SALT II AND THE COSTS OF MODERNIZING U.S. STRATEGIC FORCES

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SALT II AND THE COSTS OF MODERNIZING U.S. STRATEGIC FORCES

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PREFACE

This paper, prepared at the request of the Senate Committee on Foreign Relations and the Senate Committee on the Budget, examines a question of concern in the debate on the SALT II agreement: How will the treaty affect U.S. and Soviet strategic force developments?

The paper focuses on three specific issues. First, assuming SALT II is ratified, what are the budget requirements for planned U.S. strategic forces over the next several years? Second, if SALT II is not ratified, what strategic force levels could the Soviet Union attain by continuing current modernization rates? Third, how would a Soviet buildup that exceeds the SALT II constraints *affect* the cost of maintaining survivability for currently planned U.S. strategic forces?

This paper was prepared by the National Security and International Affairs Division of the Congressional Budget Office, with principal contributions by John J. Hamre and Robert R. Soule, under the supervision of David S.C. Chu and Robert F. Hale. Cost estimates for future U.S. strategic forces were prepared with the assistance of the Defense and International Affairs Cost Estimates Unit of CBO, particularly Edward A. Swoboda and Michael A. Miller. The authors wish to acknowledge the assistance of Richard H. Davison, Nora R. Slatkin, Nancy J. Swope, and Peter T. Tarpgaard. The paper was edited by Patricia H. Johnston. Nancy H. Brooks and Janet R. Stafford prepared the paper for publication.

CBO wishes to thank the Space and Missile Systems Organization of the U.S. Air Force for making available the MX Cost Effectiveness Model used to derive the cost estimates for the MX missile system. (All assumptions about the number and characteristics of Soviet ICBMs and the desired number of surviving U.S. warheads were supplied by CBO.)

In keeping with CBO's mandate to provide nonpartisan and objective analysis, this paper offers no recommendations.

Alice M. Rivlin
Director

September 1979

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SUMMARY

How SALT II will affect U.S. defense costs is a matter of great concern. One particular question is how rejection of the treaty might increase U.S. spending for strategic forces. That question cannot be answered with any single cost figure, for several reasons. U.S. choices in a "no-SALT" world would depend on the nature of Soviet decisions. These are unknown, and probably unknowable. Also, for any set of Soviet choices, the United States could choose from a number of alternative responses.

This study does, however, reach conclusions about several issues closely related to SALT II's effect on U.S. defense costs:

- Even if SALT II is ratified, the United States plans to increase substantially its expenditures for strategic force modernization over the next several years.

- If SALT II is not ratified, the Soviet Union could, by continuing current building rates, exceed some SALT II limits before the planned expiration of the treaty at the end of 1985.

- A Soviet buildup that exceeds the SALT II limits would adversely affect the survivability of the planned MX missile system; it could also affect the ability of U.S. bomber forces to escape safely from their bases in the event of an attack. Maintaining the survivability of these systems in the face of such a buildup could require additional expenditures.

U.S. STRATEGIC FORCE EXPENDITURES WILL GROW EVEN WITH SALT II

From what is publicly known about the Administration's plans, there will be a sizable real increase in expenditures for U.S. strategic forces over the next five years. Although the Congress may not approve all of the programs that the Administration plans to request, and may indeed substitute other choices for the Administration's proposals, the most likely changes would not affect this conclusion. Based on what is now known, CBO estimates that, under the Administration's proposals, total

spending on strategic forces will rise from $10.9 billion in fiscal year 1980 to $19.3 billion in fiscal year 1984 (all costs in fiscal year 1980 dollars). CBO estimates that $7.0 billion of the fiscal year 1980 figure and $15.4 billion of the fiscal year 1984 figure will be spent for research and development and for investment in new systems. These expenditures reflect program initiatives needed to replace systems that are aging (for example, the Polaris/Poseidon submarines) or whose survivability is threatened by Soviet developments (for example, the land-based ballistic missile force).

WITHOUT SALT II LIMITS, THE SOVIETS COULD BUILD TO HIGHER LEVELS

The Soviet Union has the capacity to build to higher levels of strategic forces than permitted by the SALT II limits. In the recent past, it has annually deployed about 125 intercontinental ballistic missiles (ICBMs) armed with multiple independently targetable reentry vehicles (MIRVs). At this rate, it could reach the SALT II limit of 820 MIRVed ICBMs in 1982, well before the treaty would expire at the end of 1985.

Until recently, Soviet shipyards have built ballistic missile submarines (SSBNs) at a rate of about six per year. Even if this pace were reduced because of the introduction of a new class of submarine (the Typhoon), the Soviets could exceed some SALT II limits before expiration of the treaty. How much restraint the treaty would place on Soviet submarine forces would depend on other decisions made by the Soviet Union to stay within the SALT II limits.

A SOVIET BUILDUP COULD INCREASE COSTS OF U.S. FORCES

Present Soviet ICBM deployments threaten the survivability of today's U.S. ICBM force. As a result, the United States plans to deploy a new ICBM--the MX--in a basing system designed to enhance survival prospects against a Soviet first-strike attack. The basing system would achieve this by rotating the MX missiles among *a* large number of hardened shelters. The objective is to build more shelters for the system than the Soviet Union could destroy with its available warheads. With a larger Soviet ICBM buildup than permitted by SALT II, the survivability of the MX in this system would be decreased, unless the United States chose to counter the buildup by constructing additional shelters.

Countering a Soviet buildup would add to the costs of the MX system. If the Soviet Union simply continued to deploy present-day MIRVed ICBMs in all of its existing 1,398 silos, rather than stopping at the SALT II ceiling of 820, the United States would have to spend $4 billion to $13 billion more than CBO estimates it would cost to achieve the same level of survivability for the MX system under the treaty limits. (Most of the added funds would be spent over the next eight years.) This is merely one of several scenarios that might characterize Soviet behavior in the absence of SALT II, but it serves to illustrate the problems that a substantial Soviet ICBM buildup could pose for U.S. plans.

The MX will not be deployed, of course, until after the SALT II treaty expires. Thus, the gains to MX survivability described here depend on the extension of SALT II-type limits into the 1990s, when the MX will be fully operational.

Even if the SALT II limits did expire in 1985, they would still provide some advantages for MX. Without the treaty's constraints on Soviet missile development, in the early 1980s the Soviet Union might be able to test missiles with significantly more warheads, which would greatly threaten MX when it is deployed. Moreover, by establishing constraints now on Soviet MIRVed ICBMs, the treaty sets a precedent for future agreements. Even if future limits are set at somewhat higher levels than SALT II, they could restrain the costs of building a survivable MX system. (Obviously, if future agreements lowered the limits, they could reduce the cost of a survivable MX system.)

A Soviet submarine-launched ballistic missile (SLBM) buildup could reduce somewhat the ability of U.S. strategic bomber forces to escape safely from their bases in the event of an attack. The United States has long worried about the vulnerability of its bombers to a surprise SLBM attack. The degree of this vulnerability depends on warning time and the number of SLBM warheads. SALT II does impose limits on potential SLBM force developments that could have a modest but beneficial impact on bomber survival prospects. It does not constrain several important factors that have a far greater potential impact on bomber survival. Soviet planners could substantially reduce bomber survival prospects by bringing their submarines closer to U.S. coastlines or by depressing ballistic trajectories to reduce missile flight times.

This increased vulnerability could be offset by further dispersal of bomber aircraft to additional airfields and by

hardening the aircraft against nuclear effects--implying added costs to reestablish prebuildup survivability levels. Since the optimal U.S. program depends on a number of other factors (for example, whether to build a new manned bomber in any event), it would be premature to estimate the cost of the U.S. response.

