

require about the same investment and would reduce the theaterwide Pact/NATO force ratios only slightly. Specifically, this alternative would reduce the theaterwide force ratios by the same amount--2 percent--that resulted from Alternative II.

Allocating the extra division to NORTHAG and to those NATO corps currently at a numerical disadvantage, however, yields a much greater impact on the balance within a specific corps. (On the other hand, it would be difficult to concentrate all of the improvements resulting from the previous alternative in one or two of the non-U.S. corps in NORTHAG because allied troops are not familiar with U.S. weapons.) For example, providing additional reinforcements to two NORTHAG corps--equal to one-half of the extra division to each corps--would reduce territory lost by 14 percent compared with a reduction of 10 percent under the previous alternative (see Figure 14). Nevertheless, one additional division would probably not be sufficient to bring all of NATO's individual corps up to a level that would provide great confidence throughout the theater. Thus, it is not clear whether this alternative or the previous one would be a more cost-effective solution.

Adding a division to U.S. forces runs directly counter to current Army budget trends. In its 1989 budget, the Army reduced the number of people on active duty by 8,600. Thus, it might be politically difficult to increase the number of divisions in the Army, even if there were agreement that conventional capability should be increased in this way.

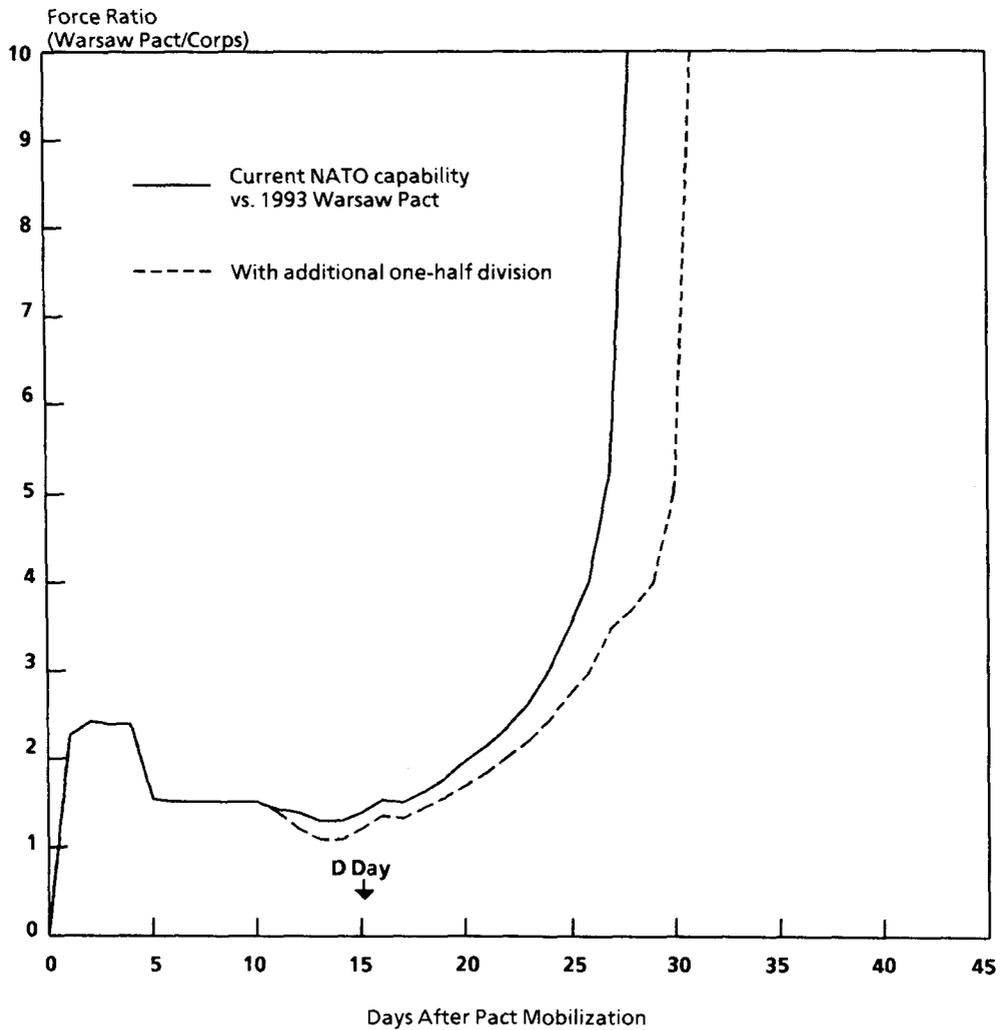
ALTERNATIVE IV: EMPHASIZE ATTACK OF FOLLOW-ON FORCES

Instead of enhancing its combat capability at the front lines, NATO could try to prevent the Pact from bringing all of its reinforcing units into the central theater. This is the philosophy behind NATO's strategy of attacking the Pact's reinforcing or follow-on forces, a strategy known as FOFA (for follow-on forces attack). Specifically, this alternative would attempt both to delay the arrival of the Pact's reinforcements in theater by attacking rail lines and bridges in eastern Europe

and to attack and destroy the follow-on or "second-echelon" combat units themselves as they move closer to the front.

Unlike the previous three alternatives, FOFA is a long-term approach that would not offer significant improvements in capabilities

Figure 14.
 Simulated Effect of Additional NATO Forces on
 Territory Lost in a NORTHAG Corps



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

until the mid- to late 1990s. FOFA also involves weapons that have not yet been tested and, in some cases, have not yet been developed fully. For this reason, the ultimate effectiveness and cost of this strategy are somewhat uncertain at this point. In addition, development problems could delay the realization of the benefits of FOFA to some time in the next century.

