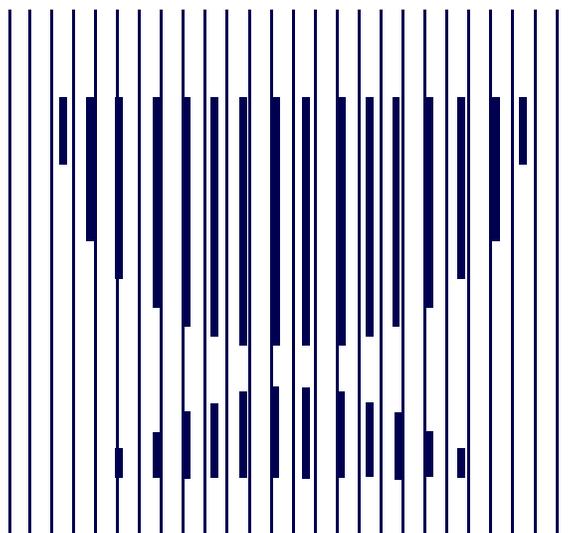




CBO MEMORANDUM

THE COSTS OF THE ADMINISTRATION'S
PLAN FOR THE NAVY THROUGH
THE YEAR 2010

November 1994



CONGRESSIONAL BUDGET OFFICE



CBO

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CONGRESSIONAL BUDGET OFFICE
SECOND AND D STREETS, S.W.
WASHINGTON, D.C. 20515



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NOTE

Unless otherwise noted, all costs in this memorandum are expressed in constant 1995 dollars of budget authority and include funding for both the Navy and the Marine Corps.



This memorandum on the long-term costs of naval forces was prepared by the Congressional Budget Office in response to a request from the Chairman of the House Committee on Armed Services. The memorandum is an update of a similar analysis completed in December 1991.

Ivan Eland prepared this memorandum under the general supervision of Neil Singer and R. William Thomas. Lane V. Pierrot reviewed parts of the paper covering tactical aviation. William P. Myers provided data on the costs of aircraft carriers and air wings. Victoria Fraider reviewed the Navy's estimates of aircraft unit costs. Shaun Black provided data on the aging of Navy aircraft. Sherwood Kohn edited and Christian Spoor proofread the manuscript. Judith Cromwell prepared it for publication.

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INTRODUCTION AND SUMMARY

In response to threats posed by the former Soviet Union, the Reagan Administration advocated building a 600-ship navy. But the Navy never achieved that level. In fact, the fleet never exceeded 570 ships.

As the Soviet threat declined, the Bush Administration proposed a fleet of 450 ships, including 13 aircraft carriers (12 active and one for training). The Clinton Administration has proposed reducing the fleet to about 330 ships by 1999, including 12 aircraft carriers (11 active and one in reserve that can be used for training), 120 to 126 active and reserve surface warships, 45 to 55 attack submarines, about 40 amphibious ships, and 14 ballistic missile submarines.

Although the size of the fleet is declining, the Navy is still developing expensive new ships and aircraft that it will begin purchasing in the late 1990s and the next decade. The Navy will develop a new attack submarine, to be purchased in fairly low numbers beginning around the turn of the century, and a new surface combat ship (SC-21), which would be procured in moderate quantities starting in the middle of the next decade. During the next decade, to maintain an aircraft carrier force of 12 ships, the Navy will purchase a new carrier every four years, beginning in 2002. The Navy and Marine Corps will modernize their aircraft fleet, buying the F/A-18E/F and V-22 aircraft beginning in the late 1990s and a medium-attack aircraft emanating from the Joint Attack Strike Technology (JAST) program late in the next decade. These expensive new weapons will have to be financed out of budgets that will probably be considerably smaller than those of the 1980s.

