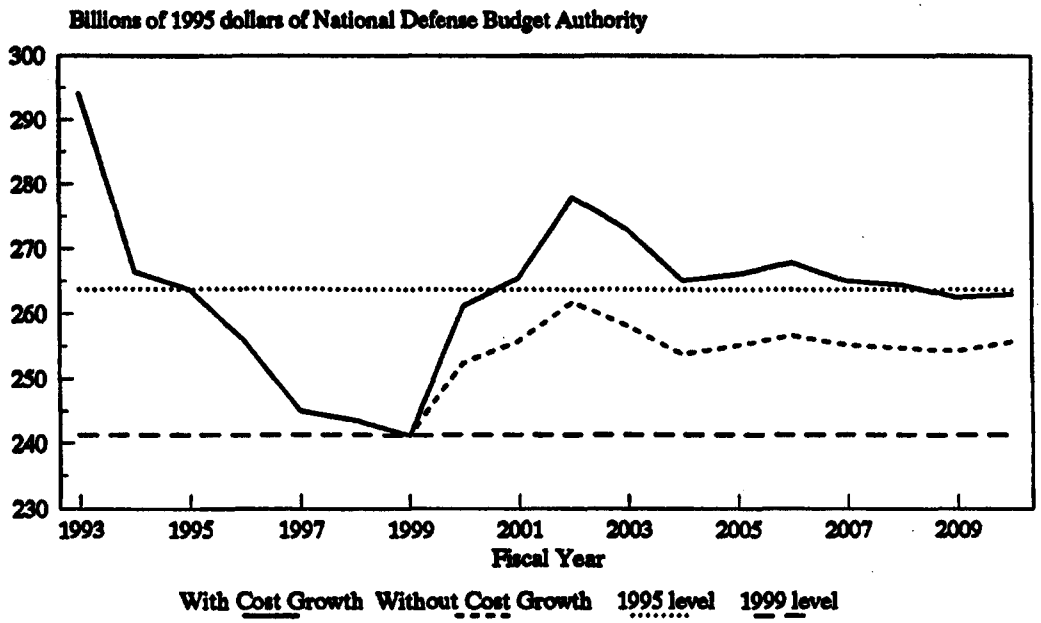
Long-Term Trends Assuming Costs Grow

If history is a guide, weapon costs will be higher for new generations of weapons. Each new generation of tactical fighters has cost more than the preceding design, as much as two or three times more in some cases. The Navy's ships have grown in cost by 3 percent a year in real terms. And the Army's M1 tank costs more than twice its predecessor, the M60. If, as CBO assumes in its second estimate, these trends continue into the future, pressure for higher funding levels will be greater.

Since CBO did not alter the quantities and phasing of the weapons procured, peaks in the projection occur in the same years as in the no-growth case, but they are higher. Funding would total $278 billion in 2002, for example, almost $40 billion more than the Administration's plan for 1999 and $14 billion more than the Administration's request for fiscal year 1995. On average over the 2000-2010 period, DoD would need annual budgets that are higher than 1999 levels by almost $25 billion, or about 10 percent.

FIGURE 3. BUDGET IMPLICATIONS OF THE ADMINISTRATION'S PLAN



SOURCE: Congressional Budget Office.

DoD's Budget Could Receive Real Increases Beyond 1999

Modest real growth in the defense budget beyond 1999 would provide DoD with ample funding even if the cost of weapons grows. About 1.5 percent annual real growth from 2000 to 2010 would provide sufficient funding, though higher real growth early in the period, offset by lower growth toward the end of the projection period, would be needed to match peaks and valleys in the estimate.

Some may argue that it is reasonable to assume that DoD will receive some real increases over the long term. Real increases of 1.5 percent a year are about 1 percentage point less than the rate of growth of gross domestic product through 1999. If GDP continued to grow at that rate through and beyond 1999, but defense spending rose only enough to cover growth in the cost of weapons, DoD's share of GDP would continue to fall from levels that are already historically low.

Conversely, some students of defense issues may argue that measuring DoD's share of GDP ignores an important point: the threat the United States faces is much smaller than it was during earlier periods. It is reasonable, they believe, for national priorities to accord much lower funding levels to DoD if the United States faces smaller threats. Thus, the affordability of the Administration's plan is closely linked to whether the forces the Administration plans to field are sufficient to meet the requirements it has set forth for them.

THREATS TO U.S. INTERESTS: REQUIREMENTS FOR TWO REGIONAL CONTINGENCIES

The United States faces a much less formidable array of threats today than during the Cold War. But the need to fight in two wars simultaneously--based on the planning scenarios several administrations have laid out--would keep forces at higher levels than would be required simply to match the capabilities of potential adversaries individually.

Smaller Threats

During the Cold War, the United States expected the former Soviet Union to be able to field the equivalent of more than 90 armored divisions (see Figure 4). The massive power of the former Soviet Union exceeded the capability of U.S. forces even at Cold War levels. This comparison, however, may overstate relative Soviet superiority for several reasons. The former Soviet

Union would not have been able to devote all of these forces to a war on its western flank, since it would probably have withheld forces to protect itself against attack from the east. Non-U.S. NATO allies would have brought more capability to a European war than the non-Soviet nations of the former Warsaw Pact. Finally, the overwhelming Soviet superiority on the ground might have been at least partially offset by superior U.S. air assets, also shown in Figure 4. U.S. naval forces were also superior, and communications and readiness were probably at higher levels, although this is not reflected in these measures.