In short, while it is not possible to provide a single cost figure for a no-SALT world, it is clear that the SALT II agreement would place some limits on what the Soviets could otherwise achieve. If SALT II were not in effect, and the Soviets chose to employ their demonstrated capacity to expand their strategic forces beyond the limits permitted by the treaty, such a buildup could measurably complicate the problem of maintaining survivable U.S. forces. Responding to these complications would add to the U.S. defense budget, but in a manner that cannot be predicted with any degree of certainty.

CHAPTER I. INTRODUCTION

The relationship of SALT II to U.S. defense expenditures, and particularly to strategic force expenditures, is a matter of great concern. One question that has been raised is how rejection of the treaty might increase U.S. defense costs. This is not a question that permits a specific answer, however useful such an answer would be. Two types of uncertainties preclude forecasting the cost of a "no-SALT" world to the United States. First, U.S. choices will depend to some extent on the nature of Soviet decisions. While it is clear that the Soviet Union could achieve higher strategic force levels in the absence of SALT II, it is not possible to predict exactly what kind of buildup it would choose to undertake. Second, to counter any particular Soviet buildup, the United States could choose from a number of alternative responses, each with attractive features. This makes predicting the U.S. course of action hazardous, even if Soviet decisions could be accurately anticipated.

There are, nonetheless, a number of related issues on which it is possible to comment; these are the focus of this paper. First, it is possible to discuss plans and costs for U.S. strategic forces, assuming SALT II is ratified (see Chapter II). Second, it is possible to discuss how Soviet capacity for the acquisition of strategic forces compares with the constraints imposed by SALT II, and thus how the agreement limits what the Soviet Union might otherwise be able to achieve (see Chapter III). Third, it is possible to speculate--again, based on demonstrated capacities--how the Soviet Union could build up its forces if it were not constrained by the SALT II limits and how such buildups might affect certain U.S. programs. Special attention is paid to the particular effects on MX, the proposed new U.S. intercontinental ballistic missile (ICBM), and on the survivability of the U.S. strategic bomber force (see Chapter IV).

THE ADMINISTRATION'S PROBABLE PROGRAM

From Administration announcements, it is clear that the President intends to request substantially larger funding for strategic programs over the next several years. CBO's estimate of the cost of the Administration's plans, based on information furnished thus far to the Congress, is presented in Table 1. If the Administration's plans are approved, real budget authority for strategic forces would be approximately 80 percent higher in fiscal year 1984 than in fiscal year 1980.

This sharp rise in expenditures for strategic forces reflects a major program of investment in new systems. Table 2 provides detailed cost data on the major programs included in the "total investment" line of Table 1. Among these initiatives are:

- Development of a new ICBM--the MX--to be deployed in a basing system that would enhance survivability against a Soviet first-strike attack.

- Continued construction of a new ballistic missile submarine (SSBN)--the Trident and/or its successor--to replace the aging Polaris/Poseidon force.

- Procurement of Trident I missiles, which will be placed aboard 12 Poseidon ships and on Trident submarines when they are initially deployed.

- Initial development of a new submarine-launched ballistic missile (SLBM)--the Trident II--that will take full advantage of the larger launch tubes aboard the Trident submarine.

- Continued development of the air-launched cruise missile, modification of the B-52 to serve as a cruise missile carrier, and development of a complementary cruise missile carrier aircraft.

What accounts for this significant investment in new strategic programs? During the 1970s, the United States spent

TABLE 1. ESTIMATED TOTAL BUDGET AUTHORITY REQUIREMENTS OF ADMINISTRATION PROPOSALS FOR STRATEGIC PROGRAMS, FISCAL YEARS 1980-1984: IN BILLIONS OF FISCAL YEAR 1980 DOLLARS

	1980	1981	1982	1983	1984
Investment					
Research and Development	1.9	2.7	3.2	4.0	4.5
Procurement	4.7	4.4	4.5	5.5	7.9
Military Construction	0.3	0.3	0.7	2.5	3.0
Total Investment	7.0	7.4	8.5	12.1	15.4
Operations					
Military Personnel	1.3	1.3	1.3	1.3	1.3
Operations and Maintenance	2.6	2.5	2.5	2.5	2.5
Total Operations	4.0	3.8	3.8	3.8	3.9
Grand Total a/	10.9	11.2	12.2	15.9	19.3

NOTE: Strategic force expenditures in this table are defined in accord with Category 1 of the Defense Planning and Programming Categories (DPPC). This definition excludes the related support force costs that would be included in the Mission 1 definition of the Senate Budget Committee's mission budget categories.

a/ Numbers may not add to their respective totals because of rounding.

TABLE 2. ESTIMATED INVESTMENT COSTS OF ADMINISTRATION PROPOSALS FOR MAJOR STRATEGIC FORCE MODERNIZATION PROGRAMS, FISCAL YEARS 1980-1984 (BUDGET AUTHORITY): IN MILLIONS OF FISCAL YEAR 1980 DOLLARS

Program	1980	1981	1982	1983	1984
MX Missile and Basing a/	675	1,440	1,992	5,622	6,767
Trident Submarine b/	1,503	1,253	1,641	1,315	2,564
Trident I Missile c/	861	684	570	514	477
Trident II Missile d/	57	239	596	1,036	1,496
Air-Launched Cruise Missile e/	475	475	433	376	362
Cruise Missile Carrier f /	30	57	79	251	832
B-52 Modification g/	719	618	602	576	487
Total	4,320	4,766	5,913	9,690	12,985
Increase over 1980	—	446	1,593	5,370	8,665

a/ Assumes an initial operational capability in fiscal year 1986.

b/ Assumes authorization of one submarine per year through fiscal year 1983, with two authorized in fiscal year 1984.

c/ Assumes production of enough missiles to arm 12 Poseidon submarines and the first Trident submarines entering the fleet, including extra missiles for testing and maintenance.

d/ Assumes initial operational capability in fiscal year 1990.

e/ Production rate assumes that each of 173 B-52G bombers will be armed with 12 cruise missiles externally in the early 1980s. These aircraft will be armed with an additional eight cruise missiles internally in the mid-to-late 1980s.

f/ Funding assumes development of a wide-bodied aircraft as a cruise missile carrier, with an initial operational capability in fiscal year 1987. Both the schedule and the type of aircraft may be changed by the Administration.

g/ Funding based on a program to modify B-52 aircraft to carry cruise missiles, to replace unreliable components, and to upgrade electronic defensive systems.

historically modest amounts on strategic forces--usually $10 billion to $12 billion a year, as measured in fiscal year 1980 dollars (see Figure 1). This was possible because of the substantial expenditures on strategic nuclear forces during the late 1950s and early 1960s, when the B-52 bombers were acquired, the Polaris and Poseidon ballistic missile submarines built, and the Minuteman ICBM system deployed. The Polaris force is now aging, and the Minuteman missile system is steadily becoming more vulnerable to a preemptive Soviet ICBM strike. The Trident submarine, or its equivalent, will replace the Polaris (and eventually the Poseidon) submarines; the MX missile, if deployed in a multiple protective structure basing system, will improve ICBM survivability. The air-launched cruise missile will improve the capabilities of airborne strategic forces to penetrate future Soviet air defenses.

POSSIBLE CHANGES IN THE ADMINISTRATION'S PROGRAM

Even from the Administration's perspective, however, a number of strategic force modernization issues are not as firmly resolved as the figures in Table 2 might suggest:

- First, the cost figures for MX and its associated basing system reflect the latest multiple protective structure basing proposal (the racetrack/horizontal shelter variant), 1/ just approved by the President. The final cost may prove to be somewhat higher than implied by Table 2, however, to counter certain steps the Soviets could take under the terms of SALT II and to accommodate uncertainties involved in estimating costs for such a large construction project.

