

CBO

An Analysis of the Obama Administration's Final Future Years Defense Program



APRIL 2017

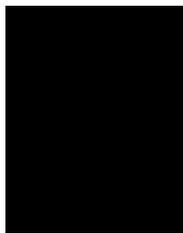
Notes

Unless otherwise indicated, the following apply to this report:

- All years referred to are federal fiscal years (which run from October 1 to September 30 and are designated by the calendar year in which they end).
- Dollar amounts are expressed in 2017 dollars that are adjusted for inflation by using the Congressional Budget Office’s projection of the gross domestic product price index.
- Dollar amounts are expressed in total obligational authority (TOA). The Department of Defense (DoD) uses TOA to reflect the funding available for its programs. TOA differs from discretionary budget authority in several ways—most notably in adjusting for the timing of rescissions and lapses of prior-year budget authority. In recent years, the difference between TOA and discretionary budget authority in DoD’s budget request for the coming year has generally been \$1 billion or less.
- The discussion of base-budget and overseas contingency operations (OCO) costs refers to the amount DoD requested for each. To simplify the presentation, this report excludes the approximately 1 percent in base-budget costs explicitly contained in the OCO request for 2017.

Numbers in the text and tables may not add up to totals because of rounding.

The photographs on the cover show the following (clockwise from top): an F-16 fighter receiving fuel from a KC-135 Stratotanker (Senior Airman Dawn M. Weber, courtesy of the U.S. Air Force); Army range safety officers observing as soldiers fire M4A1 carbines (Sgt. Michael Davis, courtesy of the Army National Guard); Pre-Commissioning Unit *Gerald R. Ford* (CVN 78) being maneuvered by tugboats in the James River during *Ford*’s turn-ship evolution (Mass Communication Specialist Seaman Apprentice Gitte Schirrmacher, courtesy of the U.S. Navy); and the Office of Naval Research–sponsored Laser Weapon System (LaWS) aboard the U.S.S. *Ponce* (John F. Williams, courtesy of the U.S. Navy).



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Summary

In most years, the Administration develops a five-year defense plan, called the Future Years Defense Program (FYDP), associated with the budget that it submits to the Congress. That multiyear plan encompasses the Department of Defense's (DoD's) expectations for its normal, peacetime activities.

This report describes the Congressional Budget Office's analysis of the Obama Administration's 2017 defense plan, which was issued in April 2016 and spanned the period from 2017 through 2021. Because decisions made now can have longer-term consequences, CBO has projected the costs of that plan through 2032. The Trump Administration has indicated its intention to substantially change those plans—for example, to increase the size of the military and to reevaluate plans for the procurement of several major weapon systems. The findings of this analysis can serve as a basis for assessing the scope, magnitude, and long-term budgetary implications of proposed policy changes.

In February 2016, DoD estimated that its plans for fiscal year 2017 would cost \$583 billion. That total included \$530 billion for base-budget activities (such as day-to-day military and civilian operations and developing and procuring weapon systems) and \$54 billion for overseas contingency operations (OCO; mostly for the wars in Afghanistan and Iraq and the Levant). President Obama's proposed budget included that same total amount—but allocated \$525 billion for DoD's base budget and \$59 billion for OCO to comply with funding caps in the Budget Control Act of 2011, as amended.¹ Adjusted for inflation, funding requested for DoD's base-budget appropriation in 2017 was 1.2 percent less than the amount enacted for 2016.

For the years after 2017, DoD estimated that the costs of executing its 2017 plans for the base budget—the FYDP excludes funding for OCO—would have been higher,

averaging \$543 billion per year between 2018 and 2021. (All costs in this report are adjusted for inflation and expressed in 2017 dollars). According to CBO's extension of DoD's plans and cost assumptions to the years beyond the FYDP period, the cost of those plans would have increased steadily, reaching \$598 billion in 2032—about 14 percent more than the proposed 2017 funding. Those higher costs would have resulted from a sharp increase in the acquisition of new weapon systems in 2022 and 2023 plus steadily growing costs to operate and support military forces over the projection period.

Moreover, CBO projects even higher costs for DoD's 2017 plans—about 3 percent higher over the next 16 years—under alternative assumptions about policies and prices that more closely match recent experience. For that higher estimate, CBO assumes that some of DoD's planned cost-saving measures would not have been enacted and that developing and buying weapon systems would have cost more than 2017 estimates indicated.

DoD's 2017 Plans Would Have Cost More in Each Year From 2018 Through 2032 Than in 2017

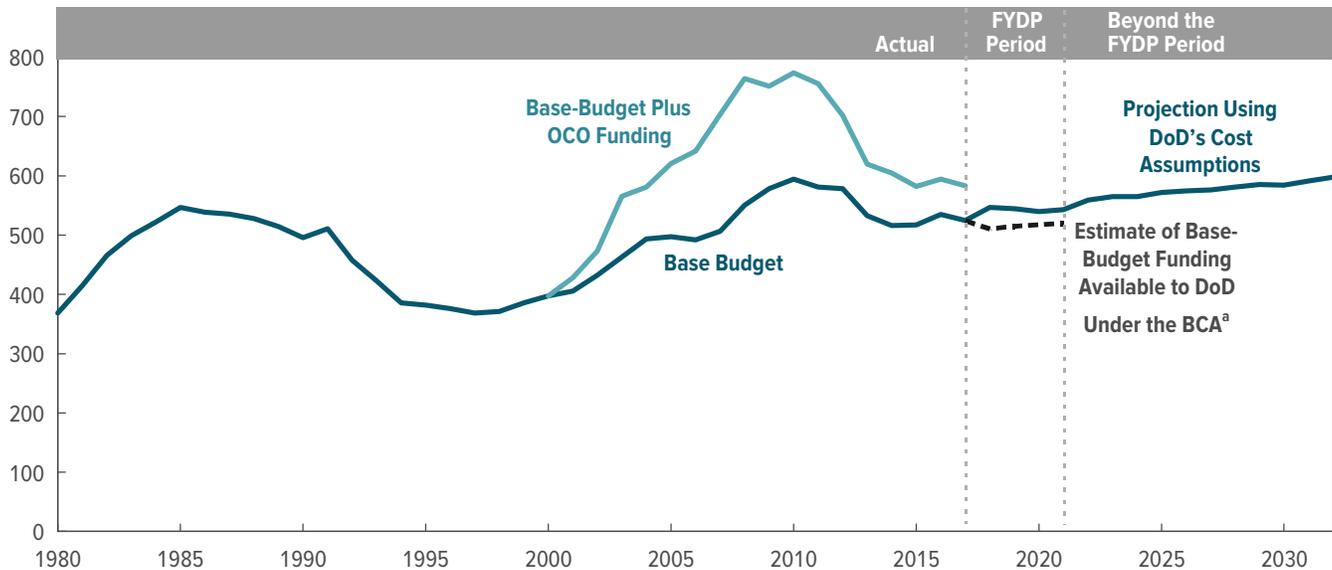
CBO has projected the costs of the 2017 FYDP on the basis of DoD's estimates of its total costs through 2021 that are described in the 2017 FYDP as well as longer-term estimates DoD has made for certain activities and programs. For example, DoD generates annual cost estimates for major weapon acquisitions that often extend

1. In November 2016, the Administration amended its request for OCO funding to include an additional \$5.8 billion. The amendment brought the OCO request to \$64.6 billion and the President's total budget request to \$589 billion. DoD has indicated that \$5 billion of the original OCO request is for activities normally considered part of the base budget. This analysis of base-budget appropriations does not include that amount.

Summary Figure 1.

Historical Funding for DoD's Activities and Projected Costs of DoD's 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Base-budget data include supplemental and emergency funding before 2001. For 2001 to 2017, supplemental and emergency funding for OCO is shown separately from the base-budget data. No OCO funding is shown for 2018 and later.

BCA = Budget Control Act of 2011; DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

- a. This estimate incorporates the assumption that the funding available to DoD would be equal to the BCA's limit for national defense minus the Obama Administration's estimates of national defense funding for agencies other than DoD (that is, funding for the Department of Energy's nuclear weapons activities, some intelligence-related activities, and the national security elements of the Departments of Commerce, Justice, and Homeland Security, and several independent agencies).

many years beyond the FYDP period. Where estimates from DoD were not available—such as for changes in labor costs—CBO used its projections of prices and compensation trends for the overall economy to estimate DoD's costs. Even without a change in Administration, CBO's projection would not serve to predict DoD's budgets; rather, it is an extrapolation of DoD's cost estimates under the assumption that the primary aspects of the 2017 FYDP remained unchanged.