Few analysts foresee a return to Cold War tensions between the United States and Russia, despite current uncertainties and concerns. But even if Russia were to return to a more combative posture, the capability it can field is considerably diminished from estimates of Soviet capability. (See Figure 4 for a comparison of Soviet and Russian ground and aircraft scores.) As with the Soviet Union, Russian scores may be somewhat misleading since Russia would probably not be able to devote all of these forces to a western war. In addition, geopolitical changes may mean that some of its former allies would be adversaries in such a war.

CBO's analysis uses an evaluation system called TASCFORM that was developed by The Analytic Sciences Corporation (TASC) for DoD. TASCFORM assigns a quantitative score--derived from assessments by military experts--for types of weapons, based on the characteristics of those weapons. The scores are best viewed as a measure of the combat potential of weapons in various forces, since they do not account for a number of factors, many of which might favor the United States in conflict. These omitted factors include personnel quality and training, the capabilities of communications equipment, appropriate warfighting strategy and tactics, and the ability of logistics forces to support personnel and maintain weapons. The measures also do not account for luck, leadership, and morale.

Russian ground forces will retain less than half of the capability of the former Soviet Union, though Russia may keep about 75 percent of the former Soviet Union's air capability (see Figure 4). Even these estimates may accord too much capability to Russian weapons, since a number of reports--including testimony by the Director for Combat Support at the Defense Intelligence Agency--indicate that the readiness of Russian forces is declining for a number of reasons, including lack of funds for supplies, spare parts, and training.[5]

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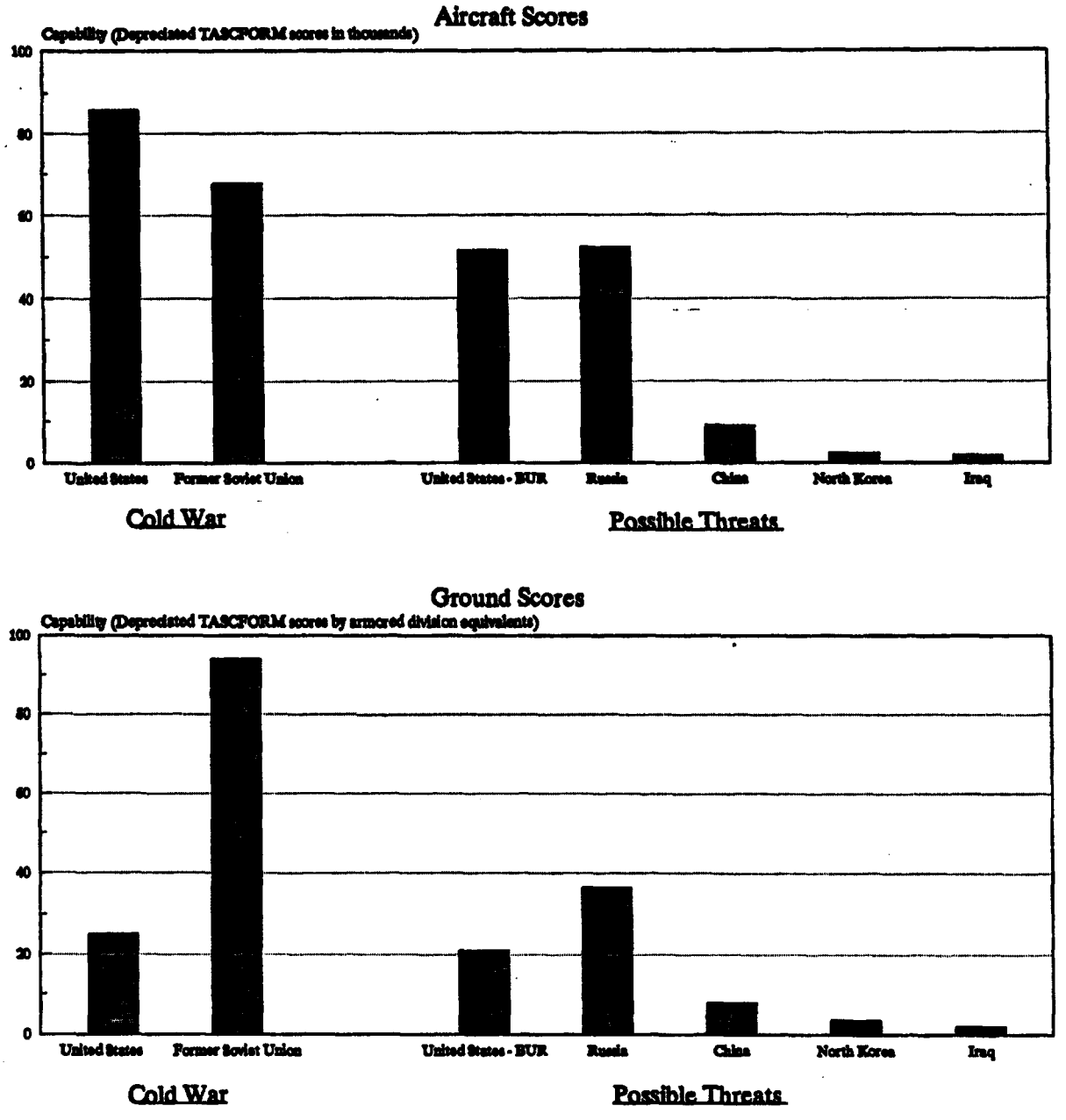
5. Statement of William Grundmann, Director for Combat Support, Defense Intelligence Agency, to the Joint Economic Committee of the Congress, June 11, 1993.

