO forces must be withdrawn along a broad front, or are enveloped. The earlier breakthroughs occur, the more rapid (and more decisive) the defeat. In simulations when the NATO commander is able to hold onto some operational reserve throughout the

conflict without thinning his forward defenses, his forces may be pushed back but are not seriously penetrated. When the NATO commander has a high level of operational reserves, NATO forces could hold a defensive line well forward for a considerable length of time.[13]

The dominant issue in the balance of forces in central Europe is therefore the availability of forces for operational reserves on the two sides. This view of the balance is depicted in Fig. 5,[14] which indicates the total number of EDs available to the two sides over the course of a 30-day conflict in the 10/5 scenario. These forces stand roughly in a ratio of 2:1. Figure 5 also indicates the minimum level of forces needed to cover the front in a defensive posture. Estimation of such a minimum requires a detailed analysis of the terrain all along the front, since some terrain can be lightly defended (hills, lack of roads, etc.). Such terrain analysis leads to rules of thumb for the minimum defensive

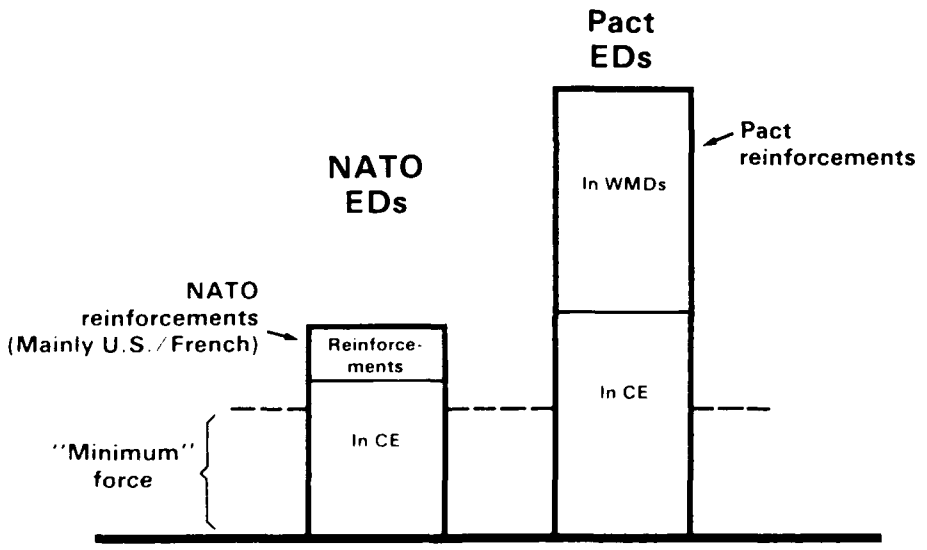

Fig. 5—Simple view of the balance

[13]In many of the simulations that depict a defeat, the theaterwide force ratio hovers around 2:1. Moreover, on a theaterwide basis, attrition occurs at about a 2:1 ratio as well. This implies a stalemated outcome, because the two sides would fight to exhaustion in roughly the same amount of time. But in such situations, this is usually not the result. The issues of defensive coverage of the terrain and the breakthrough phenomenon ultimately dominate. The attrition causes NATO to exhaust its operational reserves faster than the Warsaw Pact, NATO's lines are thinned to compensate, Warsaw Pact attacks continue, and breakthroughs occur.

[14]Thomson and Gantz, 1987.

forces needed to cover a front on the average. Contemporary estimates are normally around 25–30 km per division. These figures have grown since World War II, when the norm was around 10 km, as the range and firepower of weapons has increased.[15] The minimum force level shown in Fig. 5 is based upon 30 km per division across a 650 km front.[16] Obviously the need to defend a longer front, as would be necessary to defend the Austrian frontier, would lead to a larger minimum force requirement. (The minimum force required to hold the front is, of course, not completely independent of the size of the opposing force. However, because the attacker has the initiative and can choose the time, place, and size of his attacks, the defenders' minimum forces are more dependent upon the length of the frontage and its terrain than on the size of the opposing force.)