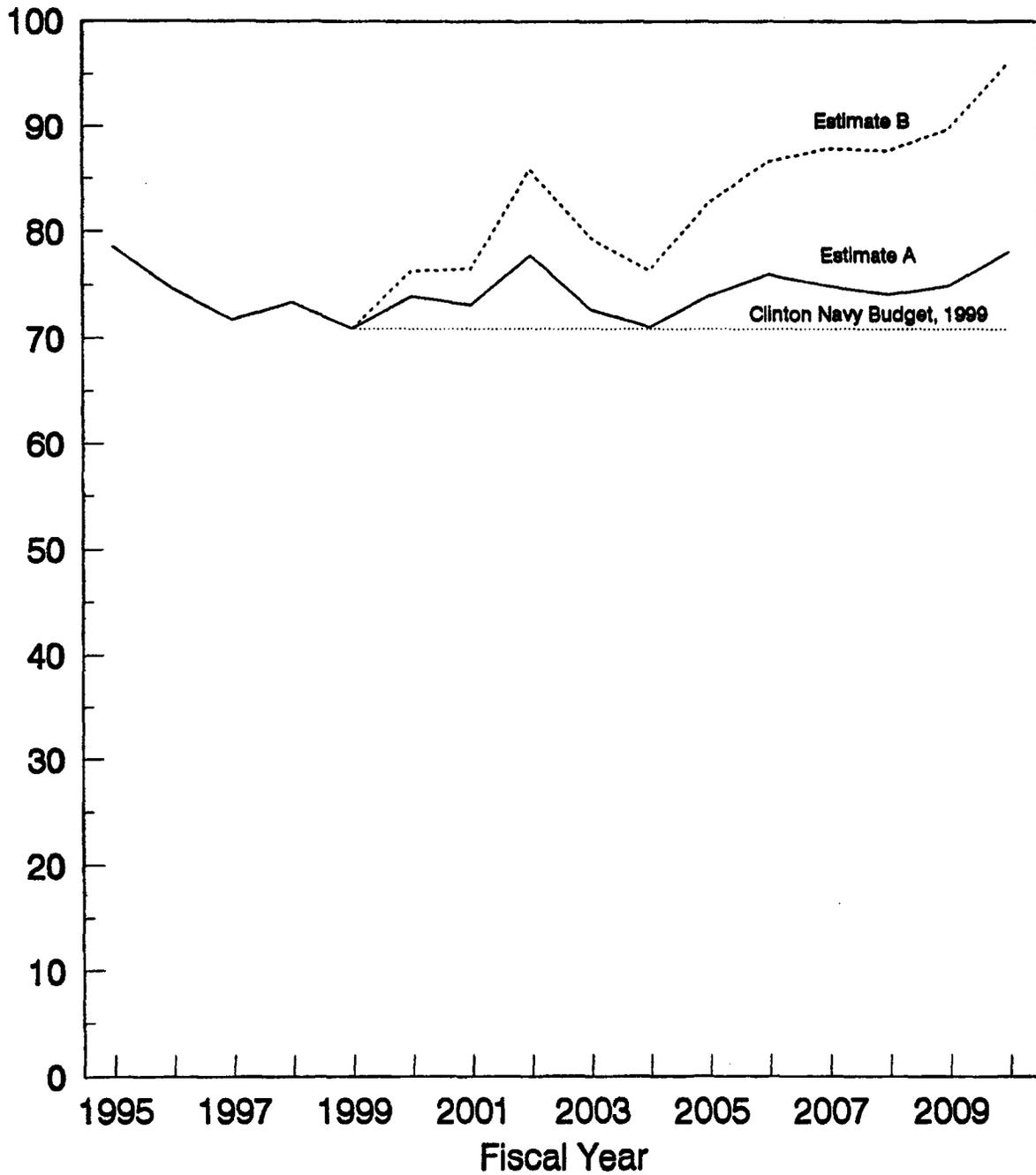
Will sufficient funds be available to pay for the new weapons and adequately support smaller, but still substantial, naval forces? The Congressional Budget Office (CBO) has examined the affordability of the Navy's program in the next decade, when the service's large bills will come due. CBO's estimate of costs in the 2000-2010 period are based on the Administration's Future Years Defense Program (FYDP) from 1995 to 1999 and informal Navy projections of quantities and costs of weapons purchased during the next decade. The Administration's program could change because projected costs prove higher than anticipated, offsetting savings are found, or programs are deferred. If the program changes, CBO's analysis of the post-FYDP period would also change.

Plan for a 330-Ship Navy May Create Budget Problems

Given the Department of the Navy's plans for acquisition and force structure, CBO estimates that its budget must average between \$75 billion and \$84 billion a year from 2000 to 2010 (see Figure 1).

FIGURE 1. NAVY FUNDING REQUIREMENTS COMPARED WITH CLINTON NAVY BUDGET FOR 1999

Billions of 1995 Dollars



SOURCE: Congressional Budget Office.

CBO estimates that during the next decade, the plan for a 330-ship Navy would cost between \$4 billion and \$13 billion more than the \$71 billion projected for the Department of the Navy's budget for fiscal year 1999 contained in the Administration's current defense plan. (Throughout this analysis, CBO assumes that the Navy will continue to receive this amount each year during the 2000-2010 period.)

CBO's current estimate of the Department of the Navy's budget, however, provides a much more optimistic outlook than its projections of December 1991. That earlier analysis, which was based on Navy planning during the Bush Administration, anticipated shortfalls in funding averaging from 10 percent to 23 percent (\$9 billion to \$26 billion) during the 2000-2010 period. CBO now estimates the gap for the Navy under the Clinton Administration at only 5 percent to 15 percent.

Further Budget Cuts Could Make Things Worse

Although they reduce the deficit, the fiscal proposals offered by the Clinton Administration would not fully resolve the nation's long-term deficit problem.¹ If there is another round of budget cuts, including further reductions in defense funding, the pressure on the Navy to economize could be even more severe. If, for example, during the next decade the Navy receives its current share of a national defense budget of \$200 billion, Navy funding would total about \$60 billion a year. That level of funding would make it even more difficult to finance the plan for 330 ships.

THE NAVY'S PLAN FOR A 330-SHIP FLEET

Three key factors influence the long-term costs of the Navy: numbers of forces (ships and aircraft), plans for modernizing the forces with new weapons, and the expected cost of those weapon systems.

Numbers of Forces

The Clinton Administration's 1995 defense program would reduce the number of Navy battle force ships from 387 in 1994 to about 330 in 1999. The force would include 11 active aircraft carriers and one reserve carrier that would also be used for training, as well as 10 active air wings and one in reserve.

1. Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1995-1999* (January 1994), p. 29.

The 330-ship fleet would also include 120 to 126 active and reserve surface combatants (warships), 45 to 55 attack submarines, about 40 amphibious ships, and 14 ballistic missile submarines. CBO assumed, as did the Navy in its informal analysis, that these approximate force goals would not change much through the year 2010. To reach these goals by 1999 and modernize the fleet by building new ships, the Navy is retiring many ships before the end of their useful lives.