FIGURE 4. COMPARATIVE SCORES OF SELECTED REGIONAL POWERS, 1995



SOURCES: Congressional Budget Office estimates based on data from *The Military Balance* (London: International Institute for Strategic Studies, 1993-1994); The Analytic Sciences Corporation; U.S. Air Force; and U.S. Department of Defense.

NOTES: TASCFORM = Technique for Assessing Comparative Force Modernization. TASCFORM scores for the former Soviet Union are based on 1988 inventories. Scores for Russia and the former Soviet Union include inventories in both Europe and Asia. The former Soviet Union would probably have kept some of its forces in the east rather than devoting them to a western front. Consequently, these scores probably overstate the capability the U.S. and its allies would have faced. If Russia were to become a threat to NATO, it would also need to withhold some of these forces. Air scores include only fighter and attack aircraft inventories. Cold War scores for the United States are based on 1991 inventories. Scores for the United States under the bottom-up review (BUR) reflect projected 2000 inventories.

The Administration argues that it has sized future forces to be able to win virtually simultaneous conflicts against two regional powers. The Administration's analysis in the bottom-up review assumes--for planning purposes--that the two hostile countries would be Iraq and North Korea. As the figure shows, both Iraq and North Korea have much more modest capability than either the Russian Republic or the former Soviet Union.

However, the Administration wishes to have the capacity to fight two wars--one in Southwest Asia and one on the Korean peninsula--at almost the same time. So perhaps a better measure of the capability of the forces the Administration expects to have would be an estimate of scores for the forces the United States could field to each theater, assuming both contingencies occur together.

The Administration's Planned Forces and Two Regional Conflicts

CBO estimated the buildup of U.S. forces in each of two theaters based on a number of assumptions. (See Appendix B for a more detailed description of the assumptions.) CBO's major assumptions were:

- The war with Iraq would start first, and about a month later war would break out on the Korean Peninsula;
- DoD would have the forces and equipment the Administration expects to have in 2000, including combat forces, lift, and prepositioned equipment;
- The United States would fight with only indigenous forces as allies--Saudi and Kuwaiti forces in Southwest Asia and South Korean forces on the Korean peninsula;
- Forces are counted once they arrive in theater. Thus, United States, allied, and hostile forces are measured as theaterwide buildups rather than as units deployed in a combat scenario;
- Army Guard combat units would not be deployed to the regional conflicts, though guard and reserve support units would participate, as would air combat units; and finally,
- One of two Army divisions in Europe would remain in place.

The Adequacy of Airlift and Sealift

CBO's results reflect a number of actions this Administration, the previous administration, and the Congress have taken or are taking to improve U.S. airlift and sealift. Those actions include buying a number of sealift ships, improving the capability of the Ready Reserve fleet, and procuring 40 C-17s. In all, improvements in mobility will cost about $33 billion. The Administration also plans to preposition equipment for three brigades of Army forces in Southwest Asia and aboard ships that could be at ports in Saudi Arabia soon after a war begins.

The Department of Defense has also taken a number of administrative actions that should facilitate mobilization. CBO assumed that the United States would act to begin full mobilization upon the outbreak of conflict. In Operation Desert Storm, although the United States did deploy a number of air and ground units quickly, a second wave of forces was deployed considerably later when the United States decided to engage in an offensive operation.

Without these improvements, certain of the unified commanders question whether today's airlift and sealift forces could cope with even one major regional contingency, let alone two. "Strategic lift in this country is broken right now," General Joseph P. Hoar, the Commander of Central Command, which encompasses the Middle East, has said in testimony before the Senate Armed Services Committee. General Hoar based his statement on several factors, including the recent limitation on the use of C-141 aircraft while cracks in wing supporting members were being repaired, uncertainty about the fate of the new C-17 airlifter, and possible limitations on the Maritime Administration's ability to secure crews for sealift ships it draws from the Ready Reserve Force.

CBO has not assessed the airlift and sealift problems that the services are experiencing today, though it appears that the problems that exist are being addressed. Most C-141s, for example, will have been inspected and repaired and returned to full service by the end of 1994. Also, in response to General Hoar's comments, Secretary of the Air Force Sheila Widnall said the United States would use all of its airlift aircraft, including the reserves, in war. More aircraft would thus be available than are for the peacetime fleets to which General Hoar was apparently referring. And the Administration has proposed assistance for the merchant marine fleet that might address concerns about the availability of crews for sealift ships. In any case, the analysis presented here is premised on the implementation of actions to improve airlift and sealift and to increase dramatically the prepositioning of equipment.

Results

The results of CBO's analysis--shown in Figure 5--suggest that the United States and its allies could build forces to have substantial superiority in both theaters over the three-month period CBO examined in its analysis.

Results for Southwest Asia. In the Southwest Asia conflict, Iraq would start out with about double the capability of the indigenous forces of Saudi Arabia and Kuwait. By CBO estimates, the United States would be able to land enough forces to attain modest superiority within several weeks, and by the end of the period of CBO's analysis, allied forces would attain a ratio of 2.8:1.

Results for Korea. A conflict on the Korean peninsula would find friendly forces in a better starting position than in Southwest Asia, largely because of the strength of South Korean forces--augmented by forward-deployed U.S. forces--compared with North Korean capability. Because CBO assumes the United States would devote to the Korean contingency fewer heavy Army forces and more air and naval forces that can be deployed more rapidly, the ratio of friendly forces to enemy forces would rise to more than 2:1 by about one month after mobilization for the Korean war began. The ratio would build to about 2.6:1 within about two months.