This study, therefore, makes conservative assumptions about the potential capability of the weapons needed to carry out FOFA. FOFA also differs from the previous three alternatives in that it is a relatively new strategy and also very complex, involving multiple weapons systems from both the Army and Air Force. Since a full discussion of FOFA, including its architecture, benefits, drawbacks, and costs would be rather lengthy, this chapter provides only an outline of FOFA's benefits, costs, and limitations. The abbreviated discussion will highlight points that enable the reader to compare this alternative with the previous three. A full discussion of the specific missions inherent in FOFA, the existing and future systems needed to carry out those missions, the study's assumptions of how the missions would be accomplished, and the detailed analysis of the impact of successful FOFA missions are included in Appendix D.

If the necessary weapons work and are deployed, FOFA could improve conventional capabilities in two ways. It could delay the arrival of the enemy's follow-on forces, giving NATO more time to muster its own reserves. It could also actually destroy these follow-on forces before they arrive at the front, thereby permanently improving the balance of forces. These two approaches are discussed separately.

Delaying Follow-On Forces

Soviet units that are based in the Soviet Union in peacetime would constitute slightly more than half of the total Pact forces that might eventually fight in the central region. Some of these units are maintained at a combat-ready status even in peacetime and could arrive in theater very quickly--within 7 to 15 days after mobilization begins. Others might not be ready for combat until 60 to 90 days after mobilization. Once ready, these units would have to travel from their permanent locations in the Soviet Union to the area near the inter-German border.

Attacking the relatively sparse rail and highway network in eastern Poland could greatly hinder Soviet troop advances. Recent studies by the Office of Technology Assessment and the RAND Corporation have suggested that long-range, air-launched, conventionally armed cruise missiles could destroy bridges and rail lines in eastern Europe.^{8/} (Cruise missiles travel long distances at relatively low speeds and at low altitude.)

By attacking the major rail bridges, transloading areas, and the Polish and East German rail networks, the arrival of the last Soviet unit could be delayed up to three weeks, slipping it from 60 days after mobilization to 81 days and reducing the arrival rate from an average of one division every 1.5 days to one division every 2.1 days.^{9/}

Destroying Follow-On Forces

Another goal of FOFA would be to destroy some of the Soviet reinforcing units before they arrive in theater. Whereas some of the attacks aimed at delaying Soviet reinforcements would be made at distances of more than 600 to 850 kilometers from the inter-German border and U.S. bases, attacks aimed at destroying combat units could be made efficiently only at shorter ranges. Pact forces, when on the offensive, typically attack in waves known as "echelons." The day before they are committed to battle, Pact divisions in the second or follow-on echelon would move from divisional assembly areas--about 80 kilometers from the forward edge of battle--to regimental assembly areas 50 kilometers closer to the front lines. Each division would include over 3,000 vehicles, but only about 750 of these would be combat vehicles such as tanks, armored personnel carriers, and artillery pieces. These 750 combat vehicles are the primary targets of FOFA.

-
8. Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (OTA-ISC-309, June 1987); Stephen T. Hosmer and Glenn A. Kent, *The Military and Political Potential of Conventionally Armed Heavy Bombers*, R-3508-AF (Santa Monica: RAND Corporation, August 1987).
 9. The impact of attacks on the eastern European rail network would be, to some extent, a function of when the attacks were initiated. If they did not begin until 15 days after the Pact started to mobilize (an oft-mentioned point for hostilities to begin), most of the units from Poland and Czechoslovakia would already be in theater, and only those forces from the central military districts of the Soviet Union would still be in transit.

Unlike bridges and rail lines whose locations are known during peacetime, combat units in transit must be found before they can be attacked. Thus, destroying Pact reinforcing units before they reach the front lines requires systems to detect the units as well as weapons to attack enemy troops at long distances.

System Design. To detect enemy reinforcements, the United States currently is developing the Joint Surveillance and Target Attack Radar System (JSTARS). This airborne radar, if it performs as planned, should be able to locate enemy units up to 300 kilometers behind the forward edge of battle. To destroy the vehicles within these units, the Army is developing a tactical missile, called the Army Tactical Missile System (ATACMS), capable of attacking targets to a range of 150 kilometers behind enemy lines. The version of ATACMS most suited for destroying armored vehicles will carry antiarmor submunitions that are guided to their targets by individual sensors. These small bombs, known as "smart" submunitions because they seek out and attempt to destroy a target on their own, are designed specifically for attacking armored vehicles at long ranges.

Capability to Destroy Vehicles. How many Pact reinforcements could NATO destroy using JSTARS for detection and the ATACMS missile for attack? The actual amount depends on many conditions that, for the purpose of this study, can only be assumed. These conditions include JSTARS' ability to detect major Pact units as they move, the density of high-value targets like tanks within these units, and the number of vehicles that could be destroyed by each ATACMS missile.

This study assumed that the JSTARS radar, complemented by other existing NATO systems, would be able to detect each division as it moved from its divisional assembly area to its regimental assembly areas.^{10/} The assumptions concerning the effectiveness of each ATACMS missile carrying antiarmor submunitions were based on an evaluation by Steven Canby that concentrated on the problems associated with the FOFA approach.^{11/} Thus, each missile was assumed to destroy, on average, two vehicles per attack. Although

10. This transition, according to a recent OTA report, would take six to eight hours. See Office of Technology Assessment, *New Technology for NATO*, p. 84.