Under the 2017 FYDP, DoD's base-budget costs would have increased by 4.2 percent, or \$22 billion, to \$547 billion in 2018, and then declined to \$540 billion in 2020, before rising slightly to \$543 billion in 2021—in comparison with \$525 billion in 2017 (see Summary Figure 1). Coupled with CBO's projections for economic growth, those plans would have seen DoD's costs as a percentage of gross domestic product (GDP) decrease slightly, from 2.8 percent in 2017 to 2.5 percent in 2021. Nevertheless, the average annual cost of \$540 billion

per year over the FYDP period would have exceeded the funding DoD received in all but six years since 1980.

After exhibiting only a slight net change over the last four years of the FYDP period, the cost of implementing DoD's plans would have risen by 3 percent, or \$16 billion, in 2022, CBO estimates. Costs would have continued to climb in most of the years thereafter, reaching \$598 billion in 2032—increasing by 0.7 percent per year, on average. That amount is 2.3 percent of CBO's projection of GDP for that year.

Most of the increase projected for 2022 is attributable to DoD's plans to develop and buy new weapons (activities categorized as acquisition). CBO projects that those costs would have grown rapidly right after the FYDP period—reaching \$192 billion in 2023, an amount 6 percent greater than the average annual spending on weapon systems within the FYDP period. That “bow wave” in acquisition funding suggests that developing and procuring weapons was being deferred to limit DoD's

overall budget through the end of the FYDP period. After that increase, costs for acquisition would have changed only slightly through 2029 and declined thereafter.

In contrast, growth in costs for operation and support (O&S) is projected to exert continuing long-term upward pressure on DoD's budget. Now accounting for 65 percent of DoD's budget, O&S includes compensation for the department's military and civilian employees, military health care, and the department's other operation and maintenance activities. CBO projects that, under DoD's 2017 plans, the costs for O&S would have grown steadily at an average annual rate of 1.4 percent from 2021 through 2032. By 2032, the costs for O&S would have reached \$409 billion, 19 percent more than the Obama Administration's request for 2017 and more than two-thirds of DoD's budget in that year.

DoD's Plans Usually Cost More Than It Estimates

The FYDP and CBO's extension of DoD's costs through 2032 are estimates of long-term costs under the assumption that plans do not change. Of course, international events, Congressional decisions, and other factors could markedly change an Administration's plans. Nevertheless, even if a plan was to generally stay the same, many program-level policies that underlie projections of its costs may not come to pass, and some of the cost estimates it incorporates may prove to be optimistic. In the 2016 FYDP, for example, DoD assumed that the Air Force would begin to retire its fleet of A-10 attack aircraft and that certain changes to the military health care system would be implemented—policies that lawmakers largely blocked.

Furthermore, the FYDPs have often incorporated estimates that understated costs. In several areas of

DoD's budget, costs have historically been higher than was projected in the FYDP:

- Costs to develop and buy weapon systems,
- Compensation costs for military and civilian personnel, and
- Military health care costs.

How much the future costs of specific programs in each area might differ from estimates made by DoD is never certain. Changes could result from some combination of Congressional action, changes by a new Administration, DoD's difficulty in controlling costs, or growth in costs in the economy as a whole.²

To assess the possible effects of such developments, CBO projected costs for DoD's 2017 FYDP under an alternative set of assumptions reflecting a growth in costs that accorded with patterns in the recent past (CBO's historical-cost scenario). In that case, CBO projected total costs for DoD from 2017 to 2021 that were about \$57 billion (2 percent) higher than indicated in the 2017 FYDP, and total costs for 2017 through 2032 that were \$274 billion (about 3 percent) higher (see Summary Table 1). About half of those higher costs through 2032 would have occurred if the Congress continued to reject certain policy changes related to military and civilian pay, military health care, and military construction that DoD has requested; the rest would have come primarily from cost growth in weapon systems.

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2. For example, when CBO prepared this report, the Congress had authorized an increase in military pay that was half a percentage point higher than the Administration's request. CBO estimates that difference alone would boost costs by \$1.5 billion over the FYDP period and by \$5.0 billion from 2017 through 2032.

Summary Table 1.

Increase in DoD's Costs With Respect to the 2017 FYDP Under Alternative Policies and Cost Assumptions

Billions of 2017 Dollars

	Total Increase	
	2017-2021	2017-2032
Areas in Which Different Policies Could Have Been Adopted		
Increase Military Pay at the Rate of the ECI Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	13.1	73.6
Increase Civilian Pay at the Rate of the ECI Minus 0.5 Percentage Points (Current Statute) Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	4.8	31.2
Do Not Implement DoD's Proposal to Consolidate TRICARE Plans and Increase Various Fees	3.4	17.6
Do Not Implement DoD's Proposal to Raise Pharmacy Copayments	1.9	7.6
Do Not Implement DoD's Proposal to Institute TRICARE for Life Annual Enrollment Fees	1.4	5.3
Fund Military Construction at Historical Levels (Adjusted for Force Size)	10.9	10.9
Areas in Which Costs Could Have Been Higher		
Acquisition Costs for Major Programs Grow as They Have in the Past	21.1	128.2
Both Areas Combined		
Total	56.6	274.3
Memorandum:		
Total Projected Costs		
DoD's estimates and their extension	2,699	9,050
CBO's alternative projections	2,756	9,324

Source: Congressional Budget Office.

DoD = Department of Defense; ECI = employment cost index for wages and salaries in the private sector, as reported by the Bureau of Labor Statistics.

Cost of the 2017 Future Years Defense Program Through 2032

Decisions about funding are usually made annually. But decisions about national defense made today—whether they involve weapon systems, military compensation, or numbers of personnel—can affect the composition and costs of the nation’s armed forces for many years. To inform lawmakers about its plans beyond the coming year, the Department of Defense usually prepares a Future Years Defense Program in conjunction with its annual budget request. The FYDP describes DoD’s plans and the estimated costs of those plans over the coming five years.

This report describes the Congressional Budget Office’s analysis of how the Obama Administration’s final five-year plan—the 2017 FYDP—would have affected defense budgets through 2032 if it was implemented. The Trump Administration has indicated its intention to substantially change those plans—for example, to increase the size of the military and to reevaluate plans to procure several major weapon systems.¹ The findings of this analysis can serve as a basis for assessing the scope, magnitude, and long-term budgetary implications of proposed policy changes.

The 2017 FYDP, which DoD issued in April 2016, covers 2017 to 2021. DoD publishes information about even longer-term plans for some activities, such as shipbuilding and aircraft procurement. However, because details about most activities beyond the FYDP period (and therefore estimates of total annual costs beyond that period) are either undetermined or not yet officially adopted, DoD does not release them.

1. Initial changes were unveiled in mid-March 2017, when the Trump Administration submitted a request for a 5 percent increase in 2017 funding for DoD’s base budget as well as the general outlines of its request for a 2018 base budget that would be 3 percent higher than in the 2017 FYDP.

To look more closely at the funding that might be needed to implement DoD’s plans beyond the five-year FYDP period, CBO has, since 2003, projected DoD’s total costs for roughly 10 years beyond the FYDP period. This report presents CBO’s analysis of the 2017 FYDP and an extension of those plans through 2032, with all costs adjusted for inflation and measured in 2017 dollars. CBO’s projections indicate a sharp increase in the costs of those plans beyond the five-year FYDP period, as often occurs when near-term resources are constrained.

The extension beyond the first five years is based on the costs DoD estimated for its planned programs and activities and, where DoD estimates were not available, is based on CBO’s estimates of prices and compensation trends for the overall economy. Even without the change in the Administration, this analysis was not meant to predict DoD’s budgets because Administrations typically change plans from year to year. Rather, the analysis serves to extend the cost estimates that underlie the 2017 FYDP under the assumption that no change would have occurred in plans for the size and composition of the military force and in the type, quantity, and schedule of major weapon purchases.

Many estimated costs that DoD included in past plans have been different from (usually lower than) the costs actually incurred. Therefore, CBO also examined how the funding needed to implement DoD’s 2017 plan would have differed from DoD’s estimates if certain policies and assumptions underlying DoD’s cost projections did not come to pass.

Under either set of estimates, the cost of DoD’s 2017 plans for its base budget would have exceeded the caps on funding for national defense established in the most recent provisions of the Budget Control Act of 2011 (BCA), as amended. The funding DoD requested was within the caps for 2017. However, the costs it projected

would have exceeded those caps for 2018 through 2021 (2021 is both the last year of the FYDP and the last year for which the BCA caps such funding). Despite exceeding the BCA caps, the costs of DoD's 2017 plans for its base budget would have slowly decreased in comparison with CBO's projection of the size of the economy (as measured by gross domestic product, or GDP).