Costs are also affected by the number of air wings (the groups of planes that are assigned to aircraft carriers). Under its plan, the Navy would have 11 air wings, including 10 in the active forces and one in the reserves. The composition of the air wings would change, however. The Navy would reduce the number of fighter and attack aircraft in each of the carrier-based air wings from about 60 to about 50 because of possible shortages of those aircraft.

Modernization

The Navy's long-term costs are heavily influenced by decisions about the number and type of ships and aircraft that are purchased to modernize the fleet.

Ship Procurement. Although CBO has focused on plans and costs during the next decade, it must also take into account the number of ships bought in the intervening years because those purchases influence long-term requirements. From 1995 to 1999, according to its fiscal year 1995 plan, the Navy will buy 26 new ships, an average of about five a year. These vessels consist of one aircraft carrier, one Seawolf submarine, one new attack submarine (the Seawolf's successor), 15 DDG-51 destroyers, five LPD-17 (formerly LX) amphibious assault ships, two TAGOS antisubmarine warfare ships, and one command ship.²

From 2000 to 2010, based very closely on informal Navy estimates, CBO projects that the service will build 83 ships--an average of 7.5 a year (see Table 1). These vessels would include three aircraft carriers, one every four years beginning in 2002; 15 new attack submarines, generally alternating between purchases of one and two a year; and 32 DDG-51s or its lower-cost successor, the SC-21 (the 21st-century surface combatant), at a rate of three a year. CBO also projects that the Navy will build seven LPD-17 amphibious assault ships, five LHD amphibious helicopter carriers (most of them late in the period), and 16 logistics ships. The Navy apparently has no plans to buy

2. There are some indications that the Navy might delay production of the new attack submarine and the LPD-17 amphibious ship, decreasing the number purchased during the 1995-1999 period.

TABLE 1. NUMBER OF SHIPS THAT THE NAVY WOULD PURCHASE IN THE 2000-2010 PERIOD UNDER THE PLAN FOR A 330-SHIP FLEET

Designator	Type of Ship	Number Purchased from 2000 to 2010
ADC(X)	Dry Cargo	14
AGF	Command Ship	1
AGOS	Surveillance Ship	1
AOE	Fast Combat Support	2
CVN	Aircraft Carrier	3
DDG-51/SC-21	Aegis Destroyer and Successor	32
LCC	Command Ship	1
LHD	Amphibious Assault Ship	5
LPD-17	New Amphibious Assault Ship	7
MCM	Mine Countermeasures Ship	1
MCS	Mine Countermeasures Command Ship	1
SSBN	Ballistic Missile Submarine	0
SSN	New Attack Submarine	<u>15</u>
Total		83

SOURCE: Congressional Budget Office based on informal Navy data.

ballistic missile submarines (SSBNs) during the 2000-2010 period. Navy budget projections implicitly assume that the Trident's normal 30-year service life can be extended to 40 years. The Navy will not know with certainty whether the life of the submarine can be prolonged until early in the next decade, after the service collects more data. Further reducing the need to buy new SSBNs, the recently conducted Nuclear Posture Review lowered the force goal from 18 ships to 14.

Aircraft Procurement. In its informal analysis, the Navy assumed that the following fixed-wing combat aircraft would be purchased during the 2000-2010 period: the F/A-18E/F fighter/attack aircraft, an aircraft emanating from the JAST program, and an upgraded version of the E-2C. The plan also assumed that the Marine Corps would buy the V-22 tilt-rotor aircraft to transport troops and equipment (see Table 2). Finally, it assumed the remanufacture of the SH-60 antisubmarine helicopter and a successor to the Marine AH-1 attack helicopter.

TABLE 2. NUMBER OF AIRCRAFT THAT THE NAVY EXPECTS TO PURCHASE DURING THE 2000-2010 PERIOD

Designator	Type of Aircraft	Number Purchased from 2000 to 2010
JAST	Medium Attack/Fighter	60
V-22	Tilt-Rotor Transport	182
F/A-18E/F	Fighter/Attack	612
E-2C Upgrade	Command and Control Aircraft	16
SH-60 Remanufacture	Antisubmarine Warfare Helicopter	186
AH-1 Successor	Attack Helicopter	42
T-45TS	Training	24
JPATS	Training	288
Total		1,410

SOURCE: Congressional Budget Office based on informal Navy data.

The Navy's production schedule for the F/A-18E/F, which begins procurement in 1997, projects a purchase of 36 aircraft in 2000 and increases the rate at which they are bought to 72 a year towards the end of the decade. Total purchases during the period are expected to amount to 612 aircraft. The JAST production schedule starts procurement in 2007 with six aircraft and increases purchases to 24 a year by 2010, for a total of 60. The Navy plans to buy 16 upgraded E-2Cs during the first part of the decade, continuing at the rate that was set during the 1995-1999 period--four a year. The Navy's schedule for the V-22 begins procurement in 1997 and increases production from 11 aircraft in 2000 to 20 in 2010, for a total of 182 aircraft during the period.

The Navy also plans to acquire trainer aircraft. It would complete its purchasing of T-45 trainers by buying 24 aircraft in the year 2000. It also plans to buy 288 Joint Pilot Aircraft Training System (JPATS) planes--a type of trainer to be purchased by both the Navy and Air Force--during the first half of the decade at a rate of 48 a year.

Remanufacture of the SH-60 helicopter, which would begin in 1998, would continue at a rate of 22 aircraft a year during the 2000-2007 period and end with 10 in 2008; total procurement would be 186 aircraft. The successor to the AH-1 attack helicopter would begin procurement with six aircraft in 2008 and increase to 24 in 2010, for a total of 42 aircraft during the decade.