11. Steven L. Canby, "The Operational Limits of Emerging Technology," *International Defense Review* (June 1985), p. 878.

other analysts have made more optimistic evaluations of the ATACMS' effectiveness, Canby's conservative assumptions were used in this study to see if FOFA would be a worthwhile strategy, even under less favorable conditions.^{12/} This study, which allotted one missile to every 10 vehicles in a division, concluded that FOFA could ultimately destroy 20 percent of the combat capability of each reinforcing Pact division as it makes its transition.

Effect on Theaterwide Capability

Coupled with the potential for delaying units discussed above, this capability to destroy enemy units could have a substantial effect on the theaterwide balance of forces. This study assumes that the United States, perhaps in conjunction with its NATO allies, makes the large investment in FOFA weapons necessary to attack each Pact reinforcing division as it moves from its divisional assembly area. Since some Warsaw Pact divisions will already be at the front when NATO begins its attack of follow-on forces (presumably on D-Day), NATO would be able to attack only about 60 percent of all the Pact units before they reach the front lines.

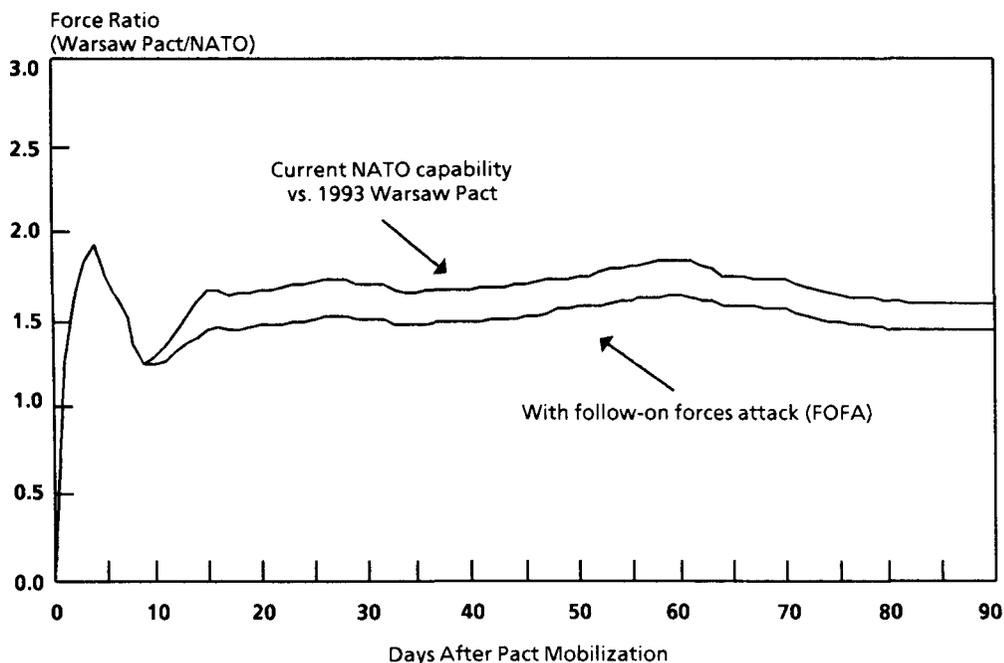
It is unlikely that NATO would attack Pact reinforcements, or perhaps even rail networks, before an actual invasion and onset of hostilities. For this reason, an assessment of FOFA's impact theaterwide, which uses the static method and is based on destroying some Pact forces before they arrive at the front and on delaying the arrival of others, would be somewhat misleading, since it assumes no losses resulting from direct combat. For this application, therefore, the dynamic analyses within the corps areas are probably more relevant.

To establish FOFA's impact throughout the theater, dynamic analyses were conducted within each of the three corps--the British I Corps, the West German I Corps, and the U.S. V Corps--assumed to face a main attack by Pact forces. The combined results of the dynamic analyses within these three corps serve as a proxy for a

12. For example, the Institute for Defense Analyses estimated that each ATACMS missile equipped with 20 antiarmor submunitions could destroy between three and seven vehicles. See Institute for Defense Analyses, *Follow-On Force Attack*, R-302, vol. I (Alexandria, Va.: IDA, April 1986), p. III-4.

theaterwide analysis. These analyses indicated that the FOFA strategy could have the same effect within the three corps facing a major attack as adding two divisions to each of the two NORTHAG corps, and one division to the U.S. V Corps. The theaterwide impact of FOFA, therefore, would appear to be equivalent to having five additional NATO divisions in theater by D-Day--assumed to be 15 days after mobilization. Such a contribution would have a significant effect on the balance of forces at the front (see Figure 15).

Figure 15.
Effect of Follow-On Forces Attack (FOFA)
on Theaterwide Force Ratios



SOURCE: Congressional Budget Office based on Department of Defense data and on Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (OTA-ISC-309, June 1987).

Effect on Corps Capability

FOFA would, of course, offer the greatest benefit if all NATO countries invested in FOFA assets. But FOFA offers an advantage largely unavailable under previous alternatives: it can significantly improve capability even in those corps where FOFA systems, such as ATACMS, are not deployed. Given the wide disparity in capability among NATO corps, that could be an important advantage. For example, even if only the United States invested in FOFA, the impact would be felt in non-U.S. corps for two reasons. First, attacks on bridges and railroads would delay Pact reinforcements throughout the theater, not just those opposite U.S. corps. Second, the ATACMS missile has a range sufficient to attack Pact reinforcements opposing neighboring NATO corps as well as those attacking corps in which the launcher is deployed. Thus, ATACMS missile launchers associated with U.S. III, V, and VII Corps should be able to attack reinforcing Pact units facing any of the eight corps in the central region.^{13/} As a consequence, the force balance in all of the corps within the central region could be greatly improved.