DoD's total costs in the coming years, however, also will depend on several factors, such as costs for overseas operations, which the FYDP does not include. Even without a new Administration, changes in the international security environment, decisions made by the Congress, and other factors might cause costs to depart substantially from the department's five-year plan. For example, DoD and the Congress often respond to higher-than-expected costs of weapon systems by changing acquisition plans, sometimes delaying or reducing purchases or canceling systems outright. In this report, however, CBO did not examine how DoD's 2017 plan might have changed as a result of such factors.

Costs of DoD's 2017 FYDP for 2017 Through 2021

DoD estimated that the annual costs of its plans would have increased slightly in real (inflation-adjusted) terms over the period covered in the 2017 FYDP. For the base budget, costs would have increased from \$530 billion in 2017 (including \$5 billion for the base budget that DoD included in its request for OCO funding) to \$543 billion by 2021. The 2017 plan would have cost about 1 percent less than DoD's previous five-year plan over the four years common to both plans (2017–2020). The 2017 plan would have cost less primarily because it complied with the BCA cap in 2017, whereas the previous plan did not. The 2017 plan did not comply with the BCA caps for 2018 through 2021.

The Budget Request for 2017

The Obama Administration requested \$583 billion in funding for DoD for fiscal year 2017. That request had two parts:

- *\$525 billion in appropriations for the base budget.* The base budget funds the normal activities of the department, including manning and training the force, developing and procuring weapon systems, and

the day-to-day operations of the military and civilian workforce.

- *\$59 billion in appropriations for OCO.* Of that amount, \$54 billion was slated to pay for overseas operations, such as Operation Freedom's Sentinel in Afghanistan and Operation Inherent Resolve in Iraq and Syria. The additional \$5 billion was to cover base-budget costs as specified in the Bipartisan Budget Act of 2015 (see Box 1-1).

CBO's analysis focuses on the costs of the plans outlined in DoD's base budget request for 2017; it therefore excludes funding for OCO. For simplicity, CBO's analysis also excludes the additional \$5 billion in OCO funding designated to pay for base-budget activities.²

Nearly all of DoD's funding for its base budget is provided in six appropriation categories (see Figure 1-1). In analyzing DoD's plans, CBO organized those six categories into three broader groups: operation and support, acquisition, and infrastructure.

Operation and Support. O&S includes the appropriations for operation and maintenance (O&M), revolving and management funds (which are folded in with O&M because they fund similar activities and are relatively small), and military personnel. Appropriations for O&M and the revolving and management funds pay for day-to-day operations, base support, maintenance, spare parts, training, most costs of the military's health care program, compensation for most of DoD's civilian employees, and payments to contractors. Appropriations for military personnel fund compensation for uniformed service members, including pay, enlistment and retention bonuses, housing and food allowances, and related items, such as moving service members and their families to new duty stations. Together, O&M and revolving and management funds made up the largest portion—almost 40 percent—of the request for the base budget in 2017; the next largest was military personnel, at nearly 26 percent. Combined, O&S made up about two-thirds of DoD's base-budget request for 2017.

2. That OCO funding represented less than 1 percent of the base-budget request for 2017; DoD did not provide estimates for OCO funding for the final four years of the FYDP.

Box 1-1.**Allocation of Funding Between the Base Budget and Overseas Contingency Operations**

Since 2001, funding for overseas contingency operations (OCO) has totaled almost \$2 trillion, according to the Congressional Budget Office's estimates—a significant fraction of the Department of Defense's (DoD's) total spending. Although the Congress appropriates funds separately for base-budget activities and for OCO, the line between the two can be subjective. In principle, OCO funding is supposed to cover the incremental costs of contingency operations—that is, the difference between costs actually incurred and the costs that would have been incurred in peacetime. Some differences are straightforward, such as the costs to activate and deploy Reserve and National Guard units or the costs for mine-resistant vehicles, neither of which would have been incurred if not for the conflicts in Iraq and Afghanistan. Other differences are harder to measure. For example, the incremental cost of having a brigade deployed overseas versus merely conducting routine training is unclear, especially after years of conflict have disrupted peacetime training cycles.

In the past, assigning costs to the base budget or the OCO budget was of little consequence as long as DoD's total funding covered the costs it was incurring. That changed beginning with the 2013 budget, when the Budget Control Act of 2011 (BCA) went into effect. The BCA capped the size of the base budget but did not constrain funding for emergency requirements or for OCO. By creating an incentive to broaden the use of OCO funding as way to increase the total funds that DoD could receive, that system may have contributed to the nearly fivefold increase in OCO funding per deployed service member since 2012. Nevertheless, through 2015, funds appropriated for OCO were at least nominally associated with OCO-related activities.

That situation changed with the Bipartisan Budget Act of 2015. In that legislation, lawmakers not only increased the caps on base-budget funding for national security in 2016 and 2017 but also indicated their intention to provide \$60 billion in OCO funds for 2016 and \$59 billion for 2017. The amount for 2016 was \$8 billion above the \$52 billion that the Obama Administration requested. Those funds were intended to further ease the constraints on the base budget. That situation persisted in the 2017 budget request, in which DoD included in its OCO funding request an extra \$5 billion for base-budget activities.

Because the appropriations for 2016 and the request for 2017 clearly included funding for base-budget activities in the OCO portion of the budget, an explicit mismatch has been created between DoD's base-budget *funding request* as reported in the Future Years Defense Program and its base-budget *costs* (the sum of the base-budget request and the funding for base-budget activities in the request for OCO funding). However, that explicit difference has been small, amounting to only about 1 percent of the base budget request for 2017. It is widely thought that a larger portion of the funding requested and appropriated for OCO would be more appropriately included in DoD's base budget. This report does not address that separate issue of "base-budget-to-OCO migration" of funding.

Acquisition. Acquisition includes procurement as well as research, development, test, and evaluation (RDT&E). Appropriations for procurement allow DoD to buy new weapon systems and other major equipment as well as to upgrade existing weapon systems. Appropriations for RDT&E pay for the development of technology and weapons. Procurement was almost 20 percent of the request for the base budget in 2017; RDT&E was nearly 14 percent. Combined, acquisition was about one-third of DoD's budget request for 2017.

Infrastructure. Infrastructure includes funds to build and renovate DoD facilities. Appropriations for military construction and family housing fund the construction of buildings and some of the housing on military

installations. Together, they made up less than 2 percent of the request for the 2017 base budget.