Unit Procurement Costs

The unit (per-item) procurement costs of new weapons are another key factor that influences costs. Because unit costs are uncertain, CBO made estimates based on two assumptions. The lower estimate (estimate A) is generally based on Navy estimates of likely unit costs. Estimate A therefore assumes that the Navy establishes policies that avoid unplanned growth in the cost of weapon systems or that hold down procurement costs by designing new and cheaper weapons. (In the case of the successor to the DDG-51 destroyer--the SC-21--the Navy plans to deploy ships that are cheaper than the current version.) The higher estimate (estimate B) assumes that, consistent with past experience, unit costs for procuring ships and aircraft exceed original estimates (see the appendix).

Effects on Capability

In this memorandum, CBO has not assessed the capabilities of the Navy's plan. Although reducing the size of the fleet could make it more difficult for the Navy to keep the same peacetime presence overseas, wartime capability could remain as high or higher because many of the new ships are much more capable than the ships they will replace. The number of carrier battle groups that could be deployed would remain essentially at the 1994 level of 12, but the 330-ship plan would reduce the number of surface warships and submarines that could conduct missions independent of the battle groups.

In addition, under the Navy's plan, the average age of many of the principal ship classes in today's relatively young fleet would increase slightly. The average age of submarines would increase from 14 years in 1994 to 16 years in 2010 (expected life is 30 years), the average age of surface warships would increase from 11 to 18 years (expected life is 30 to 40 years), and the average age of carriers would increase from 21 to 23 years (expected life is roughly 50 years for many of the ships). By contrast, the average age of amphibious ships would decrease from 17 to 15 years (expected life is 35 years), as older ships are retired before the end of their service lives and significant numbers of new ships are purchased.

Under the Navy's plan, the average age of an already mature fleet of naval aircraft would increase. If the Navy retains enough aircraft to meet all of the requirements under its plan, the average age of the service's fleet of fighter and attack aircraft would rise from about 12 years today to 16 years by 2010. Compared with ships, most fighter and attack aircraft usually have a service life of only about 20 years.

Although chronological age may be a useful measure of technological obsolescence, number of flight hours is a better measure of wear and tear. By this measure, too, the Navy's fleet would be noticeably older. By 2010, assuming current rates of use, about 44 percent of all fighter and attack aircraft would have exceeded their planned service lives, measured in terms of flight hours.

The average age of aircraft other than those in the fighter and attack fleets would increase under the Navy's plan as well. For example, the average age of S-3 antisubmarine warfare aircraft (expected life of about 25 years) would approach 40 by the year 2010.

Although it would be smaller and relatively older, the fleet available under the Navy's plan may be adequate in an era when threats to the nation's security have dropped sharply. Older aircraft fleets, although technologically less sophisticated than newer fleets, may be acceptable because the regional powers that now seem most liable to be adversaries of the United States are not as likely as the former Soviet Union to have sophisticated aircraft in their inventories. In addition, most regional powers that are possible adversaries of the United States have small navies with limited offensive capability.

LONG-TERM COST OF THE NAVY'S PLAN

CBO's analysis of the long-term cost implications of the Navy's plan shows a funding shortfall during the next decade for both estimates A and B.

Funding Requirements

For the next decade, under both estimates A and B, the funding needed for a 330-ship fleet would generally be larger than what is expected to be available each year during the 2000-2010 period--that is, the funding that the Clinton Administration plans for the Navy in 1999. In the years 2000 to 2010, under the cost assumptions of estimate A, the Department of the Navy would need an average of \$75 billion a year. Under estimate B, the funding requirement would average \$84 billion a year (see Figure 1 on page 2).³

Estimate A assumes smaller unit procurement costs for new weapons, which are generally based on current Navy estimates. Estimate A also assumes that the costs of procuring items other than ships and aircraft--such as costs for supporting weapons and modifications--would return to the 1974-

3. Budget authority is for the Department of the Navy and thus includes funding for the Marine Corps.

1993 average, adjusted for changes in the size of the fleet. Also under estimate A, research and development costs would return to the average level experienced during the 1974-1993 period, adjusted for changes in the size of the force (see the appendix).

Estimate B assumes higher estimates of unit procurement costs, based on unplanned cost growth. The costs of other items are presumed to increase with the costs of buying ships and aircraft; a common pattern in the past. Estimate B assumes that funding for research and development would receive the same average share of Navy budgets that it received during the 1974-1994 period. Because all of the reductions in forces under the Navy's plan take place by 1999, both estimates A and B hold the costs of operating and supporting those forces at the 1999 level throughout the 2000-2010 period.

Total Navy costs during the next decade, however, fluctuate from year to year. In order to maintain a fleet of 12 carriers, the Navy projects that it will have to buy three during the 2000-2010 period--in 2002, 2006, and 2010. Because a carrier is so expensive (\$4.7 billion), the Navy's funding requirements would jump in those three years to an average of \$77 billion a year under estimate A and an average of \$90 billion under estimate B. By contrast, the average funding requirements for years when carriers are not purchased during the 2000-2010 period would be \$74 billion a year under estimate A and \$82 billion a year under estimate B.