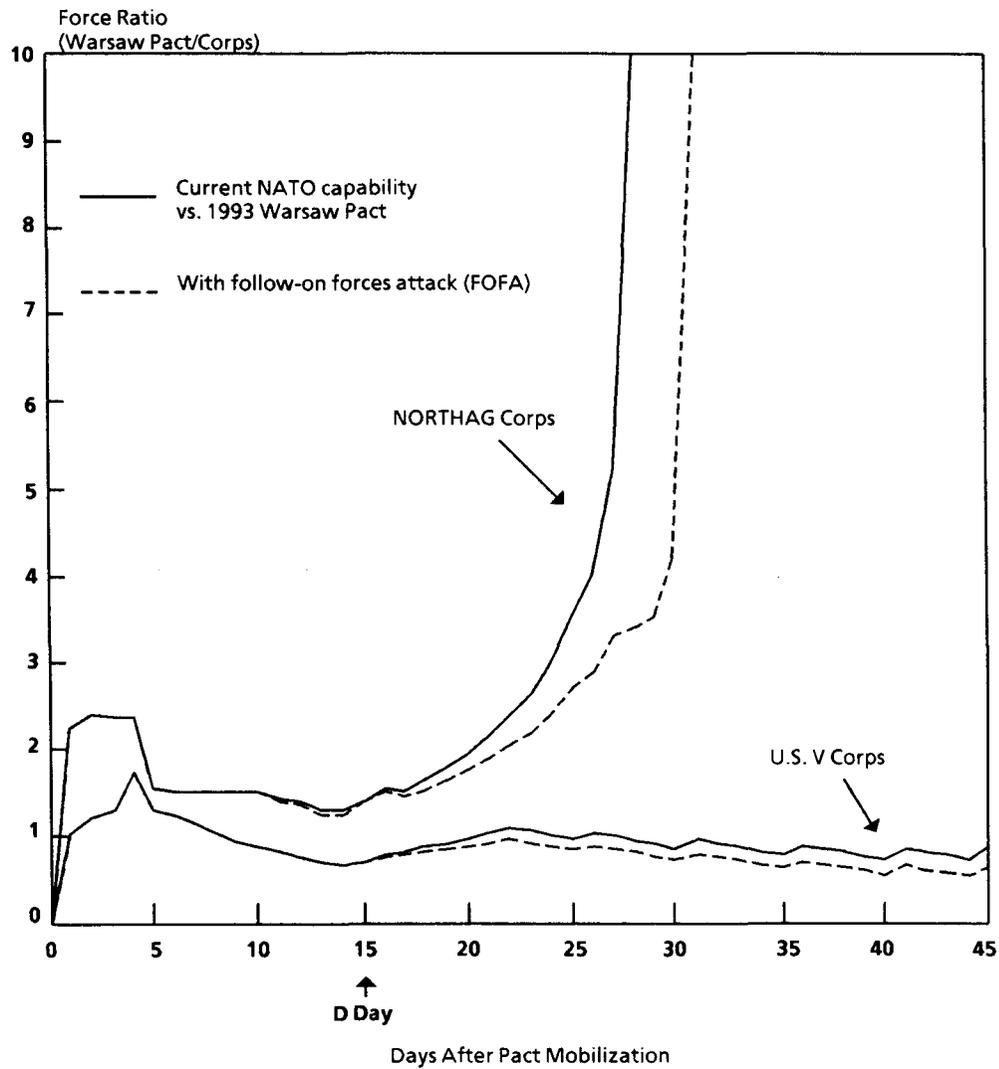
Even if FOFA assets were not deployed in the front-line corps assigned to NORTHAG, dynamic analyses show that attack by weapons attached to U.S. III Corps could, after 30 days of combat, improve the balance of forces in the NORTHAG corps by 17 percent and reduce territory lost by 16 percent (see Figures 16 and 17). An improvement of approximately 28 percentage points could also occur in the U.S. V Corps. The analysis suggests, however, that significant problems could still remain in some corps, such as those in NORTHAG, even with FOFA. Thus, FOFA alone may not be able to solve NATO's theaterwide problems.

Costs of FOFA

The benefits of a FOFA strategy would not come cheaply. The major cost associated with FOFA is the development and procurement of ATACMS missiles. Attacking one reinforcing division could require