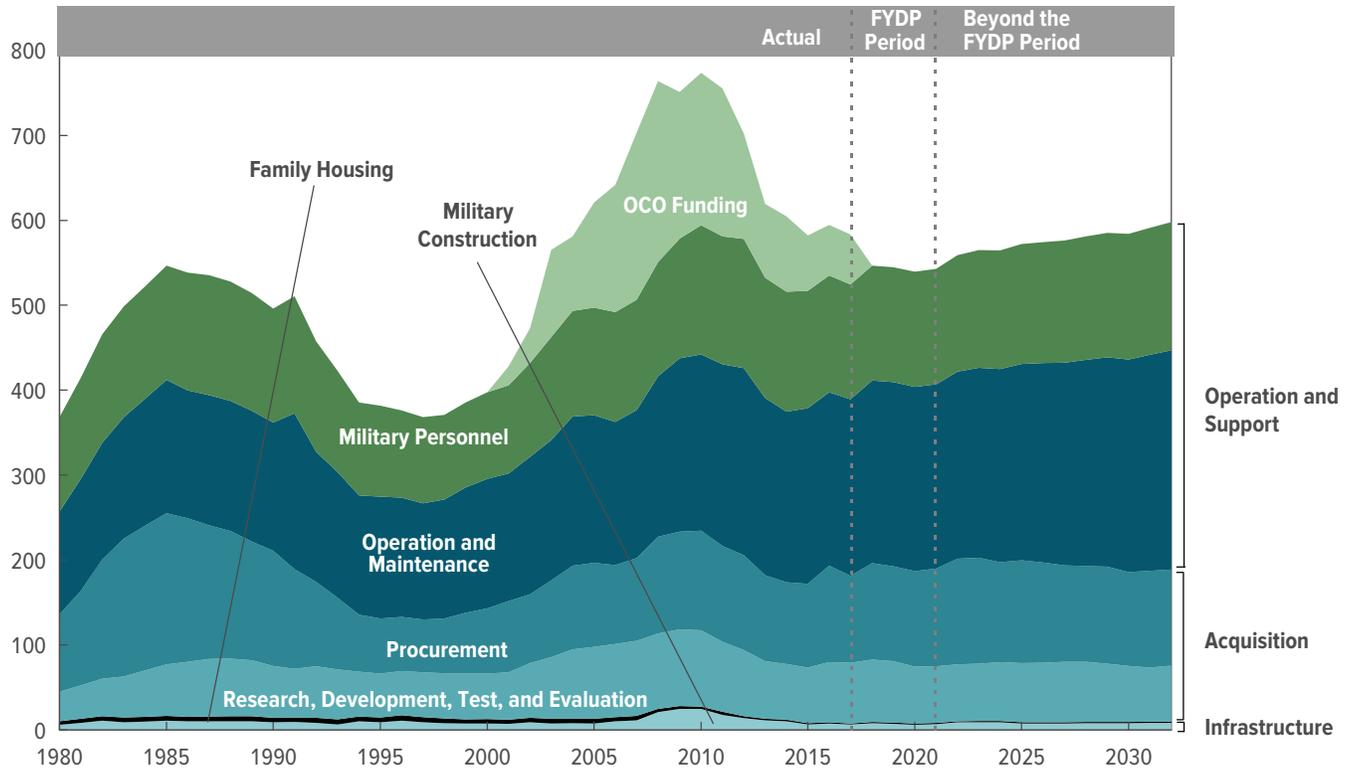
DoD's Estimates for 2018 Through 2021

DoD projected that the costs of its plans would have varied only slightly over the rest of the FYDP period, but at amounts higher than in 2017 (see Figure 1-1). Costs would have increased by 4.2 percent in 2018, decreased slightly through 2020, and increased again in 2021. In real terms, costs in 2021 would have been 3.5 percent higher than the request for 2017. In general, the share of DoD's budget allocated to each category—O&S, acquisition, and infrastructure—would have remained about the same over that time.

Figure 1-1.

Costs of DoD's 2017 Plans, by Appropriation Category

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category includes supplemental and emergency funding before 2001. For 2001 to 2017, supplemental and emergency funding for OCO is shown in a separate category. No OCO funding is shown for 2018 and later.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

For O&S, almost no change would have occurred in the costs of military personnel, whereas O&M costs would have increased in real terms by 4.3 percent from 2017 to 2021. The stability in military personnel costs reflects how the size of the military (as measured by the number of active-duty and reserve-component personnel) has stabilized after several years of reductions in force size, as well as DoD's estimates of the effects of efforts it proposed to slow the growth in costs for military compensation. The rise in O&M costs would have continued a long-standing trend of steadily increasing operations costs per service member. (See Chapter 2 for more details.)

By DoD's estimate, acquisition under the 2017 FYDP would have continued to constitute about one-third of the costs of DoD's plans through 2021. In real terms,

total acquisition costs in 2021 would have been 4.6 percent higher than in 2017. That change included a 12 percent increase in procurement but a 7 percent decrease in RDT&E.

The costs for infrastructure would have increased by 21 percent in 2018 as a result of a 26 percent increase in funding for military construction and a 1 percent decrease in funding for family housing. By the end of the FYDP period, however, both would have been about 7 percent higher than in 2017.

Extension of DoD's 2017 FYDP for 2022 Through 2032

In analyzing DoD's plans beyond the 2017 FYDP period, CBO started with DoD's estimates of costs and force structure (that is, the number of major combat units such

Table 1-1.

Cost Assumptions for CBO's Extension of DoD's 2017 FYDP

	Cost Assumptions for the Projection
Military Pay	DoD's estimates through 2021; rate of growth matches CBO's projection of the ECI after 2021
Civilian Pay	DoD's estimates through 2021; rate of growth matches CBO's projection of the ECI after 2021
Military Health Care	DoD's estimates through 2021; after 2021, tracks CBO's projection of national growth rates for health care spending
Operation and Maintenance ^a	DoD's estimates through 2021; after 2021, costs aside from civilian pay and military health care grow at the historical average rate for operation and maintenance
Acquisition	DoD's estimates or CBO's estimates based on previous programs
Military Construction	DoD's estimates through 2021; in 2022, costs equal the historical average and thereafter grow at CBO's projection of the national growth rate for construction costs
Family Housing	DoD's estimates through 2021; after 2021, costs grow at CBO's projection of the national growth rate for housing costs

Source: Congressional Budget Office.

DoD = Department of Defense; ECI = employment cost index for wages and salaries in the private sector, as reported by the Bureau of Labor Statistics; FYDP = Future Years Defense Program.

a. Operation and maintenance costs, excluding civilian pay and military health care.

as infantry brigades, battle force ships, and aircraft squadrons) for 2021. As much as possible, CBO's extension of DoD's 2017 plan to the years 2022 through 2032 is based on policies underlying the cost estimates in the 2017 FYDP, current laws regarding military compensation, and the longer-term acquisition plans that DoD publishes in Selected Acquisition Reports and other official documents, such as the Navy's 30-year shipbuilding plan.³ For the parts of DoD's budget that do not specify such policies, CBO based its extension of DoD's plans on prices and compensation trends in the general economy (see Table 1-1). For years beyond 2021, CBO assumed that the force structure and the number of military and civilian personnel would have remained as DoD specified for 2021 and that no change would have occurred in acquisition plans for major weapon systems—types, quantities, and schedules.

3. If a weapon system is expected to reach the end of its service life before 2032 and DoD has not yet announced plans for a replacement system, CBO assumes that the department will develop and purchase a generally similar but more modern system to replace the aging one. For example, a class of destroyer would be replaced with a more modern class of destroyer. DoD has not published plans for minor programs extending beyond the FYDP period. Therefore, CBO estimated costs for those programs on the basis of historical correlations between funding for major and minor programs.

After varying only slightly over the 2018–2021 period, the cost of implementing DoD's plans would have risen by 3 percent in 2022, CBO projects. Costs would have continued to climb, reaching \$598 billion at the end of the projection period in 2032. Such costs would have been 14 percent higher in real terms than the amount of funding that DoD requested in 2017 (see Table 1-2). Annual average total costs in the 11 years beyond the FYDP period would have been 7 percent, or \$38 billion, higher than the annual average over the FYDP period. All three categories of DoD's budget—O&S, acquisition, and infrastructure—would have contributed to higher costs beyond the FYDP period, but by different amounts and with different profiles (see Figure 1-2).

In CBO's extension of DoD's estimates beyond the 2017 FYDP, O&S costs would have increased steadily from 2021 through 2032, growing by an average of 1.4 percent annually (in real terms) for a total of 16 percent. Costs for O&M would have grown by 19 percent over that time and accounted for almost three-quarters of the increase in O&S costs. Costs for military personnel, which are substantially lower than O&M costs, would have grown by 11 percent and accounted for the rest of the increase in O&S costs. Almost all the difference between DoD's total costs in the last year of the 2017 FYDP (2021) and DoD's total costs at the end of CBO's projection period

Table 1-2.

Projected Costs of Defense Plans in DoD's 2017 Budget Request and FYDP for Selected Years

Billions of 2017 Dollars

	2001	2016	FYDP Period		Beyond the FYDP Period		Average, 2017–2032
			2017	2021	2026	2032	
Base Budget							
Operation and Support							
Operation and maintenance ^a	150	204	208	217	235	258	231
Military personnel	104	138	135	136	143	151	141
Subtotal	254	342	343	353	378	409	373
Acquisition							
Procurement	84	114	103	115	118	113	115
Research, development, test, and evaluation	56	71	71	67	70	66	69
Subtotal	140	185	174	182	188	179	184
Infrastructure							
Military construction	7	7	6	7	7	8	8
Family housing	5	2	1	1	1	2	1
Subtotal	12	9	7	8	9	10	9
Total Base Budget	406	535	525	543	575	598	566
Supplemental and Emergency Funding for Overseas Contingency Operations							
Total OCO Funding	22	60	59	n.a.	n.a.	n.a.	n.a.
Total							
Total DoD Budget	428	595	583	n.a.	n.a.	n.a.	n.a.

Source: Congressional Budget Office.

CBO projects the costs of DoD's plans using the department's estimates of costs where they are available and costs that are consistent with CBO's projections of price and compensation trends in the overall economy where the department's estimates are not available.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP period = 2017 to 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations; n.a. = not applicable.

a. For this analysis, CBO folded appropriations for most revolving and management funds (such as the one for the Defense Commissary Agency) into the appropriations for operation and maintenance.

(2032) would have been the result of higher costs for O&S. Chapter 2 describes the factors leading to increased costs for O&S.