What Measure of Superiority Is Required? Based on highly aggregated planning factors, the capability of the forces in both scenarios should be enough to assure a successful campaign, even if U.S. and allied forces take the offensive. A rough rule of thumb is that an attacker needs a local force ratio of at least 3:1 to win. Local balances of 3:1 in areas of offensive operations would need to be matched by sufficient forces in areas where no attack is planned to keep the enemy from achieving similar concentrations. For example, if the United States and its allies had an overall ratio of 2.7:1, then they could build to a local ratio of at least 3:1 over 20 percent of the area of engagement, while retaining a defensive ratio of 1:1 or higher throughout. Some analysts viewed defensive theaterwide balances from about 0.8:1 down to 0.5:1 as high enough to prevent a successful attack by the Warsaw Pact against NATO during the Cold War.[6]

These conclusions about force ratios certainly do not apply in every instance. History is replete with examples of campaigns won by outnumbered forces, in some cases with inferior equipment. Since leadership, luck, and morale are difficult to quantify, even the most complex models have failed to

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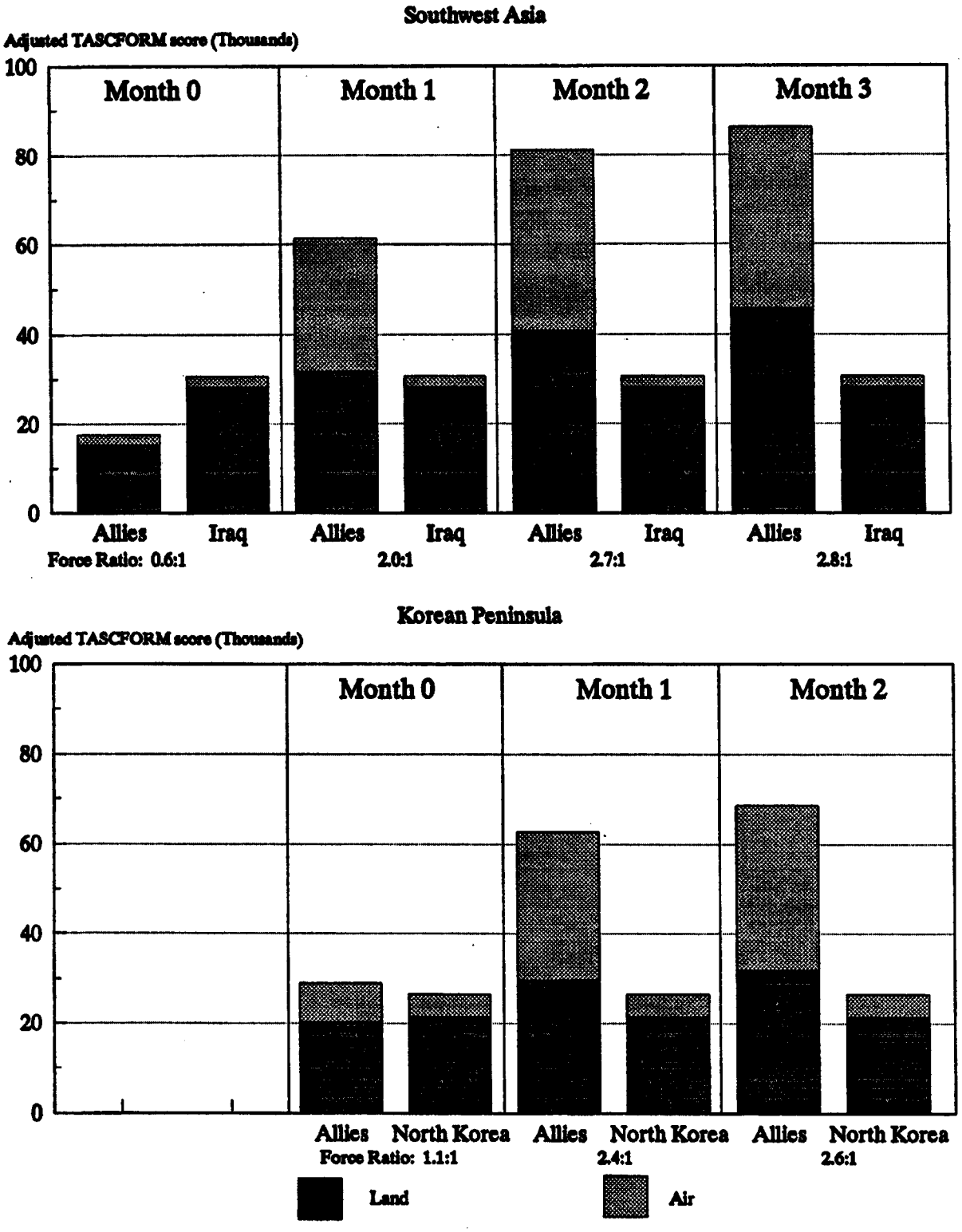
6. Congressional Budget Office, *U.S. Ground Forces and the Conventional Balance in Europe* (June 1988), p. xv.

FIGURE 5. COMPARISON OF SCORES FOR UNITED STATES AND INDIGENOUS FORCES IN THEATER



SOURCE: Congressional Budget Office based on data from The Analytic Sciences Corporation.

solve this problem. Military tacticians would agree, though, that more is better, and that the outcome of underestimating the forces needed is likely to be higher U.S. casualties.