The ratio of forces in excess of the minimum available to defend the front is the most important single numerical factor in the balance of forces in Central Europe, not the overall force ratio. Those excess forces contribute to the imbalance in operational reserve, which is necessary for Warsaw Pact operational strategy to be successful. For the scenario indicated in Fig. 5, this imbalance is roughly 4:1. The operational consequence of this imbalance is that the Warsaw Pact is able to create large local force advantages, which are unpredictable by NATO in both their location and their time of occurrence. These local superiorities can lead to breakthroughs, deep penetrations, and potentially the collapse of the entire NATO defensive line.

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[15]For example, three U.S. divisions and a cavalry group (roughly a brigade) were deployed in a defensive posture in the Ardennes in December 1944, covering a roughly 50 km front from Mondshau to the Sure River—roughly 15 km per division. These units were expected to hold their positions while the Allies mounted an offensive further to the north. They were also spread too thin and became the victims of the German offensive that broke through the American lines at the opening of the Battle of the Bulge. One division, seeking to hold 20 km, committed its reserves to hold the line but was penetrated across the breadth of the front. Its units were encircled locally and annihilated. (Author's analysis of information presented by McDonald, 1984.)

[16]Some simulations, such as the CAMPAIGN model, in effect calculate such numbers by an examination of the terrain in each sector, which leads to a definition of the "hold" density needed to maintain an effective defensive line, given the nature of the local defensive terrain. Such computations produce numbers close to the 30 km per division on the average.

V. SUMMING UP: FORCE SCENARIOS

An examination of four potential scenarios for conflict will help to illuminate these points. These don't represent actual simulation results, but rather are an attempt to summarize the lessons learned from various analyses in a structured way. The critical point is that the input assumptions, especially those connected to the scenario, not the model of combat, are the most important factors in balance assessments and define the ratio of excess forces.

A 5/1 SCENARIO

In a 5/1 scenario, Warsaw Pact forces attempt to achieve surprise. Five days probably is an adequate amount of time to mount a major assault with forces in Eastern Europe, although many East European forces would not be completely ready. Follow-on forces from the Western Soviet Union would barely have begun deploying, would not be fully ready, and would therefore not be immediately available to reinforce the assault. The attack plan would be a great gamble, with success depending crucially on NATO's reaction.

If NATO fails to react to the signs of an impending conflict and has only a day to prepare, it would probably be decisively defeated, perhaps in a week. Although some NATO forces would be able to reach their defensive positions along the West German border, they would not have time to prepare their positions. More important, many forces would not have time to reach their positions. Of course, U.S. reinforcements would have no time to deploy to Europe, even air forces, nor could the French decide to commit their forces and send them forward.

Thus, Warsaw Pact forces would find huge gaps in the NATO defensive line and NATO defensive forces that were still in the process of getting organized. The result would probably be rapid, deep penetrations of the NATO defenses and a quick decision.

This defeat might be averted by two more days of NATO preparation time. With this additional time, NATO forces would be in defensive positions and large U.S. Air Force reinforcements would have arrived or would be close to arriving at the opening of hostilities. A cohesive forward defensive line, even if not well dug in with strong air

support, would have a good chance of holding off the initial assault. The Warsaw Pact would then be in deep trouble because of the lack of immediate reinforcements from the Soviet Union. In fact, the risk of this scenario to the Pact casts doubts on its likelihood.

A 10/5 SCENARIO

In a 10/5 scenario, the Warsaw Pact would mount a major assault, again with the forces in Eastern Europe. But many of the follow-on forces from the Soviet Union would have already arrived and others would be underway, albeit at reduced readiness. The larger number of operational reserves at the outset would seem to make this a less risky scenario for the Warsaw Pact. For example, curve 3 in Fig. 2 indicates that the Warsaw Pact would have about 42 EDs, accounting for training readiness degradations—a force with 20 EDs in excess of a minimum defensive level of 22 EDs. During the following two weeks of conflict, around 20 EDs would be added.