Under DoD's 2017 plans, costs for acquisition would have increased by 5 percent, to \$191 billion, in the first year after the FYDP period. They would have inched up further to \$192 billion in 2023 in CBO's extension of DoD's estimates. Acquisition costs would have then decreased in 2024 and remained steady through 2029, averaging \$186 billion per year over those six years, before dropping to an average of \$178 billion for 2030 through 2032. CBO's projections show that costs for RDT&E would have been steady in the years beyond the FYDP period, but at a slightly lower level than the FYDP average. Costs for procurement would have increased to

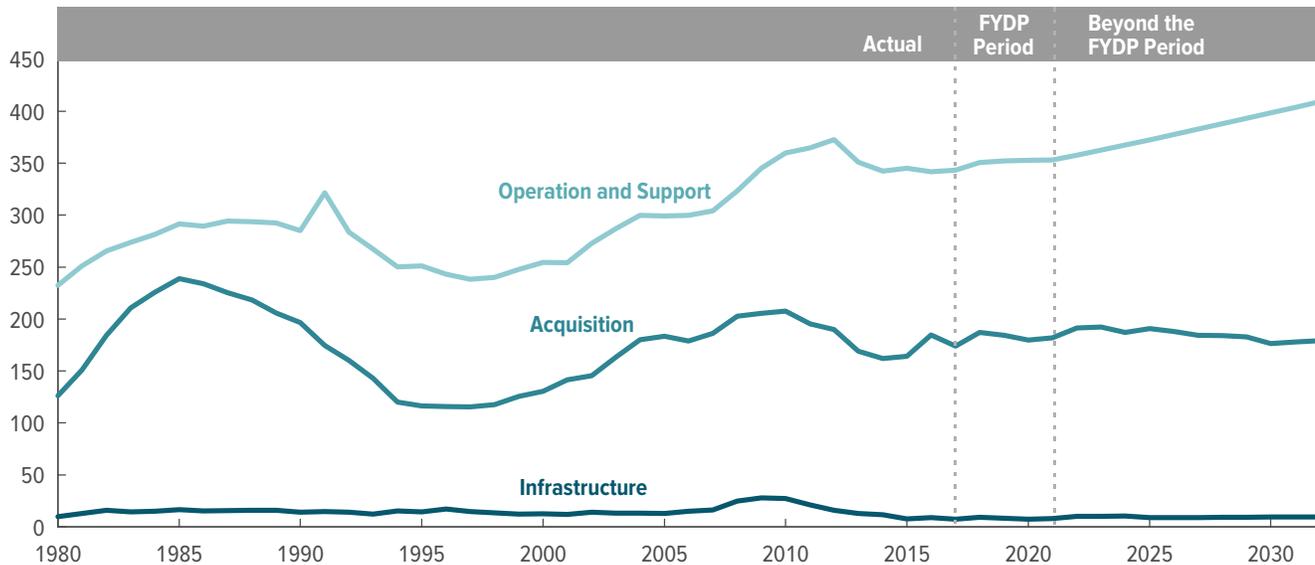
\$124 billion (or about 8 percent) in the first year beyond the FYDP period but then trended generally downward, averaging \$116 billion for 2023 through 2032. That bow wave in procurement funding suggests that DoD was deferring weapons acquisition because of constrained budgets through the end of the FYDP. Chapter 3 gives more details about CBO's projection of acquisition costs.

Infrastructure costs also would have increased under CBO's extension of DoD's estimates for the years beyond the 2017 FYDP period. The estimated increase of almost 20 percent is substantial on a percentage basis. However, the increase would have contributed only slightly to an overall increase in total costs because infrastructure would have accounted for scarcely more than 1 percent of DoD's planned budget in the final year of the FYDP

Figure 1-2.

Costs of the Operation and Support, Acquisition, and Infrastructure Portions of DoD's Base Budget Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

The infrastructure category includes the military construction and family housing appropriations. The acquisition category includes the procurement and the research, development, test, and evaluation appropriations. The operation and support category includes the military personnel, operation and maintenance, and revolving and management fund appropriations.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

period. The increase would have occurred primarily because funding for military construction in the FYDP is significantly lower than historical levels, and CBO's extension of the FYDP incorporated the assumption that infrastructure funding would have returned to historical levels. Chapter 4 gives more details about CBO's analysis of infrastructure.

Why Costs Probably Would Have Been Higher Than DoD Estimated

The total budget for an organization as large as DoD results from many program-specific policies. Even if DoD's plans remained unchanged in the size and composition of the military and the types, quantities, and acquisition schedules for major weapon systems, some of DoD's assumptions about policies may have proven inaccurate. For example, DoD's 2017 FYDP included several proposed changes to military health benefits, most of which were similar to proposals that the Congress rejected in earlier years. When DoD's assumptions about specific programs to acquire weapon systems have proven incorrect, the costs of those

programs usually have been higher than the department estimated. As a result, DoD has either requested larger budgets or altered its plans in other areas to offset those higher costs.

CBO has identified several areas of DoD's budget in which costs often have deviated from the department's estimates, usually resulting in higher than estimated costs. Three factors underlie much of the difference between DoD's past estimates of costs and the costs that actually accrued:

- Assumptions about changes in policy that require approval by lawmakers,
- The effectiveness of policies to control costs, and
- Growth in costs in the broader economy that DoD cannot control.

Some policy changes that typically require lawmakers' approval can affect DoD's budget substantially. Examples

Table 1-3.

Increase in DoD's Costs With Respect to the 2017 FYDP Under Alternative Policies and Cost Assumptions

Billions of 2017 Dollars

	Average Annual Increase		Total Increase		
	2017–2021	2022–2032	2017–2021	2022–2032	2017–2032
Areas in Which Different Policies Could Have Been Adopted					
Increase Military Pay at the Rate of the ECI Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	2.6	5.5	13.1	60.5	73.6
Increase Civilian Pay at the Rate of the ECI Minus 0.5 Percentage Points (Current Statute) Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	1.0	2.4	4.8	26.3	31.2
Do Not Implement DoD's Proposal to Consolidate TRICARE Plans and Increase Various Fees	0.7	1.3	3.4	14.2	17.6
Do Not Implement DoD's Proposal to Raise Pharmacy Copayments	0.4	0.5	1.9	5.7	7.6
Do Not Implement DoD's Proposal to Institute TRICARE for Life Annual Enrollment Fees	0.3	0.4	1.4	3.9	5.3
Fund Military Construction at Historical Levels (Adjusted for Force Size)	2.2	0	10.9	0	10.9
Areas in Which Costs Could Have Been Higher					
Acquisition Costs for Major Programs Grow as They Have in the Past	4.2	9.7	21.1	107.2	128.2
Both Areas Combined					
Total	11.3	19.8	56.6	217.8	274.3

Source: Congressional Budget Office.

DoD = Department of Defense; ECI = employment cost index for wages and salaries in the private sector, as reported by the Bureau of Labor Statistics.

include military and civilian pay raises, copayments and enrollment fees for participants in the Military Health System, and base realignments and closures. DoD can control some costs—for instance, by limiting changes to initial specifications of projects and improving contracting procedures. Examples include costs to buy weapon systems and medical services. However, DoD has little control over the prices of some goods and services, such as fuel and other commodities.

Predicting by how much programs might deviate from the assumptions that DoD incorporates in its five-year plans and the corresponding changes in costs that might ensue is challenging. However, CBO estimates that if the

costs in several broad areas of DoD's 2017 FYDP were to have increased by amounts similar to those observed in DoD's budgets in the recent past, the cumulative costs projected for DoD's plans from 2017 to 2021 would have been \$57 billion (2 percent) higher than indicated in the FYDP. Cumulative costs projected for 2017 through 2032 would have been \$274 billion (3 percent) higher than the extension of the FYDP based on DoD's cost estimates (see Table 1-3).

Almost half the difference between those projections is attributable to higher estimates of the costs to develop and produce new weapon systems. During the past several decades, those costs have been, on average,

20 percent to 30 percent higher than the department initially estimated. Although DoD and the Congress have made and are considering further changes to the way that weapon systems are developed and bought, whether those efforts will lower the growth in costs below historical averages is not yet clear. Most of the remaining difference reflects higher costs that DoD would have had to pay to compensate military and civilian personnel if the Congress did not approve the department's recommended policies. Indeed, before the publication of this report, the Congress had authorized a military pay raise for 2017 that was 0.5 percentage points larger than the increase DoD requested. CBO estimates that incorporating that change would add \$1.5 billion to the projection of DoD's costs over the FYDP period and \$5.0 billion from 2017 through 2032. Chapter 2 more fully describes the alternative estimates for O&S activities. Chapter 3 gives more details about the alternative estimates of acquisition costs.

Costs of DoD's 2017 FYDP in the Context of the Budget Control Act

The Budget Control Act of 2011 established limits, or caps, on most discretionary appropriations through 2021, including those for national defense.⁴ However, the BCA's caps do not apply to defense appropriations designated for OCO or as emergency requirements. The BCA's limits have been increased three times since it became law: by the American Taxpayer Relief Act of 2012, the Bipartisan Budget Act of 2013, and most recently the Bipartisan Budget Act of 2015. Taken together, those acts eased the constraints on funding each year from 2013 to 2017 but left unchanged the limits for the remaining years through 2021.