- Second, the development of the Trident II missile has consistently slipped behind schedule, because of budgetary constraints, and may not proceed at the pace implicit in Table 2. Moreover, there is some doubt whether two

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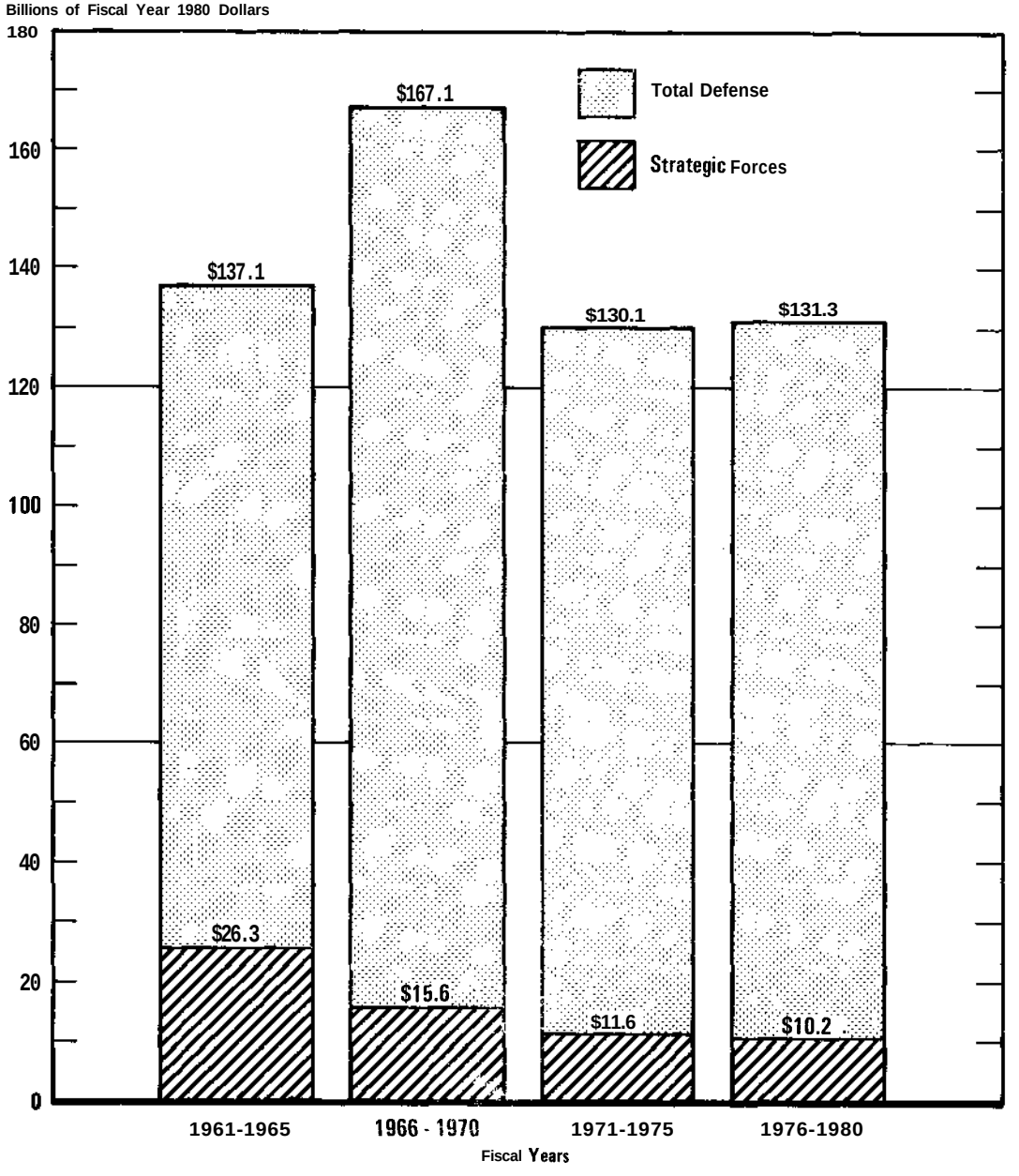
1/ For a description of this concept, see below, pp. 24-25. It is described in more detail in David R. Griffiths, "Hybrid MX Basing Wins Favor," Aviation Week and Space Technology (July 23, 1979), pp. 14-15; and "MX Basing Approval Expected," Aviation Week and Space Technology (July 30, 1979), pp. 12-13.

Figure 1.
Total Defense and Strategic Force Budget Authority, Five-Year Averages, Fiscal Years 1961-1980



NOTE: Strategic force budget authority is defined in accord with Program 1 of the Five Year Defense Plan (FYDP) Program Structure.

Trident submarines will be requested in fiscal year 1984 (again for budgetary reasons).

- Third, the cost figures for the cruise missile carrier assume modification of a wide-bodied aircraft like the DC-10 or the 747. It now appears unlikely that the Administration will actually propose using this sort of aircraft, but it is premature to speculate on what its actual proposal will be. Several choices would be more expensive than the program depicted in Table 2; others, less so.

While some of these uncertainties could be resolved in favor of lower strategic force budgets, others might be resolved in a manner that would increase U.S. expenditures on strategic forces above the level shown in Table 1.

Moreover, all of these programs will require Congressional decisions to authorize and appropriate the necessary funds. The Congress has already signalled its concerns with the scope and direction of strategic force modernization. While both the Senate and the House Armed Services Committees have expressed strong support for the MX missile program and an appropriate variant of the multiple protective structure basing proposal, the Senate Committee on Armed Services has directed the Department of Defense to study proposals for less expensive strategic ballistic missile submarines. 2/ At the same time, the House Committee on Armed Services, consistent with its actions in earlier years, has deleted funding for the Trident II missile from the fiscal year 1980 defense authorization bill, recommending that further development of the missile be deferred until the Department of Defense states a clear requirement for it. 3/ (The Committee expressed concern about the cost of developing the Trident II in a period when conventional naval force modernization programs face tight budgetary constraints.) The House Committee on Armed Services

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2/ Authorizing Appropriations for Fiscal Year 1979 for Military Procurement, Research and Development, Active Duty, Selected Reserve, and Civilian Personnel Strengths, Civil Defense, and for Other Purposes, S. Rept. 826, 95:2 (May 15, 1978), p. 90.

3/ Department of Defense Authorization Act, Fiscal Year 1980, H. Rept. 166, 96:1 (May 15, 1979), pp. 101-02.

also has deleted funds for the development of a wide-bodied cruise missile carrier, but has added funds for a competitive demonstration of a low-cost B-1 bomber and the Advanced Medium Short-Takeoff-and-Landing Transport (AMST) in this role. 4/ The Congress' final decisions on these recommendations will not be known until action is completed on both the authorization and the appropriation bills for fiscal year 1980.

Thus, even within the defined limits of SALT II, there is some uncertainty about the size of future budgets for U.S. strategic forces, reflecting decisions yet to be made by both the Executive Branch and the Congress. A further element of uncertainty must also be considered. Few of the modernization proposals shown in Table 2 will have a significant effect on U.S. strategic force capabilities in the next several years (see Table 3) because of the long lead time required for development and deployment of strategic forces.