Limits to the Analysis. CBO asked the services and the Joint Chiefs of Staff (JCS) to review the analysis underlying these results. The most commonly raised criticism was that CBO's modeling efforts are too simplistic and do not forecast war outcomes. Another concern was that the forces CBO allocates to each conflict are not the specific forces the JCS would allocate in their own planning scenarios, nor does CBO's assumption of a month-long separation between the outbreak of the two wars match details in JCS planning scenarios. The Marine Corps argued that it would take several days longer to unpack equipment and test it before forces would be available to fight. The Navy raised the issue that enemy mining of port facilities could slow the arrival of U.S. forces. Finally, constraints on the capacity of port facilities and airfields could also limit the pace of the buildup.

These reservations suggest that CBO's analysis should be used with caution. Factors that could be incorporated in more detailed wargaming might suggest that higher levels of forces or lift could be needed. If, as the JCS suggested, enemy forces were to overrun friendly ports or airfields (as they did in Korea in 1950), a prolonged struggle could ensue to retake ports via amphibious assault. Or friendly forces might need to travel from greater distances to the engagement and fight for longer periods to regain territory. Deployment times could also be longer if the Navy had to engage in a prolonged minesweeping campaign before transport ships could land their equipment.

The JCS's detailed deployment schedules are classified, and CBO deliberately elected not to use them. But the forces described in the bottom-up review should be common to both analyses: the only issues are where they would go and in what order. Shifting forces that CBO assumed would be deployed later to earlier deployment, or shifting forces from one region to the other, ought not to change the overall outcome substantially.

Finally, estimates of airfield and seaport limitations indicate that under most assumptions, there would be little or no long-term delay in deployment because of crowding. A report by the Military Traffic Management Command--a part of Transportation Command that works out the details of U.S. mobility plans--concludes that seaports are largely capable of supporting a full deployment; similarly, Air Mobility Command noted that normally, the

Continental United States "does not represent a system constraint."[7] The total capacity of Saudi airports and seaports is well above requirements, as is South Korea's seaport capacity. Assuming the host nations were willing to allow deployment to displace commercial traffic, no delays would be incurred. A possible limitation is the lack of availability of the South Korean airports because of conflict; in such a case, Japanese airbases would be large enough to absorb the excess. In-theater assets (such as the C-130 aircraft) could then deliver assets to forward bases, as could the new C-17 airlifter.

Despite their limitations, the force ratios that result from CBO's model should serve as a rough guide for assessing how much capability the Administration's forces might provide in two wars. CBO's admittedly simple deployment model suggests that the Administration's planned force levels would bring substantial capability to two regional wars and that improvements in mobility should accelerate the buildup of that capability.

Of course, the United States has never had to face the actuality of two regional powers engaging in aggression against their neighbors within the same month--at least not where U.S. interests were sufficiently involved to cause it to go to war. DoD's planning process, which is understandably pessimistic on these matters, produces a "worst-case" scenario. If one were more optimistic, then perhaps one could plan for forces that are sufficient to fight in one regional conflict. Under this scenario the United States might be able to make further force reductions if, as the earlier analysis of long-term budgets suggests, more cuts need to be made in the defense budget.

ILLUSTRATIVE ALTERNATIVES

CBO conducted an analysis of several alternatives to the Administration's plans, looking at the cost and capability of:

- Larger and smaller forces;
- Cuts in operating costs for planned force levels; and
- Further procurement and development cuts.

Increased Forces

A number of participants in the defense debate have argued that the Administration's plan cuts forces too deeply. Concerned about tensions in

7. Military Traffic Management Command, Transportation Engineering Agency, *A Study of Deployability Through the United States Strategic Ports* (Newport News, Va.: MTMC, April 1993).

Eastern Europe, perceived difficulties in fighting two wars at once, and the sharp decline in forces, they argue that cutting forces below today's levels is unwise. If the United States forces were to remain at today's levels, the Army would retain 12 active divisions--about 20 percent more than the Administration plans. The Navy would keep 387 ships, about 15 percent more than planned. The Air Force would be about 10 percent bigger, with 22 tactical fighter wings.

Increased Capability. Retaining 1994 force levels would increase the capability of U.S. forces to fight two regional wars. Because of lift constraints, however, most of the additional capability would not arrive until the end of the period CBO used in its analysis. An exception to this might be tactical aircraft: Navy tactical aircraft could arrive aboard carriers. Air Force tactical aircraft could probably fly to the theater quickly but would not be able to fight until their squadron equipment had arrived. Eventually, regional balances might rise to 3.2:1 in Southwest Asia compared with 2.8:1 for the Administration's forces. Korean balances would remain at 2.6:1.

Increased Costs. Costs for this alternative would increase both in the near term and in the longer term. The relatively large near-term increase would necessitate either substantially reallocating funds from other discretionary spending to defense compared with the Administration's plan, or relaxing the OBRA-93 caps.

Near Term. Assuming that the funding in the 1994 operating accounts would be sufficient to maintain 1994 force levels, operating costs would be almost $70 billion higher over the five-year period (see Table 6). Procurement funding would probably not need to rise appreciably for most systems since, as indicated earlier, DoD has surpluses of most major weapon systems.

One exception to this finding is in the arena of naval carrier aircraft, where DoD will experience shortages even under the Administration's plan. Indeed, the Navy plans to take a number of measures including placing Marine Corps aircraft in Navy wings and reducing the number of aircraft per carrier to deal with its shortages. If the Navy retained two extra air wings, as this option assumes, it would need to buy about 48 more F/A-18s--roughly the number of planes for two wings--during the five-year period, and it would need several billion dollars more in procurement funds.[8]

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8. A notional Navy airwing contains 36 F/A-18s. But the Navy has too few F/A-18s to provide that many for each of its wings. F/A-18 stocks in the Navy might provide for an average of about 24 F/A-18s per wing. Thus, CBO's rough cost calculation assumes that about $3 billion would be needed to buy 48 planes.