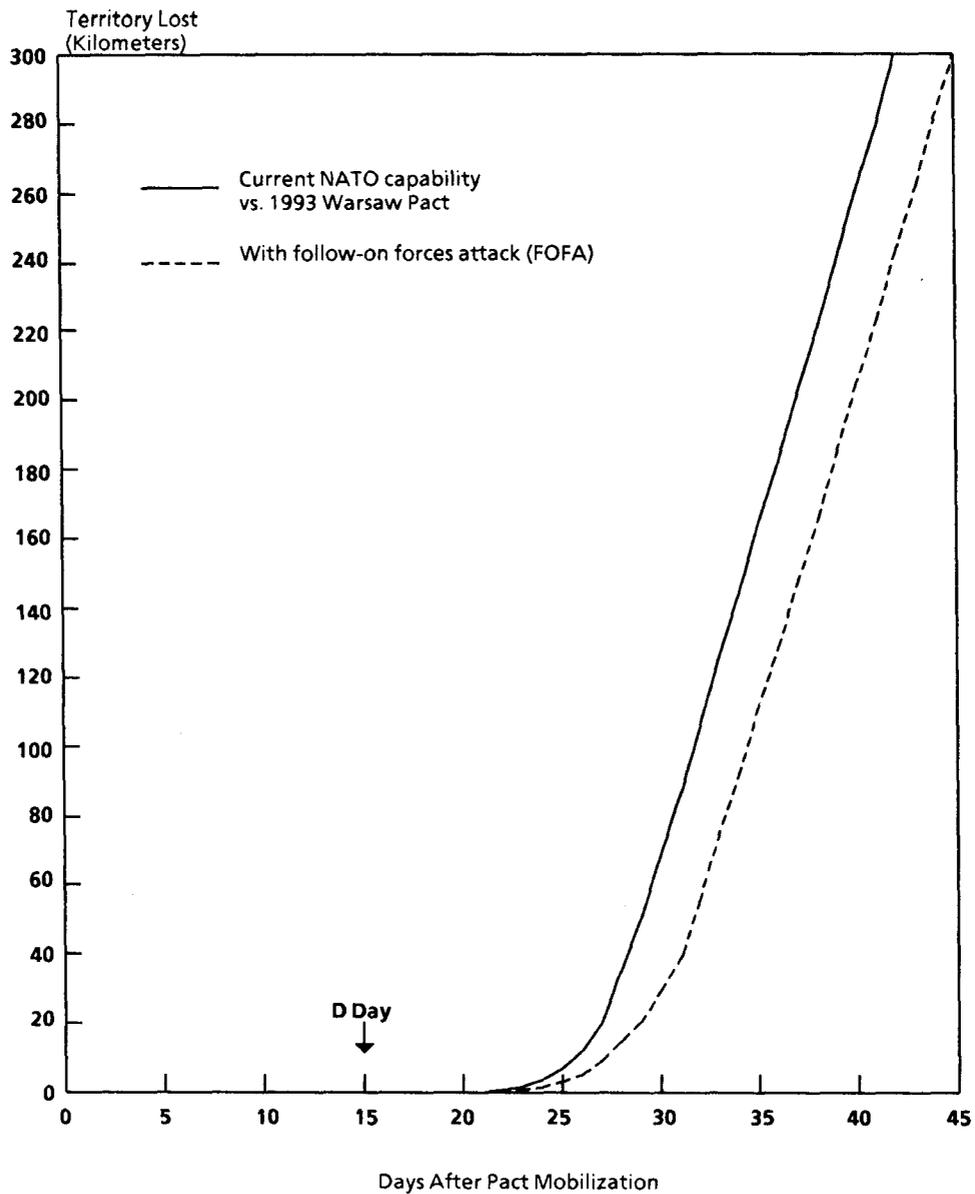
13. Since most U.S. allies equip their forces with MLRS launchers, they could, theoretically, use ATACMS to attack Pact reinforcements.

Figure 16.
Simulated Effect of Follow-On Forces Attack (FOFA)
on Force Ratios in Two NATO Corps



SOURCE: Congressional Budget Office based on Department of Defense data and on Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (OTA-ISC-309, June 1987).

Figure 17.
Simulated Effect of Follow-On Forces Attack (FOFA)
on Territory Lost in a NORTHAG Corps



SOURCE: Congressional Budget Office based on Department of Defense data and on Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (OTA-ISC-309, June 1987).

330 ATACMS missiles. The total number that would have to be bought in peacetime and stockpiled for war depends on how soon after mobilization the Pact starts its attack (which influences the number of divisions that could be attacked), how many reinforcing divisions are detected and so could be attacked, and whether the Warsaw Pact holds a large portion of its forces in reserve.

Assuming that Pact forces attack in echelons, and that hostilities commence 15 days after mobilization starts, NATO would require almost 17,500 ATACMS missiles during 30 days of combat to attack all of the Pact reinforcing divisions before they arrive at the front. If FOFA attacks were to start earlier—for example, four days after the Pact starts to mobilize—then more Pact divisions would be in transit, and almost 19,500 ATACMS could be needed to attack them all during 30 days of combat (see Table 7). (Earlier commencement of FOFA attacks, however, would result in greater benefit to NATO, because more Pact reinforcing units would be delayed or destroyed before they reach the front.) At an estimated cost per missile of \$1.6 million, the total investment in ATACMS alone needed during the next 20 years could be as much as \$18 billion (see Table 8).^{14/}

In order to detect Warsaw Pact units in transit, the United States will need to develop and procure enough JSTARS radars to provide continuous coverage. In addition, the Army might wish to field a remotely piloted vehicle to improve its ability to detect Pact combat vehicles. These expenses could add \$6.3 billion to acquisition costs.

Additional funds would be required to purchase and support the cruise missiles needed to achieve the delay of forces discussed above. A RAND report postulates that it should be possible to develop within five years appropriate conventional air-launched cruise missiles for cutting rail lines.^{15/} The B-52 bombers that would launch the missiles already exist, but each B-52 would have to be modified to carry 12 cruise missiles, at a cost of about \$7 million each. Keeping

14. The \$18 billion provides funds to purchase only 11,354 ATACMS, rather than the total 17,500 to 19,500 missiles needed for 30 days of combat. This discrepancy occurs because ATACMS procurement would not begin until 1994. A postulated maximum annual production rate of 880 missiles, coupled with a late start, prevents more missiles from being purchased by the year 2008.