Nor would increased funding for most of the programs listed in Table 2 have much effect on capabilities over the next several years. At best, increased funding for the MX might advance the date of initial operational capability (IOC) by one year, but this would involve undertaking many more key steps concurrently rather than in a more conservative consecutive fashion. (It would also involve compression of the complex land acquisition process.) Increased funding for Trident II development could move up its IOC from the currently planned date of 1990 by maybe two or three years. Trident submarines could also be built at a somewhat faster rate, perhaps two a year starting in 1982 or 1983. 5/ These ships take about seven years from authorization to full operational status, however. Thus, like advancing the Trident II IOC, this step would not have any effect on capabilities until the end of the 1980s.

Should the United States wish to improve capabilities in the next few years, there are a few measures that could be considered. Among these would be moving to a higher alert rate for

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4/ Ibid., pp. 89-90.

5/ See Department of Defense Authorization for Appropriations for Fiscal Year 1980, Hearings before the Senate Committee on Armed Services, 96:1 (March, April, and May 1979), Part 3, p. 1433.

TABLE 3. PROJECTED U.S. STRATEGIC FORCES, FISCAL YEARS 1980 AND 1984

	1980	1984
Offensive		
Titan missiles	54	54
Minuteman missiles	1,000	1,000
Polaris submarines	10	0
Poseidon submarines	31	31
Trident submarines	0	6
B-52 bombers a/ b/	316	316
FB-111 bombers b/	60	60
KC-135 tankers b/	615	615
Defensive		
F-106 interceptors b/	183	183
F-4 interceptors b/	36	36

NOTE: The number of B-52 and FB-111 bombers and KC-135 tankers shown includes only those aircraft authorized to operational units. The actual SALT-accountable inventory is larger.

a/ Includes B-52s used as cruise missile carriers; initial operational capability of the cruise missile on the B-52 is anticipated for fiscal year 1983.

b/ Primary aircraft authorization. Total inventory will be somewhat higher, reflecting allowance for losses, etc.

the strategic bomber force and fitting more Poseidon submarines with Trident I missiles. 6/ In a somewhat longer time frame, but still several years before such systems as the MX missile could make a substantial contribution, the United States could enhance

6/ This would provide these submarines with missiles of greater range, reliability, and warhead yield.

its strategic: capabilities by accelerating both the production rate of cruise missiles and the modification rate of B-52 bombers. It could also modify the FB-111 bomber to increase its range and payload, although there is some debate about how rapidly this could be accomplished. Alternatively, it could consider production of the B-1, perhaps in a modified version designed to eliminate costly, but less necessary, features. Undertaking any of these options would increase the near-term costs of U.S. strategic force programs.

Another option open to the United States would be to deploy more than the 200 MX missiles now planned by the Air Force. If the SALT II limits were extended to the MX deployment period, this would involve retiring additional Minuteman missiles. Deploying a larger number of MX missiles might be less costly than a number of other options open to the United States. Because of the MX missile's potential ability to strike Soviet ICBM silos, a higher deployment level could be construed by the Soviets as a particularly threatening choice.

If the United States wished to increase U.S. strategic capabilities in the more distant future--that is, during the 1990s and beyond--the number of possibilities is larger and the choices less well defined, since technological change will affect the options that the United States must consider. One option that has been discussed is development of a new manned bomber to replace the B-52; limited research monies are already being devoted to this effort. Whether such a system appears attractive will depend on the degree of diversity that the United States wishes to maintain in its strategic forces, on Soviet air defense developments, and on the cost of a new aircraft.

The strategic force initiatives discussed thus far focus on offensive capabilities. It is also possible that the United States would wish to give additional attention to defensive capabilities, including enhancement of the air defense system. Such an enhancement program could be initiated in the 1980s and could include purchase of additional advanced aircraft, like the F-15, for use as interceptors. Because of the high cost to procure and maintain aircraft of this kind, a decision to upgrade the interceptor force could involve substantial additional expenditures.

While there are uncertainties associated with U.S. strategic force budgets under a SALT II agreement, one thing is clear: modernization programs now being pursued will necessitate

significantly higher expenditures on strategic forces over the next several years than was the case during the last decade. The precise magnitude of the increase will depend both on the proposals advanced by the Administration and on the decisions made by the Congress.

CHAPTER III. SOVIET STRATEGIC FORCES WITH AND WITHOUT SALT II LIMITS

There is, of course, no method by which to predict what the Soviet Union will actually do under SALT II--much less, what it would do without SALT II limits. As the earlier discussion indicated, it is difficult enough to forecast how the United States will use the latitude permitted it under the treaty. Offering such predictions for the Soviet Union would entail a knowledge of its intentions, which are unknown--and perhaps unknowable. Based on recent history, however, it is possible to estimate broad Soviet capabilities and thus what the Soviet Union has demonstrated the capacity to achieve. Demonstrated capacity--not intentions--is the focus of the analysis that follows.

Two key capabilities underpin this discussion. First, according to the public statement of the Secretary of Defense, three Soviet production lines for multiple-warhead ICBMs are in operation, and about 125 missiles are produced and deployed each year. 1/ Second, until recently, the construction rate for Soviet SSBNs (Yankees and Deltas) has averaged about six per year. 2/ If the new Soviet SSBN (the Typhoon) approximates the size of the U.S. Trident, it is reasonable to assume a construction rate of three ships per year, once production of Delta IIIs subsides.

SOVIET STRATEGIC FORCES WITH SALT II LIMITS

ICBM Forces

Under the proposed SALT II agreement, the Soviet program of replacing older single-warhead ICBMs with new missiles carrying

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1/ U.S. Department of Defense, Annual Report, Fiscal Year 1980, p. 72.

2/ See interview with Lt. Gen. George M. Seignious, II, in Benjamin F. Schemmer, "The Soviets are Tough Negotiators," Armed Forces Journal International (August 1979), p. 36.

multiple independently targetable reentry vehicles (MIRVs) would have to cease in the early 1980s when the allowable limit of 820 MIRVed ICBM launchers was reached. 3/ As of mid-1979, the Soviet Union had deployed 608 MIRVed ICBMs. 4/ With continued deployment of 125 MIRVed missiles each year, it would have 820 launchers for MIRVed ICBMs by 1982. A plausible Soviet deployment mix under this limit would give them approximately 6,000 warheads aboard their MIRVed missiles. 5/

In addition to these MIRVed ICBMs, the Soviets could also deploy up to 578 single-warhead ICBMs, if they maintained their existing force of 1,398 silo-housed missiles and used 820 of the silos for MIRVed ICBMs. To stay within the ceiling of 2,250 total strategic nuclear launchers, however, they would have to retire their force of long-range bombers and decrease their SLBM force from 950 to 850 missiles. If the Soviets elected instead to maintain (or even to increase) their SLBM force and/or to keep a bomber force, then the SALT II treaty would limit them to a significantly smaller number of single-warhead ICBMs than they now possess.

The SALT II agreement would prohibit the flight-testing of existing ICBMs with more warheads than they have carried on previous flights. One "new" ICBM, limited to 10 warheads, 6/

3/ The limit includes all missile types tested with MIRVs, even if not all were deployed in this manner. This is how "MIRVed ICBM" will be construed in the remainder of the paper. Technically, SALT II counts only "launchers," not individual missiles. This discussion will refer to missiles, ICBMs, and SLBMs interchangeably with the technically precise term "launcher."

4/ U.S. Department of State, SALT II Agreement, Selected Documents, No. 12A (June 18, 1979), p. 49.

5/ For the details of this deployment mix and the calculation of the resulting warhead estimate, see Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing; Long-Term Budgetary Implications, Budget Issue Paper for Fiscal Year 1980 (June 1979), pp. 19-20.