TABLE 6. ALTERNATIVES TO THE ADMINISTRATION'S PLAN: EFFECTS ON COST AND CAPABILITY

Approach	Savings (-)/ Costs for 1995 to 1999	Capability Ratio	
		Southwest Asia	Korea
Administration's Planned Forces		2.8:1	2.6:1
Keep Larger Forces (With 1994 levels held constant)[a]	70	3.2:1	2.6:1
Cut Forces Further (2 wings, 2 carriers, 3 light divisions)[b]	-23	2.6:1	2.5:1
Cut Acquisition Programs[b]			
Buy five fewer DDG-51 destroyers for the Navy	-5	n.a.	n.a.
Cancel Air Force's F-22 Fighter	-12	n.a.	n.a
Cancel Army tank upgrade	-2	n.a.	n.a.
Cut RDT&E to Historical Shares	-12	n.a.	n.a.

SOURCE: Congressional Budget Office.

NOTES: RDT&E = research, development, test, and evaluation; n.a. = not available.

a. Administration's planned funding compared with 1994 baseline.

b. Estimates from Congressional Budget Office, *Reducing the Deficit: Spending and Revenue Options* (March 1994).

If these near-term increases were not offset by other reductions in the defense budget, it would mean that DoD would experience much smaller reductions in spending. If discretionary caps remain in place, defense would absorb only about 20 percent of the real reduction taken by discretionary programs to meet the caps, and domestic discretionary spending might have to absorb more than 70 percent of the reduction. This outcome compares with that of defense absorbing about 80 percent of the reduction in the Administration's plan.

Longer Term. Over the longer term, larger forces raise even more concerns about affordability. CBO has not done a detailed analysis of the added costs. But the addition to annual operating costs would be joined by substantially higher requirements for procurement funding, since more equipment would be needed for the larger number of forces.

Alternatives That Save Money

Though there is some support for adding to the defense budget, there may be just as much or more pressure to save additional amounts from defense. Pressure for large budget reductions may have eased somewhat because of concerns about world events. But pressure for decreases may result simply as budget forecasts become reality. The following options discuss ways of making modest cuts to defense spending.

Smaller Forces. If the United States were to cut two additional tactical air wings, two more carriers, and three of the Army's four light divisions from the Administration's force levels, the defense budget might be about $23 billion lower than the Administration plans during the five-year period through 1999 (see Table 6).[9]

After such force reductions, military capability would of course be lower. The ratios of forces in Southwest Asia would fall to about 2.6:1 after all active forces were deployed from the 2.8:1 for the BUR forces. The Korean ratio would fall from 2.6:1 for the BUR forces to about 2.5:1.

The United States might be able to make up shortfalls with reserve ground forces, though they would not be ready early in either war. In the preceding analysis, CBO did not assume that units in the Army National Guard would be deployed, since this presentation of analysis discusses only three months and even the readiest of the Guard's units might take about that

9. The force reductions discussed here are taken from CBO's publication *Reducing the Deficit: Spending and Revenue Options*. The 1994 edition contains a number of force reductions that the Congress might consider.

long to become ready to be deployed, according to Army estimates. It also seemed reasonable that the United States would withhold some forces even when engaged in two conflicts. Mobilized Guard units might fill this role. But if more forces were cut, as this option assumes, at least some of the Guard units might also be deployed eventually, thus offsetting the reductions in active capability.

Reduce Operating Costs for Planned Forces. Another way to save operating dollars might be to reduce the funds spent per unit. This reduction could be made by flying planes less, keeping ships in port, and cutting down on the number of days tanks are driven (so-called operating or "op" tempo.) It might also be done by relying more on reserve forces.

Reduce the Operating Tempo of Forces. CBO lacks the data to estimate the total decrease in funding that results from reductions in operating tempo, but it may be relatively small compared with reducing the number of forces. For example, a 50 percent reduction in the number of hours flown by an Air Force F-16 squadron would produce a cut of only about 20 percent of the squadron's direct operating costs. It might produce even more modest reductions in indirect costs, and none at all in overhead. (About $8 million would be cut out of an annual squadron operating cost of about $40 million in 1995 dollars.)

Perhaps more important, keeping up training depends heavily on operating tempo, and a number of military leaders have emphasized the priority they give to avoiding decreasing training and creating "hollow forces." But DoD has made some cuts to the operating tempo of some forces, particularly those that had to be available immediately for strategic deterrence purposes during the Cold War. For example, strategic bombers that remained on 24-hour alert no longer do so. There may be other areas--for example, the fleet of Trident submarines--where operating tempo could be cut, thus producing savings.

Rely More on Reserves. DoD could also rely more on reserve forces. Reserve forces typically cost less to operate than active forces. For example, divisions in the Army National Guard cost only about 25 percent as much as active divisions. Air and naval reserve forces also cost less than their active counterparts, though they save less than ground forces. These lower costs probably had a good deal to do with the total-force policy originally articulated by then Secretary of Defense Melvin Laird in the early 1970s. Defense planners, confronted with the formidable threat of the former Soviet Union and a public disillusioned by defense spending as U.S. participation in the war in Vietnam drew to a close, proposed relying on cheaper reserve

forces. The United States could do this again and reduce the average costs of the forces it keeps.