Availability of Funds

Regardless of which estimate is used, there would not be enough money available to cover these projected funding requirements. If the Navy had about \$71 billion available each year during the 2000-2010 period--the amount that the Clinton Administration estimates will be available in 1999--the service would be short an average of \$4 billion a year under estimate A and \$13 billion a year under estimate B. Under estimate A, the Navy would have a 5 percent funding shortfall; under estimate B, it would have a 15 percent deficit. This shortfall could be made up, however, by increases in the Navy's share of the total defense budget.

COMPARISON WITH THE NAVY'S 1991 PLAN

The Navy's 330-ship plan appears more affordable than plans under the Bush Administration. In December 1991, CBO analyzed the long-term cost and

affordability of the Navy plan then in effect.⁴ Compared with the level of funding planned by the Bush Administration for 1997, required Navy budgets would have exceeded available funds, beginning in the late 1990s. In the 2000-2010 period, shortfalls would have averaged \$9 billion under the lower estimate and \$26 billion under the higher estimate. (For comparison, costs associated with the December 1991 analysis have been inflated to 1995 dollars of budget authority.) By contrast, today's Navy plan is about \$4 billion to \$13 billion a year short during the 2000-2010 period.

In broad terms, the Navy's requirements have become more affordable because planned cuts in forces have exceeded planned cuts in budgets. Compared with the 1991 plan, the Clinton Administration's current plan reduces the size of the fleet by 27 percent (from 450 ships to 330 ships) by 1999. (The Navy is reducing the size of the fleet by retiring ships before the end of their useful lives to make funds available to buy new ships.) By contrast, the expected level of the Navy's long-term budget has fallen by only 19 percent (from \$88 billion to \$71 billion).

More specifically, affordability has improved because, at least through 2010, the smaller fleet under the Navy's plan would sharply reduce the need for new ships. In one major category of vessels--submarines--the projected purchases would decline significantly. In its 1991 analysis, CBO projected that 36 Seawolf submarines would be needed during the 2000-2010 period to maintain the attack submarine fleet. Now only 15 of the cheaper New Attack Submarine (NAS) class are required. In another category--amphibious ships--projected procurement has declined slightly, from nine LPD-17 (formerly LX) ships in 1991 to seven ships today (see Table 3).

In general, the current plan would also reduce the number of aircraft procured. Since 1991, the Navy scrapped plans to buy the Advanced Tactical Support Aircraft--a replacement for the EA-6B electronic warfare aircraft, the E-2C command and control aircraft, and the S-3 antisubmarine warfare aircraft--and a replacement for the P-3 antisubmarine warfare aircraft. The Navy canceled procurement of the expensive A/FX medium-attack aircraft and delayed production of its successor--an aircraft emanating from the JAST program--until late in the decade. Average purchases of an advanced medium-range strike aircraft during the next decade would therefore be much lower under the current plan than were projected in 1991.

4. Congressional Budget Office, "The Costs of the Administration's Plan for the Navy Through the Year 2010," CBO Staff Memorandum (December 1991).

TABLE 3. PROCUREMENT OF SELECTED WEAPON SYSTEMS, 2000-2010

System	Navy's 1991 Plan	Navy's Current Plan
Attack Submarines	36	15
DDG-51 Destroyer and Successor	34	32
LPD-17 (LX) Amphibious Assault Ship	9	7
A/FX and JAST Medium-Attack Planes	300	60
Advanced Tactical Support Aircraft^a	102	0
P-3 Replacement	261	0
CH-60 Helicopter	242	0
V-22 Transport	0	182
F/A-18E/F	324	612

SOURCE: Congressional Budget Office based on informal Navy plans.

- a. Would have replaced the S-3 antisubmarine warfare aircraft, the EA-6B electronic warfare aircraft, and the E-2C airborne command post.
-

The exception to the general decline in aircraft procurement is the nearly doubling of F/A-18E/F purchases. In addition, the Navy is now planning to buy V-22 tilt-rotor aircraft as a medium-lift transport aircraft rather than the less expensive CH-60 helicopter.

CAN THE NAVY AFFORD THE 330-SHIP PLAN?

Although changes under the 330-ship plan make the U.S. naval force structure less costly, problems of affordability remain. But as noted earlier, an increase in the overall defense budget, or in the Navy's share of the defense budget, could provide the funding needed to finance the projected shortfalls.

The Navy may find it even more difficult to afford its long-term plans, however, if the defense budget is cut more deeply. Although the Administration's fiscal proposals would substantially reduce the U.S. deficit by the late 1990s, they would not solve the long-term deficit problem.⁵ In its long-term budget outlook, CBO projects that if policymakers make no concerted effort to reduce the deficit, it will increase after the turn of the century, both in dollar terms and as a proportion of gross domestic product (GDP). In terms of current dollars, the deficit is expected to increase from \$204 billion in 1999 to \$365 billion in 2004. As a percentage of GDP, it is projected to increase from 2.4 percent in 1999 to 3.3 percent in 2004. Eventually, pressure may build to enact further cuts in defense spending, which makes up a substantial portion of federal discretionary expenditures.

If, for example, the budget for national defense (budget function 050) were eventually cut to \$200 billion per year, rather than the \$238 billion proposed by the Clinton Administration for 1999, the 330-ship Navy would be even less affordable (see Figure 2). Based on its 30 percent portion of the 1994 national defense budget, the Navy's share of a \$200 billion defense budget would be about \$60 billion. Under that standard, the \$75 billion to \$84 billion per year required during the 2000-2010 period would create a shortfall of 20 percent to 29 percent.