6/ In addition to increases in warhead loadings, changes of more than 5 percent in the length, diameter, launch weight, or

could be developed and deployed during the life of the treaty. Thus, the Soviet Union could develop a new 10-warhead ICBM to replace its existing four-warhead SS-17s and six-warhead SS-19s, thereby deploying up to 8,200 warheads on its 820 MIRVed ICBMs. This would increase the cost of the MX system to the United States, an issue addressed in Chapter IV. Choosing this option would require the Soviet Union to forego any plans it might have had to develop a "new," large single-warhead ICBM to replace its older and smaller single-warhead SS-11 ICBMs.

SLBM/SSBN Forces

Current Soviet ballistic missile submarine forces reflect the impact of the SALT I Interim Offensive Agreement of 1972, which limited them to 62 SSBNs and 950 SLBM launchers (see Table 4).

Two aspects of SALT II will potentially affect Soviet SSBN forces: first, the limit of 2,250 strategic nuclear launchers of all types; and second, the limit of 1,200 MIRVed ICBM and SLBM launchers. The effect of these two constraints on the Soviet SLBM force structure will depend on decisions regarding their ICBM and bomber forces. CBO has assumed that the Soviet Union would deploy 820 MIRVed ICBMs--the sublimit established by the treaty—since it insisted on a higher ICBM limit than proposed by the United States during the SALT negotiations. This would constrain Soviet MIRVed SLBM launchers to 380. The size of their non-MIRVed submarine force would depend on the number of bombers and single-warhead ICBMs they choose to retain. If the Soviets keep approximately 360 non-MIRVed ICBMs, as one noted analyst expects, 7/ they could deploy 600 to 690 non-MIRVed SLBM launchers, depending on the number of heavy bombers they choose to retain in active service.

The second column in Table 4 suggests a possible missile and submarine force structure consistent with these assumptions

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throw weight of an ICBM would make it a "new" missile, as would any change in the number of missile stages or the type of propellant. See SALT II Agreement, Document 12A, p. 16.

7/ See testimony of Hon. Paul Nitze, in The SALT II Treaty, Hearings before the Senate Committee on Foreign Relations, 96:1 (July 1979), Part 1, pp. 469-72.

TABLE 4. POSSIBLE SOVIET SSBN FORCE DEVELOPMENTS WITH AND WITHOUT SALT II CONSTRAINTS

	1979 a/ (Actual)	SALT Constrained 1985 (Possible)	No SALT 1985 (Possible)
Submarines b/			
Yankee Class	33	22	33
Delta I and II Classes	20	20	20
Delta III Class	9	12	12
Typhoon Class	—	9	14
Total	62	63	79
Launchers			
Non-MIRVed			
SS-N-6	512	352	512
SS-NX-17	12	12	12
SS-N-8	260	260	—
MIRVed c/			
SS-N-18	144	192	452
SS-N-XX	—	180	280
Total	928	996	1,256
Warheads			
Non-MIRVed	784	624	524
MIRVed	1,008	3,864	7,084
Total	1,792	4,488	7,608

a/ At the time of the SALT II signing. The Soviet Union also has a small number of older Golf- and Hotel-class SSBNs and their respective missiles, which would bring the SLBM total to 950. These submarines are not included here, since they are expected to be decommissioned during the tenure of the treaty.

b/ Yankee-class submarines have 16 SS-N-6 missiles; Delta Is and Us have 12 and 16 SS-N-8 missiles, respectively; Delta IIIs have 16 SS-N-18 missiles; and the Typhoon is expected to have 20 missiles comparable to a Trident II, designated provisionally the SS-N-XX.

c/ The SS-N-18 has been tested with seven warheads. It has been assumed that a Typhoon missile will be comparable to a Trident II missile, carrying 14 warheads, the maximum allowed under SALT II.

regarding SALT II constraints. There are three areas of uncertainty. The first concerns the introduction of the new Typhoon-class submarine with a new MIRVed missile. To exploit the MIRVed SLBM limit, the Soviet Union could introduce nine Typhoon-class submarines into the force by 1985 without having to decommission any Delta III submarines. 8/ Soviet construction facilities could produce that number of submarines, and there is limited evidence to suggest that production of them may have already begun. The force structure presented in Table 4 therefore assumes Soviet deployment of nine Typhoon-class submarines 9/ and decommissioning or conversion of approximately 11 Yankee-class boats.

The second area of uncertainty concerns Soviet plans for MIRVing SLBM warheads. The SS-N-18 has been tested with seven warheads, though reports indicate that it is currently being deployed with only three. 10/ Similarly, the new Typhoon missile could be deployed with up to 14 warheads under the terms of SALT II, though it quite possibly might be armed with fewer. If the SS-N-18 is loaded with three warheads instead of seven, the SALT-limited total inventory in 1985 would be 3,720 instead of the potential of 4,488 shown in Table 4. Warhead inventories in a no-SALT case could be 5,800 instead of a possible 7,608.

Third, while undoubtedly the Typhoon will ultimately be fitted with a new, larger missile, it is entirely possible that the Soviet Union could choose initially to deploy the SS-N-18 in the new submarine and only later install a larger SS-N-XX. This would parallel current U.S. plans regarding its Trident program.

8/ Ibid., p. 471. Nitze believes that the Soviet Union will build a total of nine Typhoon submarines.

9/ Alternatively, the Soviets could choose to reach the 380 MIRV limit by building more Delta-class submarines and installing MIRVed missiles in the Delta I and II boats. Since the SS-N-18 is already fitted to the Delta III, placing it in Delta I and II missile tubes would not involve lengthy reworking. It is reasonable to assume that Soviet planners would prefer to install a new MIRVed system in a new class of submarine rather than in Delta boats, which are of 20-year-old design.

10/ U.S. Department of Defense, Annual Report. Fiscal Year 1980. p. 72.

Such a program is plausible, since there is no evidence to date that the Soviet Union has tested a new missile like the SS-N-XX. Moreover, initial deployment of the SS-N-18 in the Typhoon could potentially ease possible warhead production constraints in the Soviet Union. Should the Typhoon be fitted with the three-warhead SS-N-18, warhead inventories in a SALT-constrained world would total only 1,740, and only 2,720 in a no-SALT situation.

If SALT II MIRV limits were continued beyond 1985, further additions of Typhoon-class submarines would require early retirement of Delta III ships, which would then have been in service for a relatively short time. While it would not be characteristic of Soviet submarine-building practices to terminate a major class like the Typhoon after producing only nine boats, it would be equally uncharacteristic to retire a major system like the Delta III so early in its service life. Delaying deployment of the Typhoon until the late 1980s, when Delta III boats would have had a longer service life, would resolve this dilemma. 11/ Clearly, SALT II limits impose some potentially painful decisions on the Soviet Union regarding SLBM force modernization.

SOVIET STRATEGIC FORCES WITHOUT SALT II LIMITS

ICBM Forces

The Soviet Union could expand its strategic forces beyond SALT II limits simply by continuing existing programs at current rates and expenditure levels. Whether it would actually wish to continue the present level of spending on strategic offensive forces, or even increase that level, will depend on the domestic and international political context and on relative priorities for funds. Overall Soviet defense expenditures are believed to have grown 4 to 5 percent a year in real terms for the last decade. At least until recently, this was approximately equal to the rate of growth of the Soviet economy as a whole, thus maintaining defense expenditures at perhaps 11 to 13 percent

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11/ The "dilemma" could also be a creation of faulty assumptions, since no Typhoon has yet been deployed. Without actual observations of the deployment rate, it is difficult to forecast the timing of this program.

of Soviet GNP. 12/ With the projected slowdown in Soviet economic growth in the 1980s, however, there has been some debate over whether the Soviet Union will maintain the present rate of increase in defense spending. 13/

Even with increased defense spending, the Soviet government might have higher priorities than strategic offensive forces. Among the other needs that might compete for funding are a new air defense system to counter the U.S. cruise missile and further investment in antisubmarine warfare forces to deal with U.S. SSBNs. And Soviet planners might wish to increase further the already high rate of buildup of their conventional forces.