Under the terms of the BCA, if lawmakers keep defense appropriations within the BCA's limits on funding for national defense, no sequestration (the cancellation of budgetary resources after they have been appropriated) would occur for base-budget funding or funding for OCO. However, if in any year lawmakers appropriate more for national defense (excluding OCO or emergency funding) than the BCA allows, a sequestration would

occur in an amount equal to the overage (that is, the difference between the appropriated amounts and the BCA's limit in that year). Funding for OCO would also then be subject to sequestration.

President Obama's request of \$525 billion for DoD's base budget in 2017 complied with the increased BCA cap for national defense that the Bipartisan Budget Act of 2015 established. According to DoD, however, actual base-budget costs in the 2017 request were \$530 billion, or \$5 billion more than the caps. The Bipartisan Budget Act of 2015 allowed DoD to shift that \$5 billion to its request for OCO funding, which the BCA does not cap. In a similar maneuver to circumvent the BCA's caps, the Congress designated \$8 billion of the OCO funding it appropriated in the Consolidated Appropriations Act, 2016, to cover base-budget costs.

So far, no amendments to the BCA have increased the BCA's caps for 2018 through 2021. If DoD and the national defense activities of agencies other than DoD were to have received the funding indicated in the Obama Administration's 2017 plans, funding for national defense would have exceeded the BCA's caps in those years by a total of \$112 billion in 2017 dollars (see Table 1-4). The 2017 FYDP was the last plan for which the BCA would have capped funding for all five years. Thus, the increase in costs in 2022 indicated by CBO's extension of DoD's cost estimates beyond the FYDP period would not have conflicted with the BCA's constraints.

Costs of DoD's Plans in a Broader Context

CBO intends its analysis to highlight the long-term budgetary implications of DoD's plans as specified in the 2017 FYDP. The analysis does not measure affordability or evaluate how the plans relate to the nation's defense needs, nor does it presume that DoD will implement a particular strategy. When assessing the affordability of defense plans, some analysts consider the federal government's overall budget situation, including the costs of other programs and the amount of revenues collected. Other analysts, by contrast, focus on the share of overall economic output (as measured by GDP) being used for defense.

In relation to the size of the economy, DoD's base-budget spending has recently been on a par with spending since the military drawdown that occurred after the Cold War

4. National defense—also called budget function 050—includes the appropriations for DoD, the Department of Energy's nuclear weapons activities, intelligence-related activities, and the national security elements of the Departments of Commerce, Justice, Homeland Security, and several independent agencies.

Table 1-4.

Costs of DoD's 2017 Base-Budget Plans and the Funding Projected to Be Available Under the Limits of the Budget Control Act of 2011 as Modified by the Bipartisan Budget Act of 2015

Billions of Dollars

	FYDP Period					Total, 2017–2021
	2017	2018	2019	2020	2021	
	Nominal Dollars					
Projected Costs of DoD's Plans	525	557	565	570	585	2,802
Estimate of DoD's Funding Limits Under the BCA ^a	525	520	533	547	560	2,685
Amount That Would Need to Be Cut From DoD's Base-Budget Plans or Redesignated for OCO to Stay Within the BCA's Limits	0	36	31	24	25	117
	2017 Dollars					
Projected Costs of DoD's Plans	525	547	545	540	543	2,699
Estimate of DoD's Funding Limits Under the BCA ^a	525	511	514	517	520	2,587
Amount That Would Need to Be Cut From DoD's Base-Budget Plans or Redesignated for OCO to Stay Within the BCA's Limits	0	36	30	22	23	112

Sources: Congressional Budget Office and DoD's National Defense Budget Estimates for Fiscal Year 2017 (Greenbook).

BCA = Budget Control Act of 2011; DoD = Department of Defense; FYDP = Future Years Defense Program; OCO = overseas contingency operations.

- a. This estimate incorporates the assumption that the funding available to DoD would be equal to the BCA's limit for all of national defense minus the Administration's estimates for national defense funding for agencies other than DoD (that is, funding for the Department of Energy's nuclear weapons activities, intelligence-related activities, and the national security elements of the Departments of Commerce, Justice, and Homeland Security, and several independent agencies).

(see Figure 1-3).⁵ The department's outlays fell from an average of 5.5 percent of GDP in the 1980s to 2.8 percent in 1998, when the size of the active-duty military leveled off at about 1.45 million personnel. Since then, outlays for the base budget have averaged 2.9 percent of GDP, CBO estimates, though they were as high as 3.4 percent in 2010.⁶ By 2016, outlays for the base budget had dropped to 2.8 percent of GDP, CBO estimates. The latter percentage is about the same as it had been in 2001. (Funding for OCO accounted for another 0.3 percentage points of GDP in 2016.)

5. In a departure from elsewhere in this report, CBO measures costs for this comparison in terms of outlays rather than budget authority. The reason is that some categories of budget authority are "multiyear" funds that may be spent over six or more years from when the authority is enacted. Outlays, by contrast, are contemporaneous with GDP, which measures current-year economic activity.
6. Including supplemental and emergency spending for the wars in Iraq and Afghanistan, DoD's outlays have averaged 3.5 percent over that period. Outlays for total (base and OCO) spending rose above 4.0 percent of GDP after 2007, peaking at 4.5 percent in 2010.

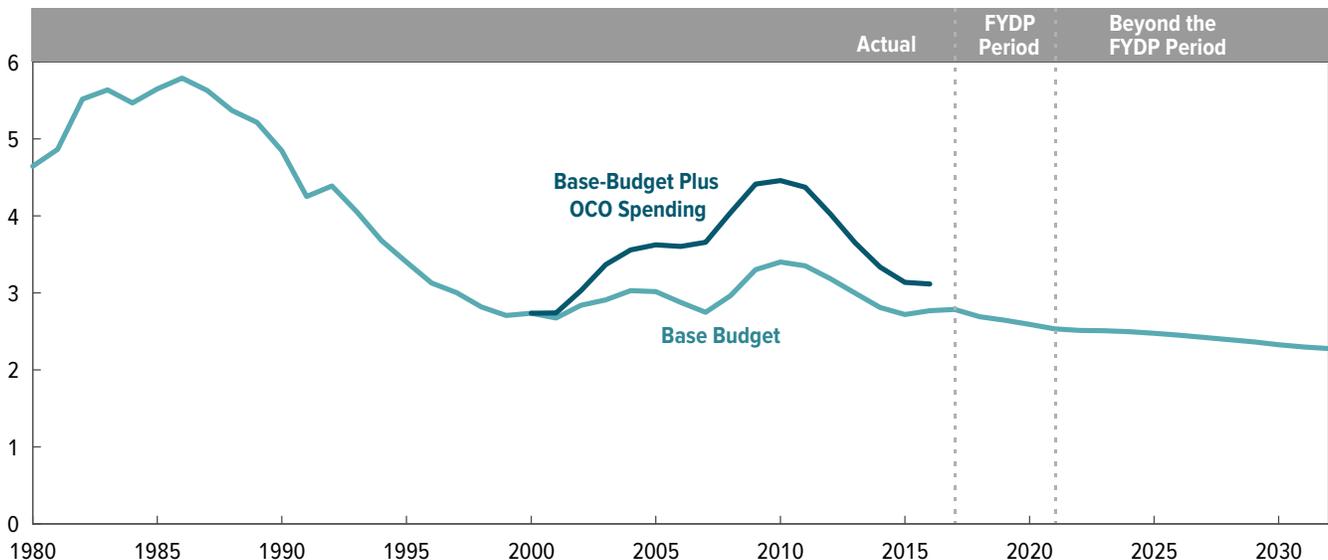
Although the projected costs of DoD's base-budget plans under the 2017 FYDP would have been higher in 2032 than in the years that the FYDP covers, the rate of increase would have been slower than the growth of the economy that CBO projects. Consequently, DoD's outlays as a share of GDP would have declined from 2.8 percent of GDP in 2017 to 2.5 percent by 2021 and 2.3 percent by 2032 (see Figure 1-3). Nevertheless, the average funding proposed under the 2017 plan, \$540 billion per year for 2017 through 2021, would have exceeded DoD's funding in all but a few years since 1980, after adjustment for inflation. Furthermore, any future spending for OCO would, all else being equal, increase the share of GDP spent on defense above those amounts.

Costs for Overseas Contingency Operations
Operation Freedom's Sentinel in Afghanistan and Operation Inherent Resolve in Iraq and Syria are ongoing. Those and other operations that might arise increase total costs in relation to DoD's base budget. From 2001 to 2016, DoD's appropriations for OCO

Figure 1-3.