But the five days available to NATO in this scenario would also be important: The defensive line could be established cohesively and with a modest amount of preparation. U.S. and French ground force reinforcements would be on the way, and U.S. Air Force reinforcements would already be in place. NATO would have about 25 to 30 EDs in place at the outset, with the range depending crucially on the speed of French commitment and movement and of U.S. reinforcements. During the next two weeks, the level would rise into the mid-30s. The excess force ratio would be large at the outset, and depending on attrition rates, NATO's small "excess" could be whittled away faster than it could be replenished.

The Warsaw Pact would probably try to exploit the weakness of NORTHAG forces compared with CENTAG forces by creating major attack axes in the north while mounting pinning attacks against CENTAG forces. Although some U.S. and French reinforcements would be able to reach the NORTHAG area as the conflict unfolded, their numbers might not be adequate over time, as Warsaw Pact operational strategy continued to wear down the defense in the north. To avoid serious breakthroughs, NATO forces must trade space for time, leading to a NATO withdrawal along a broad front and a substantial loss of NATO territory (perhaps 100–200 km) in that region over a few weeks.

Whether such territorial loss would be a decisive defeat is debatable. Warsaw Pact forces would not have achieved their military objectives, which certainly would

include overrunning West German territory over the entire front and the destruction of the main body of NATO forces. In a military sense, this scenario does not depict the decisive military defeat. However, such a major loss of West German territory would be a political catastrophe for West Germany and NATO and would not be conducive to a favorable postwar situation, to say the least. In political-military terms, such a territorial loss could easily be a decisive defeat of NATO, leading to its collapse.

A 10/5 SCENARIO (PREMOBILIZATION PREPARATIONS)

Perhaps as a consequence of a previous crisis, in this scenario the Soviets would improve the training readiness of their forces in the western Soviet Union. Over a period of several months, soldiers would be called back into Category II and III divisions for individual and small unit training and then be sent back home. The result would be a quantum improvement in the training readiness of those forces when mobilization occurred. Consequently, Warsaw Pact reinforcements would be far stronger after ten days of overt preparation than they would be in the previous scenario. With reference to Fig. 2, they would have moved from curve 3 to curve 1—roughly 45 EDs available at the outset, rising to 80 EDs within the next week. This provides the Warsaw Pact with an overwhelming excess force advantage.

In this scenario, NATO either did not detect or failed to react to the Warsaw Pact "premobilization" training activities.[1] With five days to prepare, NATO forces would perform about as well against the initial Warsaw Pact assault as they did in the previous scenario during the first two weeks of the battle. However, when reinforcements from the Soviet Union begin to enter the battle, they would be stronger than in the previous scenario and be able to force more serious breakthroughs across the entire front, potentially leading to a complete collapse of NATO's defenses.

A 20/25 SCENARIO

From the Warsaw Pact perspective, a 20/25 scenario is more conservative, for it allows the deployment of all reinforcements from the western Soviet Union before the outset of conflict, although some of those forces would still be at reduced readiness (see curve 3 in Fig. 3).

[1]Failure to react is the more likely reason. Training preparations could easily be interpreted as innocuous. On the Western side, many would probably argue that the West need not take any important (or seemingly provocative) steps to react.