Affordability could be even more troubling if problems with the aging of aircraft require the Navy to buy more planes than anticipated under its current plan. As noted earlier, the average age of naval fighter and attack aircraft and the fraction that are beyond the end of their normal service lives (in terms of flight hours) both rise sharply under the current plan. The average age of other types of aircraft would also increase. If the Navy discovers that it cannot safely and effectively operate these older aircraft, it will need to increase aircraft purchases. This action could add billions of dollars to costs beginning in the early part of the next decade.

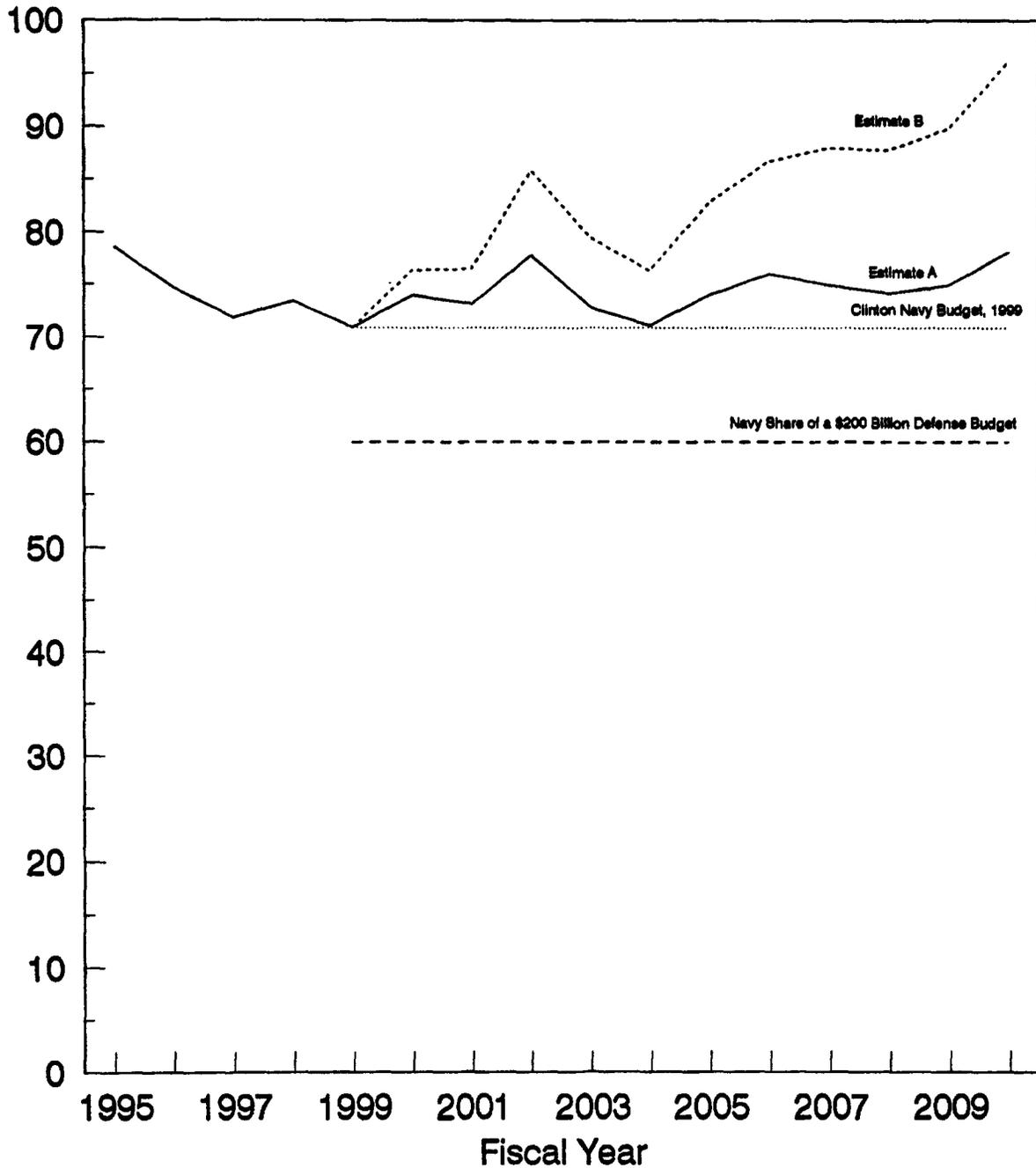
RESOLVING PROBLEMS OF AFFORDABILITY

In order to make its plans more affordable, the Navy could make several changes to bring them into line with available funds. Those changes include reducing the production of submarines and surface combatants, reducing the number of aircraft carriers, focusing naval aviation on shorter-range missions, and cutting the fleet size further.

5. See Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1995-1999*, pp. 28-29.

FIGURE 2. NAVY FUNDING REQUIREMENTS COMPARED WITH POTENTIAL BUDGETS

Billions of 1995 Dollars



SOURCE: Congressional Budget Office.

Reduce the Production of Some Submarines and Surface Combatants

Under the 330-ship plan, the Navy would buy new attack submarines at a rate of about three every two years (generally alternating purchases of one or two ships a year throughout most the 2000-2010 period), leading to a total acquisition of 15 ships. At a cost of between \$1.6 billion and \$1.9 billion for each vessel, the new attack submarine adds \$23 billion to \$28 billion to the procurement bill during the 2000-2010 period.