Should the Soviet Union continue to expand its strategic offensive forces at current rates, however, it could either deploy additional MIRVed ICBMs or put a larger number of smaller warheads aboard the missiles now deployed ("fractionation"). Without the SALT II limit of 820 MIRVed ICBMs, the Soviets could deploy MIRVed ICBMs in all of their existing 1,398 silos by 1987, simply by continuing to produce and deploy 125 missiles each year. Even if they did not fractionate the payloads on these missiles, they could thus deploy more than 9,000 warheads on their MIRVed ICBMs, versus the approximately 6,000 to which they would be constrained by the SALT II limit of 820 MIRVed ICBMs, assuming a "new" 10-warhead missile is not developed. 14/

12/ See, for example, Andrew Marshall, "Sources of Soviet Power: The Military Potential in the 1980s," Prospects of Soviet Power in the 1980s, Part II, Adelphi Papers #152 (London: The International Institute for Strategic Studies, Summer 1979), p. 11.

13/ Marshall suggests they will maintain the present rate of increase and speculates that--with correction for possible underestimation of the Soviet defense effort--Soviet defense expenditures could reach 20 percent of GNP by the late 1980s (Ibid.). His views are of some interest, since he serves as Director of Net Assessment for the U.S. Department of Defense.

14/ These cases are discussed at greater length in Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing; Long-Term Budgetary Implications, pp. 48-50, 131-32.

Alternatively, if--in the absence of the SALT II fractionation limit--the Soviet Union decided to deploy a larger number of smaller warheads on its MIRVed ICBMs, it could conceivably achieve close to 15,000 200-kiloton warheads in its MIRVed ICBM inventory, even confining itself to only 820 MIRVed ICBMs. (As the 15,000 figure was approached, of course, the size of these warheads would be considerably smaller than present Soviet weapons.) 15/

Either of these developments--and especially the two together--would pose a substantial threat to the survivability of the MX missile system. Responding to this enhanced threat would add significantly to the cost of MX, as discussed in Chapter IV.

SLBM/SSBN Forces

The earlier discussion of SALT-constrained SLBM forces indicated that there are several uncertainties about force structure developments even in that relatively definite case. Far greater uncertainties surround estimates of Soviet SSBN forces in a no-SALT world.

Should the SALT II treaty not be ratified and the Soviet Union choose to expand its SSBN capabilities, three options are immediately available:

- o Retain Yankee-class submarines that might otherwise be retired from the SSBN fleet under the terms of SALT II;
- o Continue production of Delta III submarines or accelerate production of Typhoons;
- o Replace the SS-N-8 with MIRVed SS-N-18s in Delta I and II submarines.

The third column in Table 4 presents possible Soviet force inventories in 1985 assuming these programs were pursued without SALT II limits and at rates consistent with past levels of

15/ Ibid.

effort. 16/ The large increase in warhead inventories results principally from increased deployment of MIRVed missiles on the new Typhoon-class submarine and from replacement of SS-N-8 missiles with the SS-N-18 in Delta *I* and II SSBNs. It is important to emphasize that these production rates are potentially attainable with existing facilities and would not require significant net capital investment on the part of the Soviet Union.

Such a large buildup would represent a significant expansion of the Soviet SSBN fleet. This, in turn, would require increased manning in SSBN forces and expanded support facilities. It might also require additional investments in warhead and fissionable material production facilities. Although there is no way to predict that the Soviet Union would actually seek to achieve the SSBN force levels displayed in Table 4, these levels appear within its means and could pose a somewhat greater threat to the ability of U.S. bombers and cruise missile carriers to escape safely from their bases in the event of an attack. This issue is discussed at greater length in Chapter IV.

16/ Because of substantial MIRVing, the warhead production assumed in the force inventories presented in Table 4 may not be consistent with previous levels of effort. The Soviet Union might have to invest additional capital resources in warhead production facilities to meet these rates.

CHAPTER IV. IMPLICATIONS OF POTENTIAL SOVIET DEVELOPMENTS FOR U.S. STRATEGIC FORCES

If the Soviet Union were not constrained by SALT II limits and chose to expand its strategic offensive forces, the United States would be faced with decisions regarding both the extent and nature of a response. If "essential equivalence" were emphasized, the United States would pursue one set of programs--presumably, stressing numbers of launchers and weapons. If ensuring the survivability of a certain level of U.S. strategic forces were emphasized, the United States might pursue a somewhat different set of programs--for example, constructing additional shelters for the MX missile system. At very high levels of Soviet buildup, the United States might be compelled to pursue entirely new directions for its strategic deterrent, resulting in a radically different force structure from that now contemplated. The costs of the U.S. response would depend, therefore, not only on the extent of the Soviet threat, but also on the nature of the U.S. strategy. Given these broad uncertainties, it is difficult to assign any particular figure to the total cost of U.S. strategic forces in the absence of SALT II.

As the earlier discussion suggests, however, Soviet compliance with the SALT II limits would enhance the survivability of the MX missile. The limits might also assist those U.S. strategic forces that depend on aircraft for weapons delivery to escape safely from their bases in the event of an attack. The relationship of SALT II limits to the security of these two legs of the U.S. strategic triad is the subject of this chapter. 1/

1/ Because SALT II does not deal with antisubmarine warfare issues, future U.S. SSBN vulnerability is not discussed here. Some observers have speculated whether high levels of Soviet buildup might permit the Soviet Union to launch a pattern attack against U.S. SSBN operating areas, thus neutralizing the U.S. SSBN force. Evaluation of this possibility is beyond the scope of this paper.

MX COSTS AND THE SIZE OF THE SOVIET ICBM FORCE 2/

The size of the Soviet missile force and SALT II limits on that force directly affect the required size and cost of the MX missile system that the United States would have to deploy to maintain a given level of survivable forces. This reflects the mechanism by which the MX missile would achieve survivability against a preemptive Soviet attack. If deployed in a multiple protective structure (MPS) basing mode, MX would achieve survivability by having more protective structures in which it could be hidden than the Soviets could destroy. For example, if the United States wanted one-half of its deployed MX missiles to survive an attack, it would need twice as many shelters as the Soviets could destroy.

Not every shelter would actually contain a missile, of course. Rather, the MX missiles would move periodically among the shelters on a random basis. The MPS basing system would enhance MX survivability both by increasing the number of targets that Soviet missiles would have to attack and by keeping secret the exact location of the MX missiles among the many possible shelters.

The President's proposal for the MPS basing system includes the capability to reshuffle the location of MX missiles in half a day and, if necessary at high stages of alert, to have the missiles constantly on the move, ready to dash to a shelter on warning. This would help protect the system against any Soviet development that allowed them to spot which shelters actually contain missiles. Neither the "rapid reshuffle" nor the "dash" capability, however, changes the basic relationship between Soviet force size and MX survivability: The United States must still have proportionately more shelters than Soviet warheads can destroy for any given fraction of its MX missiles to survive a preemptive attack.

2/ For a more detailed discussion of this issue, see Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing; Long-Term Budgetary Implications, Budget Issue Paper for Fiscal Year 1980 (June 1979). This section updates the findings of that report to take into account new cost factors for the latest ("racetrack") version of the multiple protective basing system concept.

The Soviet missile force of concern is the MIRVed ICBM force--in particular, the ICBM force that will be deployed in the 1990s. 3/ Only Soviet ICBMs have sufficient accuracy, warhead yield, and numbers to threaten the large number of hardened shelters that the United States plans to construct. 4/ Changes to the Soviet ICBM force will directly affect the size of the U.S. MPS basing system and the cost of deploying the MX missile.