15. Hosmer and Kent, *The Military and Political Potential of Conventionally Armed Heavy Bombers*, p. 35.

TABLE 7. REQUIREMENTS FOR ATACMS MISSILES
DURING THIRTY DAYS OF COMBAT

	Days After Mobilization that Follow-on Forces Attacks Start	
	4	15
Number of Reinforcement Divisions Subject to Attack	59	53
Number of ATACMS Missiles Needed	19,470	17,490

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

NOTE: Assumes the middle-range scenario described in Chapter II and that the Warsaw Pact attacks in waves or echelons.

ATACMS = Army Tactical Missile System.

the bridges and rail lines closed in eastern Europe for the 60 days or so when Pact reinforcing divisions might be in transit could require approximately 4,000 cruise missiles and 20 B-52s. The acquisition cost, then, of this part of the follow-on forces attack could be \$7.5 billion for missiles and \$140 million to modify the B-52s. Thus, the total acquisition costs for FOFA could reach \$33.3 billion (see Table 8). Additional costs associated with operating and supporting these systems through the year 2008 could be \$16.4 billion, bringing the total cost for this alternative to \$49.7 billion.

Nor is that necessarily the final bill for FOFA. Costs of systems still in development commonly rise beyond planned levels. Historically, the cost of many systems has increased in real or inflation-adjusted terms by 50 percent to 200 percent from when they begin full-scale engineering development (the stage during which a prototype of the system is produced) to when they achieve initial operating capability.^{16/} Many components of the FOFA system have not yet reached the point of full-scale engineering development. Thus, costs could increase, and the extent of that increase is not known.

16. Congressional Budget Office, "Cost Growth in Weapon Systems: Recent Experience and Possible Remedies" (Staff Working Paper, October 12, 1982), p. 2.

TABLE 8. COSTS FOR FOLLOW-ON FORCES ATTACK IN ALTERNATIVE IV (Costs in millions of fiscal year 1989 dollars of budget authority)

	1989	1990	1991	1992	1993	Subtotal 1989- 1993	1994- 2008	Total 1989- 2008
Joint Surveillance and Target Attack Radar System								
Radars	0	0	1	1	8	10	12	22
Ground Stations	0	6	17	14	11	48	38	86
Cost	270	200	300	220	1,410	2,400	2,180	4,580
Remotely Piloted Vehicles								
Quantity	0	26	31	29	26	112	88	200
Cost	100	230	220	290	210	1,050	650	1,700
Army Tactical Missile System ^{a/}								
Quantity	0	0	0	0	0	0	11,354	11,354
Cost	100	100	50	50	50	350	17,550	17,900
Multiple Launch Rocket System								
Launchers	44	44	44	44	44	220	428	648
Cost ^{b/}	100	100	100	100	100	500	950	1,450
Conventional Air-Launched Cruise Missiles								
Missiles	0	0	0	0	0	0	4,000	4,000
Cost	50	100	150	250	350	900	6,610	7,510
B-52 Modification								
Quantity	0	0	0	3	17	20	0	20
Cost	0	0	10	50	80	140	0	140
Total								
Acquisition Costs ^{c/}	620	730	830	960	2,200	5,340	27,940	33,280
Operating and Support Costs	0	20	60	110	170	360	16,040	16,400
Acquisition and Operating and Support Costs	620	750	890	1,070	2,370	5,700	43,980	49,680

SOURCE: Congressional Budget Office based on Department of Defense data; Institute for Defense Analyses, *Follow-On Force Attack*, R-302, vol. V (Alexandria, Va.: IDA, April 1986); and Department of the Army, U.S. Army Concepts Analysis Agency, *Forward of the FEBA Weapon System Cost and Benefit Study (FOFEBA), Phase I*, CAA-SR-81-3 (February 1981).

- a. Includes only those funds for the development and procurement of the antiarmor version of ATACMS.
- b. Reflects costs for the launcher only.
- c. Acquisition costs include procurement, research, development, test and evaluation, and military construction costs associated with acquiring the system.

Risks of Implementing FOFA

The previous discussion of the impact of delaying and attacking Pact reinforcements assumed that the weapons needed to perform this mission would work, at least well enough to be consistent with conservative estimates of performance. None of the systems envisioned in this analysis, however, has yet been produced in large numbers or tested under realistic conditions. Some components, such as JSTARS, have not yet reached the prototype stage. This leads to considerable uncertainty concerning the postulated effectiveness of a FOFA strategy, specifically in the ability of the FOFA systems to observe and locate Pact reinforcements as they move from their divisional assembly areas and to destroy vehicles once they have been found.

Additional uncertainty exists concerning the availability of all the components necessary to perform the FOFA mission. The previous analysis assumed that the JSTARS radar and ATACMS missile with antiarmor submunitions would be available by the mid-1990s. Recent developments may place this schedule in jeopardy, however. The JSTARS program has experienced delays in its testing schedule; the first flight test with the radar has slipped six months from spring of 1988 until the fall, at the earliest. The schedule for fielding an antiarmor version of the ATACMS missile also appears to have slipped from the early 1990s to the mid-1990s, at the earliest. (There is no funding for the antiarmor version noted in the Department of Defense program descriptions or other unclassified five-year defense plans.) Furthermore, procurement of the antiarmor warhead for MLRS, which is also a candidate for use on the ATACMS missile, has been delayed two years. As a consequence, it is impossible to predict how much capability NATO will have in 1993 to attack Warsaw Pact follow-on forces.