Under its plan, the Navy would generally buy either three DDG-51s, three 21st-century surface combatants (SC-21s)--the DDG-51's successor--or a combination of both each year during the period. The DDG-51 costs \$900 million per unit, and the SC-21 is estimated to cost \$750 million per unit. During the 2000-2010 period, purchases of the two ships will total about \$26 billion to \$29 billion. Thus, acquiring the new submarines and ships during the period will cost about \$49 billion to \$57 billion.

The Navy could save money by doing the following:

- o Reducing the purchase of new attack submarines to one every year, thus cutting total procurement during the period from 15 ships to 11. This would save about \$6 billion to \$8 billion from 2000 to 2010.
- o Reducing the purchase of DDG-51s and SC-21s to two a year. This reduction would cut the number of ships purchased during the period from 32 to 22. The total savings during the decade would be about \$8 billion to \$9 billion.

Such cutbacks might reduce the number of multimission surface combatants that can operate independent of a carrier battle group and reduce the number of submarines that are better suited for operation in coastal areas. In view of the reduced threat in the post-Cold War world, however, the lower numbers might be acceptable.

The purchase of fewer ships and submarines might also have implications for the industrial base by causing adverse effects on some shipyards building the vessels, including the possibility of shutdown. Reducing quantities purchased might also adversely affect the subcontractor industrial base for both types of ships.

Reduce the Number of Aircraft Carriers

The Navy could also reduce the number of aircraft carriers from 12 to 10. During his campaign, President Clinton endorsed a reduction of the carrier fleet to 10. This number was the lower end of the range suggested in 1992 by Senator Sam Nunn, Chairman of the Senate Armed Services Committee. Such a reduction would lower operating costs for the carrier force and its associated air wings. The change would also lower procurement costs by permitting cancellation of the carriers that the Navy plans to buy in 2002 and 2006 and, eventually, by reducing needs for aircraft. The total savings from reducing the carrier force to 10 would be \$25 billion to \$27 billion during the 2000-2010 period. Because the Navy will have a shortage of aircraft for its carrier force, this estimate does not reduce planned aircraft purchases.

Fewer carriers might mean less capability to bring air power to bear during crises that occur with little notice. A decrease might also increase gaps in the United States' peacetime presence overseas. The Navy could, however, rely more heavily on seagoing alternatives to the carrier battle group for both peacetime presence overseas and crisis response. Groups of ships and submarines centered around a cruiser or amphibious assault ship might fill this role. With the advance of technology, such formations have become more effective. Although they are still not as capable as carrier battle groups in strike, anti-air, anti-surface, and anti-submarine warfare, the reduced threat in a post-Cold War world might allow alternative formations to substitute for carrier battle groups. The Navy has already experimented with such new concepts for deploying forces.

Focus Naval Aviation on Shorter-Range Missions

The roles and missions of the services could be realigned so that the Air Force would handle longer-range bombing missions, leaving the Navy to concentrate on shorter-range missions, such as providing air support for amphibious assaults by the Marines. Such a shift might obviate the need for the Navy to buy a JAST aircraft, which is being designed to handle relatively longer-range strike missions. During the 2000-2010 period, not buying a JAST aircraft could save \$4 billion to \$7 billion.

Even without a JAST aircraft, the Navy can hit most potential targets with existing aircraft. According to the Secretary of the Navy, about 85 percent of the Navy's targets are within 200 miles of shore--within the range of the existing F/A-18C aircraft. Furthermore, the Navy is planning to buy the F/A-18E/F, which could have a greater range and payload than the aircraft's C and D models.

Although allowing the Air Force to take over longer-range bombing would generate cost savings, aircraft from carriers are less subject to overflight restrictions or denial of access to bases by the governments of foreign nations.

Reduce Forces Further

The Navy could also reduce the size of its fleet to fewer than 330 ships. For example, if the number of carriers were reduced from 12 to 10, supporting ships in those two battle groups (including surface combatants, submarines, and replenishment ships) could also be reduced. Other types of ships might also be cut back. A smaller Navy requires less money to operate and support its ships and fewer funds to buy new ships. According to a press report, the Navy anticipates a gradual decline below 330 ships after the year 2010.⁶ At least some of these potential reductions might be moved forward into the 2000-2010 period.

After the decline of its principal opponent--the Soviet navy--the U.S. Navy faces only the relatively small and less capable navies of regional powers and would probably be able to remain superior to them even at this reduced level.

Any of these four revisions of the possible Navy plan--reducing production of destroyers and submarines, reducing the number of aircraft carriers, focusing naval aviation on shorter-range missions and not buying the JAST, or further reducing the number of ships in the fleet--could help make the Navy more affordable in the future.

6. See "Navy Plan Forecasts Radical Changes for Service During the 1990s," *Inside the Pentagon* (March 25, 1993).

APPENDIX: COSTING METHODS AND SUPPLEMENTARY DATA

In estimating the costs of maintaining a 330-ship force in the 2000-2010 period, the Congressional Budget Office used methods that vary according to the category of costs. In all cases, costs were based on budget authority and were calculated after adjustment to 1995 dollars.

Ship Procurement

In this analysis, CBO estimated most categories of ship procurement explicitly. That is, CBO generally obtained Navy projections of the number and types of ships that it plans to buy during the 2000-2010 period (see Table 1 on page 5).

CBO estimated the unit costs of ships in both estimates A and B. In general, estimate A was based on Navy cost estimates. Under the higher-cost case (estimate B), CBO assumed that unit costs would exceed the levels currently estimated by the Navy by 3 percent a year, consistent with historical rates. In general, the higher cost estimates exceed the lower ones by about 20 percent (see Table A-1).