Thus, CBO's analysis concentrates on the Soviet MIRVed ICBM force. It was earlier estimated (p. 14) that the Soviet Union could deploy approximately 6,000 warheads in its MIRVed ICBM force yet remain within SALT II limits. Assuming that these limits covered the period of MX deployment, Table 5 shows the cost of developing and deploying MX, plus the first twelve and a half years of operating costs. 5/ Table 5 presumes that the United States would want 1,000 warheads to survive a Soviet preemptive attack.

3/ Single-warhead ICBMs would be less effective in an attack on the widely scattered shelters in an MPS basing complex than would MIRVed missiles, each of which could potentially destroy several U.S. shelters. It is therefore assumed that Soviet single-warhead ICBMs would either be withheld from an attack to serve as a reserve force or be targeted on other U.S. military targets, including air bases, underground Minuteman launch control centers, or other command and control facilities.

4/ At some point in the future, Soviet SLBMs might also pose a threat to MX survivability, but too little information is available to permit any discussion of that issue in this paper.

5/ A variety of other assumptions about the characteristics of Soviet and U.S. forces underlies the cost calculations presented here. These assumptions are discussed in greater detail in Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing: Long-Term Budgetary Implications, Chapters II and III. This paper updates the cost estimates on p. 47 of that report, to take account of the new "racetrack" variant of the MPS basing system and more up-to-date estimates of the rate of inflation. CBO's assump-

TABLE 5. IMPACT OF CHANGES IN THE NUMBER OF SOVIET WARHEADS ON THE COSTS OF A U.S. RACETRACK/HORIZONTAL SHELTER BASING SYSTEM WITH MX MISSILES, POST-1990 PERIOD: IN BILLIONS OF FISCAL YEAR 1980 DOLLARS

Soviet Threat	Number of Soviet Warheads	Number of Horizontal Shelters	Number of U.S. MX Missiles	U.S. MPS System Cost (1,000 Surviving Warheads)	Increase Over Cost of "No-Response" Base Case
SALT II-Limited Cases (820 MIRVed ICBMs)					
"No-Response" base case a/	5,928	5,828	275	45.6	--
New 10-warhead missile b/	8,200	8,241	325	55.0	9
Cases Without SALT II Limits					
1,398 MIRVed ICBMs, existing payloads c/	9,100	9,159	350	58.9	13
820 MIRVed ICBMs, fractionation d/	15,000	15,120	400	74.8	29
1,398 MIRVed ICBMs, fractionation e/	23,000	23,485	450	100.7	55
Cases Involving Further (SALT III) Reductions (550 MIRVed ICBMs)					
Existing payloads f/	3,900	3,421	225	35.9	-10
New 10-warhead missile g/	5,500	5,246	275	43.6	-- 2

NOTE: The table assumes U.S. deployment of a racetrack/horizontal shelter basing system. All of the Soviet warheads shown in this table would not be used to attack a U.S. MPS basing system. Many would be used to attack fixed-base U.S. MInuteman and Titan missile silos. Moreover, it is assumed that only 85 percent of the Soviet missiles used to attack a U.S. MPS basing complex would be reliable. The number of shelters and MX missiles shown for each case represents the combination that would minimize the cost of an MPS basing system designed to provide 1,000 surviving warheads. The cost estimates were derived from the MX Cost Effectiveness Model developed by the Space and Missile Systems Organization of the U.S. Department of the Air Force.

a/ Assumes SALT II limit of 820 MIRVed ICBMs and no increase in the number of warheads carried on each missile.

b/ Assumes SALT II limit of 820 MIRVed ICBMs and deployment of a new 10-warhead missile to replace SS-17 and SS-19 ICBMs.

c/ Assumes 1,400 MIRVed ICBMs and no increase in the number of warheads carried on each missile.

d/ Assumes SALT II limit of 820 MIRVed ICBMs and conversion of all missiles to carry larger numbers of 200-kiloton warheads.

e/ Assumes 1,400 MIRVed ICBMs and conversion of all missiles to carry larger numbers of 200-kiloton warheads.

f/ Assumes future SALT limit of 550 MIRVed ICBMs and no increase in the number of warheads carried on each missile.

g/ Assumes future SALT limits of 550 MIRVed ICBMs and deployment of a new 10-warhead missile to replace SS-17 and SS-19 ICBMs.

If the Soviets chose to exercise their SALT II option to build a "new" ICBM, and if that ICBM exploited the SALT II fractionation maximum, they would be able to deploy 8,200 warheads on their MIRVed ICBMs. While it is by no means certain that the Soviet Union would use its option in this manner, a decision to deploy such a "new" ICBM could raise the cost of a U.S. MX system that provides 1,000 surviving warheads to $55.0 billion, $9.4 billion above the cost of the "no-response" base case.

Without SALT II, the Soviet Union could deploy more than 820 MIRVed ICBMs and/or it could fractionate the payloads aboard existing ICBMs. It was earlier estimated (p. 19) that by 1987 the Soviets could easily achieve a 9,000-warhead level by taking the former course of action. If, instead, they chose to fractionate, they could deploy as many as 15,000 200-kiloton warheads --albeit much smaller warheads than their missiles now carry--even without building beyond 820 MIRVed ICBMs. Either choice would significantly increase the cost of a survivable U.S. MX missile system (see Table 5).

Thus, both the MIRVed ICBM limit and the fractionation constraint in SALT II have important implications for the U.S. MX system. Without the kind of limits imposed by SALT II, of course, the Soviet Union could increase the number of MIRVed ICBMs and fractionate the payloads of existing ICBMs. While Table 5 presents cost estimates for an MX system -that responds to such a high Soviet buildup ("1,398 MIRVed ICBMs, fractionation"), the cost of responding to this high threat could lead the United States to choose a course of action that involves something other than simply adding shelters and missiles.

To counter such a high threat, the United States could consider a preferential ballistic missile defense system for the MX. 6/ In this approach, the United States would defend only

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tions for the MX system differ somewhat from those of the Department of Defense, with a consequent effect on any comparison of CBO's "base case" cost estimate with the Defense Department's proposal. It should also be noted that press reports of the President's recent decision on MX did not include operating costs, which are included here.

6/ Department of Defense Authorization for Appropriations for Fiscal Year 1980, Hearings before the Senate Committee on

those shelters that actually contained MX missiles. The ballistic missile defense system would probably have to be mobile, however, or it would also become an easy target for Soviet warheads. While this approach has great theoretical leverage in defending an MX/MPS missile field, the requirement for mobility--together with the likely number of launchers needed--would compel the United States to abrogate or renegotiate the permanent ABM treaty, a potentially destabilizing step.

At some point, the United States might decide that further investment in either expanding its MX system or pursuing an active defense was less attractive in responding to a Soviet MIRVed ICBM buildup than strengthening other elements in the triad of strategic forces. This would not necessarily imply abandonment of MX. Quite the contrary: MX missiles deployed in a multiple protective structure basing system would still require the Soviet Union to use up large numbers of warheads should it contemplate any kind of disarming strike against U.S. strategic forces.

Which course the United States actually selected would depend, among other factors, on the costs of the competing alternatives. The cost estimates in Table 5 are helpful in suggesting the approximate magnitude of the requirements the United States would face if it took one course of action in responding to a Soviet buildup.

The United States does not, of course, intend to deploy MX until after 1985, when the SALT II treaty will have expired. Thus, the gains to MX survivability described here depend critically on the extension of SALT II-type limits into the 1990s, when the MX will be fully operational.