But the time is more important to NATO. With three weeks of preparation, NATO forces on the front line would be well dug in. All U.S. POMCUS units would have arrived and deployed as operational reserves, as would all French units, if they had been committed to the Alliance. Simulations often indicate that with the few more operational reserve divisions provided by POMCUS and careful preparation of the front, a grinding war of attrition is possible. This is by far the most favorable of the four scenarios from NATO's point of view. With a war of attrition and slow moving front, the Soviets would have to be concerned about defections from the East Europeans. But this could be changed should the Soviets decide to commit their strategic reserves to the battle.[2]

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[2]As a general proposition, the more time available to NATO the better, so long as the Soviets do not commit the strategic reserves. If the bulk of the U.S. Army can get to Europe before the outbreak of hostilities, the Warsaw Pact would have a tough time. In such very long mobilization scenarios, there are grounds for agreeing with Epstein's (1988, p. 163) statement that "NATO has the material wherewithal to stalemate the Warsaw Pact." However, one must ask why the Warsaw Pact would attack under those scenario conditions when there are more favorable ones.

VI. CONCLUSIONS

The imbalance of forces in central Europe favors the Warsaw Pact today. NATO would probably lose most war scenarios and be decisively defeated in many.

But the key word is "probably." As stated at the outset, the best that can be done is to predict the outcome, all other things being equal. They never are, of course. Despite analysts' efforts to include as many factors as reasonable—and modern conflict simulations treat a great many—they can never treat them all. Nevertheless, the essential fact of an imbalance of forces favoring the Warsaw Pact is inescapable.

But the analysis presented here indicates that "fixing" the problem might not be daunting. NATO's goal ought to be to reduce the feasibility and therefore the likelihood of the unfavorable scenarios. There are a broad range of potential measures,[1] but two categories stand out:

- A *quick reaction to warning signals.*
- Additional forces.

Reaction to warning signals is probably more important than the collection of them, because modern intelligence is likely to provide numerous indications of preparations for hostilities. The key is interpretation and political reaction. Ultimately, this is a question of political will, but some steps could be taken to improve NATO's ability to react should crisis come—political involvement in exercises, improved communications and procedures, etc. Arms control might also play a role by restricting important activities that must occur in war preparation and thereby providing important indications of intent should these restrictions be broken in a crisis. Whatever is ultimately done in this area cannot really substitute for additional forces because adequate reaction can never be assured.

Force additions in the range of 5–15 EDs would probably provide NATO the capability to hold a Warsaw Pact attack in even the unfavorable third scenario discussed

[1]See Davis, 1988.

above.[2] If the French commitment were assured, the range would be 5–10. It is possible that applications of advanced technology for interdiction, especially in the areas of intelligence, command/control and munitions, or improved forward defense preparations such as rapidly created tank ditches and mines, would reduce these numbers further. Although the political obstacles to such force increases are high, these are *not* large numbers.

Because the numbers are not large, NATO has more leverage to improve its situation by its own unilateral actions than by arms control. The "excess" Warsaw Pact forces are so large that they must be cut very deeply to have the same effect on the balance as the sort of additional NATO forces mentioned above—20–30 Pact EDs eliminated.[3] This suggests that arms control is probably not the best route to an improved conventional balance unless the Soviets prove far more generous in future talks than they have been in the past.

Although the conventional balance is unfavorable to NATO, large uncertainties cloud the assessment and make it difficult to be precise about the severity of the imbalance. Chief among these uncertainties are those associated with assumptions about the forces available to the two sides, the readiness of the forces, and the overall war scenario, all of which are more important than the precise model of conflict, although that is also important. Modern combat simulations have underscored the importance of the breakthrough phenomenon and the availability of operational reserves to the two sides. Indeed, the ratio of forces in "excess" of those needed to provide a defensive cover of the frontier is a more valuable single index of the state of the balance than the traditional force ratio measure. The large number of these available to the Warsaw Pact relative to NATO's paucity is the chief source of NATO's conventional defense problem.

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[2]Thomson and Gantz, 1987.

[3]This difference in leverage can be understood with arithmetic. If the key measure of the balance, the ratio of excess forces, stands at 60/15, then five EDs added to the denominator have the same effect on the balance as 15 removed from the numerator. This is overly simple but gives the general idea.

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