Outlays Under DoD's 2017 Plans as a Share of Economic Output

Percentage of Gross Domestic Product



Source: Congressional Budget Office.

This figure depicts outlays (as opposed to total obligational authority, which the other figures show).

Base-budget data include supplemental and emergency funding before 2001. For 2001 to 2016, supplemental and emergency funding for OCO is shown separately from the base-budget data. No OCO funding is shown for 2017 and later.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

totaled almost \$2 trillion, nearly 20 percent of the department's total funding during that period.

DoD requested \$59 billion for OCO in 2017. Of that total, \$26 billion was for the operations, force protection, and associated in-theater support of deployed U.S. units.⁷ As described above, \$5 billion of the funding requested for OCO was allocated to cover base-budget costs.⁸ The rest was allocated to other overseas operations and related activities such as repairing or replacing equipment, supporting coalition military forces, and conducting

other counterterrorism operations. The request for OCO funding in 2017 was, after adjustment for inflation, about 2 percent less than DoD received in 2016. However, subtracting the portions of those OCO funding amounts explicitly slated for base-budget activities—\$8 billion appropriated in 2016 and \$5 billion requested for 2017—yields an OCO cost for 2017 that was (again, adjusted for inflation) \$2 billion, or 4 percent higher than the amount in 2016.⁹

How much DoD will request for OCO in future years is unclear. Substantial overseas operations will probably continue after 2017, but the FYDP does not include estimates of the funding that might be requested to support them in those years.

7. See Department of Defense, *Defense Budget Overview: United States Department of Defense Fiscal Year 2017 Budget Request* (February 2016), p. 7-3. <http://go.usa.gov/x9sRY> (PDF, 4.9 MB).

8. In the Fiscal Year 2017 National Defense Authorization Act, which was enacted in December 2016, the authorization for OCO included an additional \$3.2 billion for base-budget expenses above those in DoD's OCO funding request. If that amount is appropriated, a total of \$8.3 billion in OCO funding would support nonemergency, non-OCO-related activities that are ordinarily funded in the base budget.

9. In addition to the OCO funding explicitly appropriated to support base-budget activities in 2016 and similar funding requested for 2017, concern has arisen that OCO funding has been used to support base-budget activities in less explicit ways. CBO did not try to estimate the amount of such funding in the OCO budget in the request for 2017.

Projected Costs of Operation and Support

Funding for operation and support is the sum of the appropriations for military personnel, operation and maintenance, and revolving and management funds. For this report, CBO folded the amounts appropriated for revolving and management funds into the appropriation for O&M because they fund similar activities and the revolving and management fund appropriations are relatively small.¹ The O&S appropriations are used to compensate all uniformed (and most civilian) personnel in the Department of Defense, to pay most costs of the military's health care program, and to fund most day-to-day military operations.

For 2017, the Obama Administration requested \$343 billion in base-budget funding for O&S: \$135 billion for military personnel and \$208 billion for O&M (including the revolving and management funds). That amounted to about two-thirds of the Obama Administration's total request for DoD, excluding funding in the appropriations for overseas contingency operations. Of the \$59 billion requested for OCO in 2017, \$49 billion was for O&S (\$45 billion for O&M and \$4 billion for military personnel). To comply with the limits set by the Bipartisan Budget Act of 2015, that total included nearly \$4 billion in O&M intended to pay for base-budget activities.

1. DoD uses revolving and management funds to pay for many services and goods provided within the department. Customers (usually military units or commands) buy services and goods such as depot maintenance, fuel, and spare parts (usually with O&M funding) from organizations within DoD or the military services that exist to provide them. In principle, the prices of those services and goods match the costs of providing them, but sometimes a shortfall occurs. The appropriation for revolving and management funds is the sum of all the shortfalls to be eliminated in a given year. That appropriation is relatively small. Appropriations in the base budget for revolving and management funds have averaged \$3 billion per year since 1980; for 2017, the Obama Administration requested \$1.4 billion.

Under DoD's plan, costs for O&S would have grown slightly in real terms over the rest of the 2017 Future Years Defense Program period (see Figure 2-1). Through 2021, real costs for military personnel would have stayed almost flat, increasing by less than 1 percent over that time; costs for O&M in the base budget during that period would have increased by 4.3 percent over the amount requested for 2017. The slower growth in costs for military personnel reflected plans to trim the number of service members over the next five years.

CBO's analysis indicates that the O&S costs to implement DoD's 2017 FYDP would have steadily increased at an average annual rate of 1.4 percent above the rate of inflation in the 11 years beyond the 2017 FYDP period, reaching \$409 billion in 2032 (see Table 2-1). That estimate is based on the policies and their associated costs that DoD expected to be in place during the FYDP period.

CBO also examined the effect on O&S costs of adopting policies for pay and health care that differ from those underlying the 2017 FYDP. According to CBO's analysis, if the Congress adopted policies similar to ones it has adopted in the past, the projected O&S cost of DoD's 2017 plans would be higher than DoD's estimate by 2 percent during the FYDP years and by 3 percent for 2022 through 2032.

Although the defense plans of the Trump Administration differ from those of the 2017 FYDP, the factors that affect CBO's long-term projection are likely to be similar. For example, increasing the size of the military would probably result in a proportional increase in many of the long-term O&S costs CBO estimates for the 2017 FYDP.

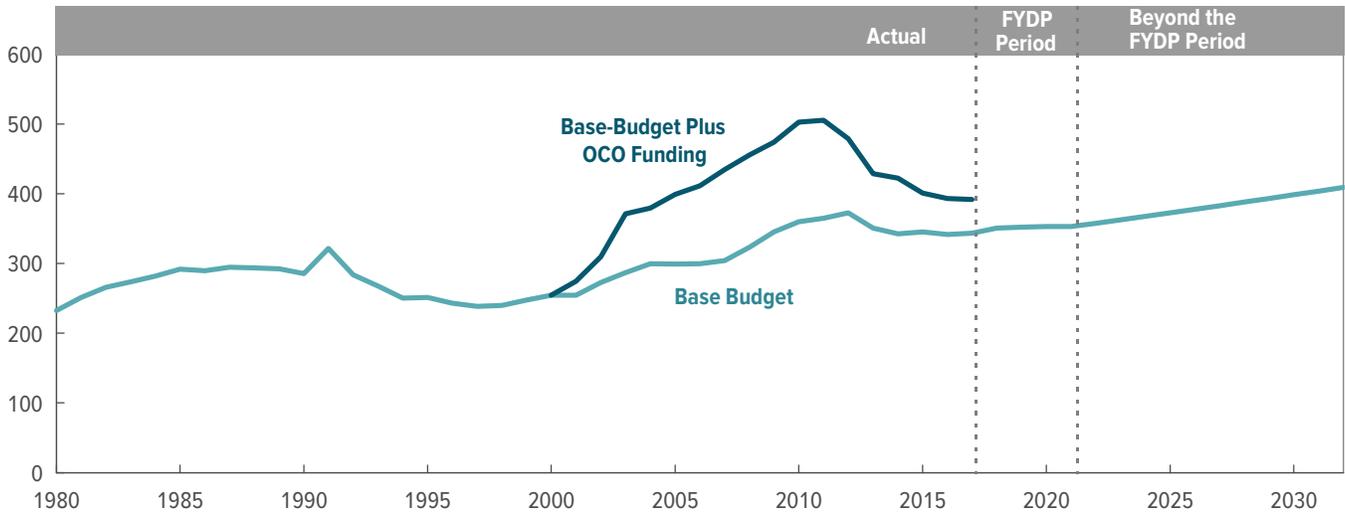
How CBO Projected O&S Costs

CBO projected the future O&S costs of DoD's plans in three parts that do not directly correspond with the two budget appropriations, military personnel and O&M, that make up the O&S category:

Figure 2-1.

Costs of DoD's Operation and Support Plans Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Base-budget data include supplemental and emergency funding before 2001. For 2001 to 2017, supplemental and emergency funding for OCO is shown separately from the base-budget data. No OCO funding is shown for 2018 and later.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

- *Compensation (pay and cash benefits) for military personnel and DoD's civilian employees and accrual payments for military retirement.* Those costs totaled \$197 billion in the 2017 budget request and are paid from the appropriations for O&M (for civilians) and military personnel.
- *The Military Health System (MHS), which provides medical care for military personnel, military retirees, and their families.* Those costs totaled \$48 billion in the 2017 budget request and are paid from the appropriations for O&M and military personnel.
- *Other O&M costs, such as base operations, fuel, repairs, and spare parts.* Those costs totaled \$120 billion in the 2017 budget request and are paid from the appropriation for O&M.