Even if the limits did expire at the end of 1985, they would still provide some advantages to MX. During its life, the treaty limits the number of "new" missiles that the Soviet Union can develop and the number of warheads that can be tested on new and existing ICBMs. Without such limits, the Soviet Union might be in a position to test missiles in the early 1980s that would threaten

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Armed Services, 96:1 (March and April 1979), pp. 3257 ff. The point at which the United States might consider such an approach would depend, among other factors, on estimated costs. At the present time, estimated costs for a preferential ballistic missile defense system are highly speculative.

MX when it is deployed. With the SALT II constraints, such developments would be somewhat delayed.

Moreover, as noted earlier, at the current rate of 125 MIRVed ICBMs deployed each year, the Soviet Union could surpass the SALT II ceiling on this type of weapon in 1982. At the very least, SALT II temporarily holds the Soviets below what they have demonstrated they could otherwise achieve.

Finally, without the SALT II accord, Soviet planners would be free to conceal their strategic force testing and deployment actions. The uncertainty for U.S. planning generated by such a Soviet step might compel building more "insurance" against worst-case Soviet ICBM deployment developments into any MPS basing system, thus substantially increasing its cost.

The results of this analysis highlight the important relationship between the costs to the United States of a survivable ICBM system and the size of the Soviet MIRVed ICBM force. It thus underlines the gains from further constraints on that force and future reductions in it. The SALT limits proposed by the Carter Administration in March of 1977 provide one example of how cuts in arms ceilings could actually reduce the cost of a U.S. MPS basing system. Under this proposal, the Soviet MIRVed ICBM force might contain as few as 3,900 warheads. Were that the case, the cost of a U.S. MX/MPS system would drop to $35.9 billion (see Table 5). 7/

SALT II AND THE SURVIVABILITY OF U.S. AIRBORNE STRATEGIC FORCES

The previous discussion demonstrated that limiting Soviet ICBM forces directly affects the cost of the MX missile system. The potential effect of SALT II limits on the survivability of U.S. bombers and cruise missile carriers is more difficult to determine. Nonetheless, a qualitative evaluation is possible.

Because of an SLBM's short flight time, a Soviet SLBM attack traditionally has been considered the most serious threat to U.S. bomber forces. If this is true, SALT II would most directly

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7/ For a discussion of the assumptions behind this calculation, see Congressional Budget Office, The MX Missile and Multiple Protective Structure Basing; Long-Term Budgetary Implications, pp. 50-51, 134-35.

affect the survival prospects of U.S. airborne strategic forces in the ways it affects Soviet ballistic missile submarines.

Recent Congressional testimony indicates that Soviet SLBMs could reach inland U.S. bomber bases within 12 minutes, and potentially in as few as 7 or 8 minutes should the Soviets develop the capacity to fly SLBMs at "depressed" trajectories. 8/ Within that very limited time, U.S. forces would have to detect the attack, signal those bomber crews assigned to alert aircraft, 9/ and take off and fly to safe distances so as to escape the effects of nearby nuclear detonations.

8/ Depressed trajectories require powered flight through most of the missile flight pattern and, as such, require a good deal more energy, which, given fixed fuel reserves, limits the ranges of existing missiles. Congressional witnesses have testified that depressed trajectories pose no technically difficult problems. Depressed trajectories would appear to be an advantageous application of SLBM resources by Soviet planners. The Soviet Union has never tested depressed trajectories, however. This might indicate that it does not intend to launch SLBM attacks primarily at bombers. This view is reinforced by the enormous Soviet commitment to air defense systems, which would be less necessary--under some scenarios--were the Soviet Union planning to destroy U.S. bomber forces with preemptive SLBM attacks. While there is no evidence that the Soviet Union plans to use depressed trajectories, the destructive potential of such a capability means that it must be considered in minimizing the vulnerability of U.S. airborne strategic forces.

9/ In the 1950s and early 1960s, the United States kept B-52s in "airborne alert." At any time a fraction of the bomber force was armed and flying, awaiting notice of an attack and orders to commence a retaliatory strike on the Soviet Union. Airborne alert proved expensive and politically awkward, especially subsequent to the crash of several aircraft. As a day-to-day policy, airborne alert has been cancelled, and armed B-52 aircraft are now kept on "strip alert." Approximately 30 percent of the total fleet of operational aircraft is armed, fueled, and located at special facilities near the end of runways, awaiting notice to take off.

Several factors would affect the survival rate of U.S. alert bomber aircraft. One such factor is the number and size of attacking warheads. This is the primary area in which SALT II affects bomber survivability. But of greater significance is the speed with which warheads can be delivered against U.S. targets. Soviet planners could reduce this time by altering the trajectory of their missiles or by bringing their submarines closer to the U.S. coastline. These possible actions are not constrained by SALT II.

The Air Force in turn has several means available for maintaining bomber survivability in the face of an increased Soviet threat. It could increase readiness levels of aircraft and air crews when indications of possible attack were received (even to the point where planes with engines running were placed at the end of the runway). With more time, the Strategic Air Command could disperse aircraft to additional bases, increasing the number of target areas that Soviet submarines would have to hit. Longer-term solutions might include procuring new "harder" aircraft, 10/ improving the take-off performance and hardness of existing bombers, as well as providing new bases in the central United States to give the bomber force maximum escape time. The costs associated with any of these longer-term solutions cannot be estimated at this time but clearly would be substantial. If Soviet technicians began testing "depressed" trajectories or altering submarine deployment patterns--with or without SALT constraints--expensive long-term solutions would be unavoidable.

10/ Aircraft are susceptible to most of the immediate effects of nuclear weapons--heat, immediate radiation and blast effects. Some aircraft, because of their design and construction, are "harder" than other aircraft. For example, the B-1 was designed as a harder aircraft than the existing B-52.

CHAPTER V. CONCLUSIONS

Even within the limits of the SALT II agreement, the precise course of U.S. and Soviet strategic force structure developments is not yet completely determined. It is clear, however, that if the United States pursues the programs now seriously contemplated, the result will be a substantial investment in new strategic capabilities. A good part of that investment, of course, is designed to replace existing systems.

It is hazardous to forecast the development of U.S. and Soviet strategic forces were the SALT II agreement to be rejected. This paper has emphasized steps that the Soviet Union has already demonstrated the capacity to undertake. How it would actually choose to proceed is unknown, and probably unknowable. For this reason, it would be inadvisable to attempt to forecast how the United States might or should proceed in the event of rejection, or how much it would "cost" the United States to reject the treaty.

It is clear, however, that the SALT II agreement--and, especially, the extension of SALT II-type limits into the 1990s--could enhance the survivability of the planned U.S. ICBM force. The agreement also might add somewhat to the ability of the U.S. bomber force to escape safely from its bases in the event of an attack. For the ICBM force, the survivability gain can be measured in dollar terms--the costs avoided by not having to overcome the effects of additional Soviet warheads. At very high levels of Soviet buildup, of course, such cost estimates may be a poor measure of the nature of the U.S. problem. Were rejection of SALT II to result in a very rapid Soviet buildup, the United States might be compelled to undertake a fundamental rethinking of its strategic force posture, resulting in a very different force mix from that now planned.

As noted earlier, many of these gains from SALT II limits will come only if the limits are extended into the deployment period for MX, illustrating the potential importance of SALT III. Even SALT II, however, delays certain developments that the Soviet Union has demonstrated the capacity to undertake--developments that would be threatening to the U.S. strategic modernization

program. Thus, the important "savings" from SALT II are best measured not in dollar terms, but in the added security that such limits provide to the modernization of the strategic deterrent force.

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