Heavier reliance on reserve forces, however, would raise concerns about readiness, particularly for the Army, where savings are greatest. Such concerns probably arise from a perception that Guard forces were not available quickly enough in the war with Iraq. The active Army now expects to fill out its divisions with three active brigades, rather than keeping two active brigades and counting on Guard brigades to round out the division on mobilization. Reversing this policy and also looking for opportunities in the other services to make more use of reserve forces could save substantial amounts of money, though, once again, probably less than would outright force cuts. At least for Army forces, concerns would then be raised about whether Guard forces can be available quickly enough to be useful in rapidly arising regional wars.

Reduce Acquisition Programs

A number of reductions to procurement funds might also be considered, especially in the near term. Development funding might also be cut.

Reduce Procurement Funding. Although DoD's budgets will buy considerably fewer weapons during the next five years than they have in past periods, some weapons might not be needed to counter the smaller and less capable threats the United States might face. In its annual publication on possible deficit reductions, CBO provides a number of options that would cancel systems. The Congress might consider eliminating some of these systems, perhaps replacing them with less costly ones. (Three program changes were selected as examples--one each for the Army, Navy, and Air Force. Table 6 shows the savings associated with canceling them.)

DoD expects to buy several weapons--particularly ships--not because of current shortfalls in inventory, but rather to preserve the industrial capability needed for potential future procurement. In contrast, DoD has been willing to forgo producing new equipment to maintain the industrial base for tanks, though it does plan on substantial modifications to the existing tank fleet that should sustain much of the capability for tank production. To meet budget targets, the Army once was willing to cancel all tank production. At that time, it argued that the cost of continuing tank production exceeds the cost of storing plant stock and facilities until the next time a tank is needed for

inventory purposes (around 2009, though the Army may wait longer since it has not yet started development of a new tank).[10]

The Navy and the Air Force might be able to tolerate similar gaps in new procurement. As with Army tanks, the Navy has excess stocks of ships and the Air Force of planes, compared with the stocks they would need for the smaller planned forces. Both services, however, seem to be at least contemplating the possibility of accelerating retirement schedules of less desirable equipment to bring inventories more in line with requirements. In view of this surplus, further cuts to procurement might be taken, especially if there are other ways to hedge against lost production facilities. CBO has not performed a detailed analysis to determine if problems exist that make the Army's willingness to "mothball" its industrial base less appropriate for the other services.

Reduce Development Funding. The Congress or the Administration could also reduce development funding further. The Administration plans to reduce funding for development by 1999 to about 12 percent of the budget. This share is lower than the 14 percent share that development was given in 1994, but it remains higher than its historical share of about 11 percent from 1950 to 1993. Given reduced worries about innovation by potential adversaries, further cuts to development might be acceptable. Cutting development's share of DoD funding by 1 percentage point per year, while keeping other titles at their requested levels, would save about $12 billion over the five-year period starting in 1995.

Ultimately, such reductions may be difficult to realize. In particular, under the RDT&E title it may not be easy to cut those portions of spending that reflect nontraditional spending with high priority, such as funds for defense conversion and environmental cleanup. In addition, the United States may want to keep a fairly high level of basic research even in a fairly safe world because research is a relatively inexpensive hedge against uncertainty.

10. Congressional Budget Office, "Alternatives for the U.S. Tank Industrial Base," CBO Paper (February 1993).

APPENDIX A: TABLES PRESENTING ANALYTIC ASSUMPTIONS FOR CBO'S LONG-TERM FUNDING ANALYSIS

TABLE A-1. CBO ASSUMPTIONS BEHIND PROJECTIONS OF LONG-TERM COSTS, 2000 TO 2010

Budget Category	Estimate A	Estimate B
	For All Military Services	
Military Personnel	Administration estimate for 1999 held constant.	Same.
Operation and Maintenance	Administration estimate for 1999 held constant.	Same.
Major Weapon System Procurement	Uses DoD prices and planned replacement schedules.	Incorporates estimate of cost growth.
Minor Procurement	Estimate based on factors related to force size.	Regression on major procurement spending.
Research and Development	Historical real average amount held constant.	Historical average share of total DoD budget.
Military Construction and Family Housing	Estimate based on factors related to force size.	Same.
	For Other DoD Categories	
Ballistic Missile Defense	Administration estimates through 2005. Constant real spending thereafter.	Incorporates estimate of cost growth.
Defense Health Program	Estimate based on expansion of managed health care nationwide.	Some cost growth due to expansion of managed health care nationwide.
Environmental Spending	Cleanup of past hazardous waste sites expands over 2000 to 2004, then slows.	Incorporates estimate of cost growth.
Defense Conversion	Personnel, community, and dual-use technology programs end in 1999.	Dual-use technology programs continue through 2010.
Other Defense-Wide/ Defense Agency	Administration estimate for 1999 held constant.	Same share of DoD budget as in 1999.
Other National Security	Administration estimate for 1999 held constant.	Same.

SOURCE: Congressional Budget Office.
NOTE: DoD = Department of Defense.