CBO made an important exception to these rules in estimating the cost of the surface combatant that will replace the DDG-51. Because the Navy hopes to develop a lower-cost alternative to the DDG-51, the higher cost estimate reflects the current price of a DDG-51 (\$900 million per ship), while the lower cost estimate reflects about a 20 percent reduction in costs for its successor (\$750 million). Based on Navy plans, CBO assumed that procurement of the lower-cost successor would begin in 2003.

The Navy's shipbuilding and conversion (SCN) account funds the purchase not only of major ships but also of minor ships, modifications, overhauls of nuclear-powered ships, and service-life extensions for conventionally powered ships. CBO used the ratio of funding for major ships to the total SCN account in the Clinton five-year (1995-1999) defense plan to estimate the funding needed for these other categories in the 2000-2010 period.

Aircraft Procurement

The Navy also informally provided CBO with schedules for the purchase of aircraft. The number of aircraft procured during the 2000-2010 period is discussed in the text and shown in Table 2 on page 6.

Lower estimates of the unit costs of aircraft are generally based on current service estimates of procurement costs. In most cases, higher estimates for aircraft are based on informal Navy estimates of potential cost growth. The Navy's informal estimates of higher costs assume about a 33 percent to 60 percent cost increase, depending on the aircraft type (see Table A-2).

A portion of the Navy's aircraft procurement (APN) account provides funds for aircraft modifications and spare parts. As with ships, these funds were not estimated explicitly. Instead, they were included in CBO's estimates for nonmajor procurement, which are discussed below.

Other Costs

Some categories of costs are not directly related to the number of ships and aircraft. These include costs for nonmajor procurement, such as other procurement (OPN), weapons procurement (WPN), and Marine Corps pro-

TABLE A-1. UNIT PROCUREMENT COSTS FOR SHIPS
(In millions of 1995 dollars)

Designator	Type of Ship	Lower Unit Cost	Higher Unit Cost
ADC(X)	Dry Cargo Ship	450	550
AGF	Command Ship	200	250
AGOS	Surveillance Ship	200	250
AOE	Fast Combat Support Ship	650	800
CVN	Aircraft Carrier (Nuclear)	5,150	6,200
DDG-51/SC-21	Aegis Destroyer or Successor	750	900
LCC	Command Ship	200	250
LHD	Amphibious Helicopter Carrier	1,750	2,100
LPD-17	New Amphibious Assault Ship	550	650
MCM	Mine Countermeasures Ship	150	200
MCS	Mine Command Ship	150	200
SSN	New Attack Submarine	1,550	1,850

SOURCE: Congressional Budget Office.

NOTE: Lower unit cost is based on Navy estimates. Higher unit cost assumes historical rates of cost growth.

curement (PMC). The OPN account funds communications and support equipment and many other items; the WPN account finances missiles, torpedoes, guns, and ordnance; and the PMC account supports the procurement of ground weapons for the Marine Corps, such as vehicles, armaments, and ammunition. The general category of other costs also includes expenditures for operation and support of forces; research, development, test, and evaluation; military construction; and family housing. In some cases, CBO estimated these other categories in different ways under estimates A and B.

Nonmajor Procurement. Estimate A treats nonmajor procurement costs as independent of those of major procurement. Under this method, purchases of items such as communications equipment, ordnance, and vehicles are not related to the amounts spent on ships and planes. Estimate A for nonmajor procurement is based on the average level of spending for these items from 1974 to 1993, adjusted for the decline in forces.

For estimate B, CBO based its estimates for nonmajor procurement in a given year on the funding level for major procurement (major aircraft and shipbuilding and conversion) for that year and the previous year's spending on nonmajor procurement. CBO employed an ordinary least squares regression equation using these variables to formulate the estimate. The results showed a statistically significant relationship for both of the variables. The regression is based on historical data for all of the variables for the years

TABLE A-2. UNIT PROCUREMENT COSTS FOR AIRCRAFT
(In millions of 1995 dollars)

Type of Aircraft	Lower Unit Cost	Higher Unit Cost
JAST	70	110
F/A-18E/F	65	90
E-2C Upgrade	80	80
AH-1 Replacement	20	30
SH-60 Remanufacture	15	20

SOURCE: Congressional Budget Office.

NOTE: Lower unit cost is based on current Navy estimates. Higher unit cost is based on informal Navy estimates of potential cost growth.

1975 to 1994. Estimate B reflects the notion, which seems consistent with past budgetary history, that parts of nonmajor procurement that pay for sophisticated support weapons--such as missiles and torpedoes--are likely to increase along with increases in spending for major ships and aircraft.

Operation and Support Costs. Because all reductions in forces in the Administration's plan will occur by 1999, the value of operation and support costs for each year during the 2000-2010 period for the forces that remain was held at the 1999 level for both estimates A and B.

Research and Development. For estimate A, CBO assumed that research and development costs would, over a long period, return to their average historical level of the 1974-1993 period, adjusted for a decline in forces. For estimate B, yearly costs for research and development for the 2000-2010 period were based on the average percentage of the Navy budget from 1974 to 1994 that was allocated to the research and development account--about 9.7 percent.

Military Construction and Family Housing. CBO used the same method to estimate military construction and family housing costs for both estimates A and B. Because all reductions in personnel in the Administration's plan will occur by 1999, the value of military construction and family housing costs for each year during the 2000-2010 period was held at the 1999 level for both estimates A and B.