Locating Targets. The primary means for locating groups of moving combat vehicles will be the JSTARS radar. Some analysts are concerned, however, that JSTARS' capability could be negated. Since the system will be easy to locate because of its size and radar emissions, the opposing forces will obviously know its whereabouts and might attempt to destroy it with fighter aircraft and surface-to-air missiles. Enemy forces could also thwart JSTARS' ability to detect moving

combat units by covering their vehicles' radar returns with electronic noise or jamming.

These enemy attacks on JSTARS could be countered to some extent. The JSTARS should have the range to operate from deep within friendly territory, and NATO aircraft could defend JSTARS. In addition, the radar has been designed to negate electronic countermeasures through sophisticated electronic and signal processing techniques. By itself, however, JSTARS would probably not be able to detect all of the pertinent targets all of the time.

Destroying Targets. Once detected, targets must be destroyed. This is also a complex process fraught with risks. To destroy a target, a missile must be programmed to fly to the suspected location of the target and must reach the predicted position without going off course or being shot down. The missile must fly close enough to the correct location so that when it dispenses its submunitions, they will be able to locate individual target vehicles. Finally, the submunition must detonate and inflict sufficient damage on the vehicle to render it ineffective for combat.

As stated previously, this alternative presents a long-term solution, one that cannot benefit NATO before the mid- to late 1990s. Indeed, it may not be possible to purchase the large numbers of ATACMS missiles envisioned here before the early part of the next century. This adds further uncertainty as to when this alternative could improve NATO's position, and underlines the difference in timing between this alternative and the previous three.

Pact Countermeasures to FOFA. Finally, the Warsaw Pact could, by changing its strategy or tactics, attempt to limit FOFA's effect. As evidenced by articles in the Soviet military literature, the Soviet Union has studied the use of both active and passive countermeasures to reduce FOFA's impact.^{17/} Passive measures include the use of terrain for camouflage and protection from the JSTARS radar, hardening of equipment, and troop dispersion. The Pact could also use decoys such as flares and other deliberately set fires to try and divert infrared

17. Sally Stoecker, "Soviets Plan Countermeasures to FOFA," *International Defense Review* (November 1986), p. 1608.

submunitions from combat vehicles. The most obvious active countermeasure to FOFA would be to attack ATACMS launchers with conventional artillery.

The extent to which the Warsaw Pact can successfully counter NATO attempts to attack follow-on forces is, of course, also highly uncertain. The fact that Soviet military literature reflects concern regarding NATO's ability to make such attacks, however, points to their potential. Furthermore, any Pact efforts designed to negate FOFA's impact could divert energy from the Pact's primary mission of defeating NATO at the front. FOFA could, therefore, provide some benefit to NATO simply by its potential lethality, even if it did not work as well as predicted.

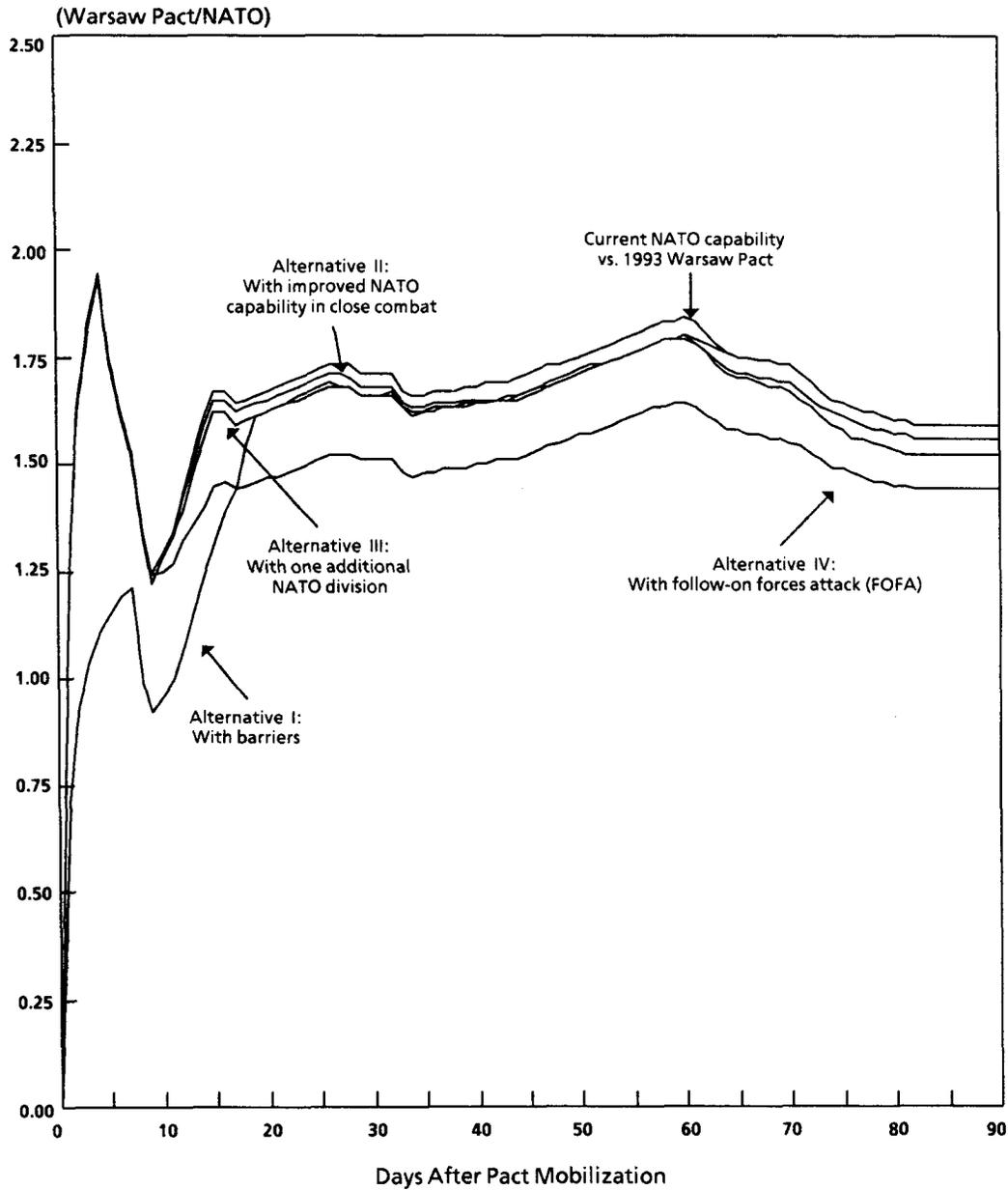
For FOFA to work, then, many separate components have to perform well. Sensors have to detect targets, processors have to locate targets and relay information to weapons, which then have to destroy targets. Because so many system components must all work, and because none of them currently exists, investing in FOFA presents a major risk. Comparison with the other alternatives makes clear, however, that FOFA also offers opportunities for improving the balance of forces in Europe.