TABLE A-2. PROCUREMENT OF SELECTED MAJOR WEAPONS UNDER THE ADMINISTRATION'S PLAN, AS ESTIMATED BY CBO

Category	FYDP, 1995-1999 Period	2000-2010 Period	Maximum Annual Rate	Program Timing
		Army		
Attack Helicopters	0	1,008	120	Begins in 2001
		Navy		
Carriers	1	3	1	n.a.
Destroyers	15	33	3	n.a.
Attack Submarines				
Seawolf	1	0	1	Procured in 1996
New Attack Submarine	1	16	2	Begins in 1998
Attack Aircraft				
F/A-18 C/D	72	0	36	Ends in 1997
F/A-18 E/F	72	528	48	Begins in 1997
JAST	0	18	12	Begins in 2009
		Air Force		
Tactical Combat Aircraft				
F-22	20	422	48	Begins in 1997
JAST	0	120	48	Begins in 2007
Airlift Aircraft				
C-17	50	44	12	Ends in 2003

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

NOTE: FYDP = Future Years Defense Program; JAST = Joint Advanced Strike Technology; n.a. = not available.

TABLE A-3. AVERAGE UNIT PROCUREMENT COSTS ASSUMED BY CBO (In millions of 1995 dollars)

	Lower Estimate	Higher Estimate
Army		
Attack Helicopters		
RAH-66	23	29
Navy and Marine Corps		
Carriers	4,600	5,500
Destroyers[a]	700	900
Attack Submarines		
Seawolf	2,400[b]	2,700[c]
New attack submarine	1,500	1,800
Attack Aircraft		
F/A-18E/F	60	80
JAST	55	80
Air Force		
Tactical Combat Aircraft		
F-22	90	120
JAST	35	50
Airlift Aircraft		
C-17	275	275

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

NOTES: FYDP = Future Years Defense Program; JAST = Joint Advanced Strike Technology.

CBO assumes the Navy will spend about $1 billion per year on the V-22.

a. The DDG-51 costs $900 million each. The lower estimate of $700 million and higher estimate of $900 million are the costs for the DDG-51 successor.

b. Of the unit costs of $2.4 billion for the third Seawolf, about $900 million has already been funded. About $1.5 billion would be needed to complete the ship in fiscal year 1996.

c. Assumes continuing cost overruns on Seawolf submarines.

APPENDIX B: MIRKWOOD ASSUMPTIONS AND METHODOLOGY

MIRKWOOD is a model developed to simulate the first 90 days of deployment of U.S. military forces to theaters of two nearly simultaneous major regional contingencies. It also measures the total capability of forces within a theater using TASCFORM scores for both U.S. forces that have arrived in port and all allied and opposition forces. TASCFORM (Technique for Assessing Comparative Force Modernization) was developed by The Analytic Sciences Corporation (TASC) to measure relative performance of weapon systems. The model does not measure forces engaged in combat: that step would involve modeling intratheater mobility, logistics constraints, strategic decisions, and tactical choices made by the commanders in the field, all of which are beyond the scope of this analysis.

MIRKWOOD does not reflect the impact of attrition; command, control, communications, and intelligence; morale; training; leadership; or other factors which would influence the outcome of the war.

The strategic mobility portion of the model makes a number of assumptions about mobility performance, which were taken from military planning factors when available. In MIRKWOOD, active component units are mobilized without difficulty, and deployed to U.S. airports or seaports without constraints. It is assumed that no traffic congestion-related delays take place at such ports, en route, or at the destination. In the two contingencies actually analyzed here (Southwest Asia and Korea), airfields and ports to be used meet the requirements for airport and seaport space. However, political or military constraints on the use of airfields, mining of seaports, or other similar factors could constrain the deployment.

Reserve components that play a role in the movement of forces are assumed to be called up and available immediately. Other Air National Guard and Air Force Reserve tactical units would be available within the first month; all other reserve-component combat units are assumed to be unavailable through the 90-day period of analysis, though they might be available and used later.

The analysis assumes that improvements to mobility assets in the Administration's plan, such as the construction and conversion of sealift, procurement of the first 40 C-17s, and software and administrative improvements at Transportation Command, are carried out fully as of 2001. Ninety percent of military airlift and all military sealift (including the Ready Reserve Fleet) are assumed to be available for mobility operations. The Marines would maintain their three brigade-sized prepositioning squadrons, and the Army would establish two brigades of prepositioned equipment in Southwest Asia and an additional brigade afloat. The Civil Reserve Air Fleet would be activated at Stage II immediately, and at Stage III at the beginning

of the second major regional contingency. Approximately 500,000 tons of commercial containerized shipping would be contracted for; the additional sealift this provides combined with sealift not used in unit deployment would be enough to sustain the forces with high estimates of sustainment requirements.

Calculations for airlift were performed by using a spreadsheet model that included the effects of maintenance limitations on aircraft availability; availability of pilots and operating assumptions; en-route basing; planning factors for average payloads; and maximum on-ground limitations for airfields. This approach was considered by Air Mobility Command to be an acceptable methodology.

Sealift totals were derived from a computer simulation of the movement of individual ships and ship types from the United States to theater, using Navy planning factors for activation rates, speeds, and operating cycles, and Army assumptions for loading, unloading, and average cargo by square feet. MIRKWOOD does not adjust cargo utility for various types of unit equipment. CBO's model assumed--based on averaging Army factors--that about 30 percent of the space on ships goes unused.

Total airlift and sealift capacity are then matched against an illustrative deployment schedule based on experience in the war with Iraq, service comments, and CBO assumptions. The resulting capability (in TASCFORM scores) for the cumulative equipment deployed in theater is measured against the total score for the armed forces of the opposition.

United States combat forces are assumed to be at 1999 bottom-up review levels. The model assumed that one of the two U.S. divisions stationed in Europe would be deployed to Southwest Asia; the other, along with nondivisional assets, would remain in Europe. Estimates of allied and enemy force structures are as of 1993 and are from *The Military Balance 1993-1994*, by the International Institute for Strategic Studies.