COMPARISON OF ALTERNATIVES

If FOFA can be made to work, it offers the greatest payoff under the greatest range of assumptions among the alternatives considered in this study. Sixty days after mobilization, for example, FOFA could improve the Pact/NATO balance of forces by 11 percent (see Figure 18). None of the other alternatives examined here comes close to that level of improvement. Although the FOFA strategy has promise, it is too early to conclude that it is the most cost-effective approach to improving NATO's ground forces.

The option to add barriers (Alternative I) differs from the others in terms of costs and the pattern of benefits. Barriers cost relatively little (see Table 9) and, depending on judgments about their effectiveness, could greatly enhance capability early in a conflict. Barriers add

Figure 18.
 Comparison of Force Ratios Under Four Alternatives for
 Improving NATO Conventional Ground Forces



SOURCE: Congressional Budget Office based on Department of Defense data; John C.F. Tillson IV, "The Forward Defense of Europe," *Military Review* (May 1981), p. 66; and Office of Technology Assessment, *New Technology for NATO: Implementing Follow-On Forces Attack* (OTA-ISC-309, June 1987).

TABLE 9. TOTAL COSTS OF ALTERNATIVES FOR IMPROVING
NATO CONVENTIONAL GROUND FORCES
(Costs in billions of fiscal year 1989 dollars of budget authority)

	1989	1990	1991	1992	1993	Subtotal 1989- 1993	1994- 2008	Total 1989- 2008
Near Term								
Alternative I: Add Barriers	1.0	1.0	1.0	1.0	1.0	5.0	0.0	5.0
Alternative II: Improve Close- Combat Capability	4.6	5.9	7.4	6.9	4.5	29.4	19.1	48.4
Alternative III: Add One Division	5.0	4.5	1.8	1.8	1.8	14.8	26.4	41.2
Long Term								
Alternative IV: Emphasize Follow-On Forces Attack	0.6	0.8	0.9	1.1	2.4	5.7	44.0	49.7

SOURCE: Derived by the Congressional Budget Office based on data included in Department of Defense publications; John C. F. Tillson IV, "The Forward Defense of Europe," *Military Review* (May 1981), p. 66; Institute for Defense Analyses, *Follow-On Force Attack*, R-302, vol. V (Alexandria, Va.: IDA, April 1986); and Department of the Army, U.S. Army Concepts Analysis Agency, *Forward of the FEBA Weapon System Cost and Benefit Study (FOFEBA), Phase I*, CAA-SR-81-3 (February 1981).

less to capability after the initial days of a conflict as they are destroyed by enemy forces. Nonetheless, their relatively modest costs suggest they would be desirable if political opposition to their installation could be overcome.

Other studies have reached similar conclusions about the merits of FOFA and other approaches for strengthening U.S. ground forces. A recent U.S. Army analysis, for example, concluded that modernizing equipment for close combat would not enable U.S. ground forces to defeat the Warsaw Pact without the capability to attack follow-on forces.^{18/} That study also concludes that attacking Pact reinforcements enables U.S. forces at the front to perform better because they would not be as badly outnumbered. In addition, the delay imposed by

18. Brigadier General John C. Bahnsen, USA (Ret.), "The Army's in Third Place--It Better Try Harder!" *Armed Forces Journal International* (May 1987), p. 82.

an attack on reinforcements would allow U.S. and NATO forces to reconsolidate defenses and negate, to some extent, the damage inflicted by the Pact's first-echelon forces.

The FOFA strategy is risky, however, because it relies on unproven weapons designed to attack follow-on forces. To reduce this risk, it might be possible to combine near-term strategies--such as adding barriers, if that is politically possible, or improving close-combat weapons--with continued development of FOFA weapons systems at a pace that is sufficiently slow to allow full testing of FOFA components before making investment decisions. Emphasis could shift to FOFA weapons when and if their feasibility is established. Such an approach would, however, maximize total costs because two or more alternatives would be pursued instead of carrying out just one option to improve conventional ground forces.