The sum of those three categories exceeds the total for O&S because both the cash compensation category and the MHS category include the costs of salaries for uniformed service members and federal civilian employees in the MHS (see Figure 2-2 and the memorandum in Table 2-1). When discussing a single category, CBO included all costs therein to present a complete picture for that activity. CBO corrected for that

double-counting when discussing combined costs of the O&S categories.

Compensation was the largest component in the 2017 budget request for O&S, accounting for more than half of the total.

The MHS also is funded from those appropriations. Funding from the O&M appropriation pays mostly for care provided by contractors, for drugs, and for civilian personnel who work in the MHS; it accounted for about 70 percent of the funds slated for the MHS in 2017. Funding from the military personnel appropriation pays for the military personnel who work in the MHS and for the accrual payments for the TRICARE for Life program, accounting for about 30 percent of the funds slated for the MHS in 2017.

Funding in the third category, Other O&M costs, pays for everything else in O&M. It includes funding to buy consumable items as varied as office supplies and aircraft fuel but excludes major capital equipment such as ships, tanks, aircraft, missiles, and ammunition, which are purchased through the procurement accounts. Other O&M also includes the cost of purchasing services, such as contracts with private entities to maintain facilities,

Table 2-1.

Operation and Support Costs in Selected Years for DoD's Base Budget Under the 2017 FYDP

Billions of 2017 Dollars

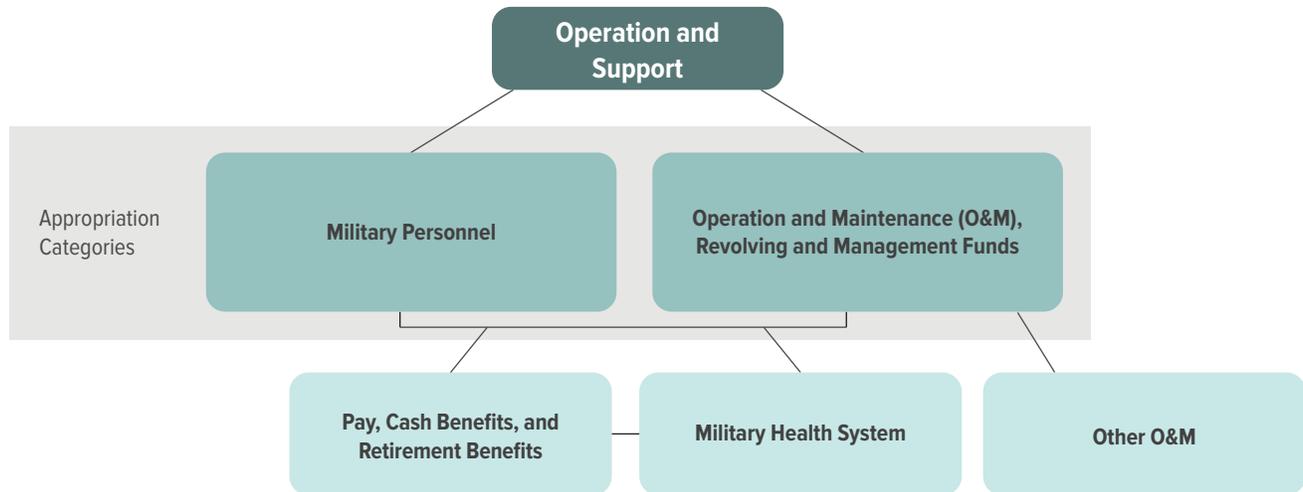
	2017	2021	2032
Military Personnel			
Military personnel in the MHS	9	9	9
TRICARE for Life accrual payments	6	7	10
Other military personnel	121	121	132
Total	135	136	151
Operation and maintenance^a			
Civilian personnel			
Civilian personnel in the MHS	7	8	9
Other civilian personnel	54	53	58
Subtotal	62	60	67
Operation and maintenance in the MHS excluding civilian personnel	26	27	39
Other operation and maintenance	120	130	152
Total	208	217	258
Total Appropriations for Operation and Support	343	353	409
Memorandum:			
Compensation ^b			
Military personnel ^c	135	136	151
Civilian personnel ^d	62	60	67
Total	197	196	218
Military Health System ^e			
Military personnel in the MHS	9	9	9
Civilian personnel in the MHS	7	8	9
Operation and maintenance in the MHS excluding civilian personnel	26	27	39
TRICARE for Life accrual payments	6	7	10
Total	48	50	67

Source: Congressional Budget Office.

DoD = Department of Defense; FYDP = Future Years Defense Program; MHS = Military Health System.

- For this analysis, CBO folded appropriations for most revolving and management funds (such as the one for the Defense Commissary Agency) into the appropriations for operation and maintenance.
- Compensation consists of pay, cash benefits, and accrual payments for retirement benefits. For civilians, it also includes DoD's contributions for health insurance.
- These amounts include costs for military personnel in the MHS and TRICARE for Life accrual payments (which are also shown under the MHS).
- These amounts include costs for civilian personnel in the MHS (which are also shown under the MHS). They do not include compensation for civilian personnel funded from accounts other than operation and maintenance.
- These amounts do not include MHS spending in accounts other than military personnel and operation and maintenance.

Figure 2-2.

Components of DoD's Base Budget, as Analyzed by CBO

Source: Congressional Budget Office.

DoD = Department of Defense.

prepare food, repair weapon systems, and operate information systems. The activities included in the category of Other O&M contribute significantly to the overall growth of O&M spending, according to CBO's analysis, yet little is known about why that growth occurs. (Box 2-1 describes how total O&M has grown—a trend likely to continue.)²

CBO estimated costs for compensation and medical care in a bottom-up manner. To do so, CBO estimated the number of people who will receive compensation or be eligible for medical care, enrollment and participation rates in different health care plans, and various factors relating to cost and price. Such estimates were not possible for the category Other O&M because of the variety of goods and services purchased. To estimate those costs, CBO used DoD's estimates through 2021 and projected costs from 2022 to 2032 on the basis of DoD's historical experience, with adjustments for changes in the size of the military force.

The Number of Military Personnel

The size of the military force contributes directly to all three major categories of O&S costs. One way DoD measures the size of its force is in end strength—the number of military personnel on the last day of the fiscal

year. DoD's plans include its projections of end strength for each service's active and reserve components for each fiscal year within the FYDP period. Lawmakers, via the annual National Defense Authorization Act (NDAA), limit end strength in ways that may not be consistent with DoD's plan.

In comparison with 2016 levels, DoD's 2017 plan would have reduced the total size of its force by 2 percent between 2016 and 2021—a decrease in end strength of about 29,000 personnel in the active force and about 10,000 personnel in the reserve and National Guard (see Table 2-2 on page 24). Almost all the reduction in end strength under DoD's 2017 plan would have occurred in the Army. From 2016 to 2018, the Army would have shrunk to a total force of 980,000: Its active-duty end strength would have dropped from 475,000 to 450,000 (a decrease of 5 percent); the Army Reserve's, from 198,000 to 195,000 (2 percent); and the Army National Guard's, from 342,000 to 335,000 (2 percent). DoD also estimated that, if future appropriations were consistent with the Budget Control Act caps now in effect through 2021, a further reduction in end strength would have been necessary. According to DoD, the Army would have again been subject to the largest cuts, needing to reduce its total force to 920,000.³

2. For more about the causes of growth in the O&M account, see Congressional Budget Office, *Trends in Spending by the Department of Defense for Operation and Maintenance* (January 2017), www.cbo.gov/publication/52156.

3. See National Commission on the Future of the Army, *Report to the President and the Congress of the United States* (January 28, 2016), Appendix D, pp. 122–123, www.ncfa.ncr.gov/.

However, Army leaders, as well as some policymakers and defense strategists, have warned that even the Army's planned end strength of 980,000 in the 2017 FYDP is too small. In response to those concerns, the National Defense Authorization Act for 2017, signed by President Obama on December 23, 2016, increased end strength limits for the Army to 1,018,000, or 28,000 more soldiers than DoD requested for 2017 and 3,000 more than was authorized for 2016.⁴ (Box 2-2 on page 25 examines the cost implications of both a smaller and a larger Army.)

Pay, Cash Benefits, and Accrual Payments for Retirement Benefits

The Obama Administration's 2017 budget request included \$197 billion in O&S funding for pay and benefits for DoD's military personnel and most of its civilian employees. About \$135 billion of that total was in the appropriation for military personnel, which supports DoD's active-duty service members and planned training activities for reserve and National Guard members (but not their potential activations for overseas conflicts, the funding for which comes from outside the base budget). CBO estimates that another \$62 billion to pay most of DoD's civilian workers would come from O&M funding.⁵ DoD projected that annual costs to pay military and civilian personnel would have decreased slightly by 2021, to \$196 billion (in 2017 dollars; see the memorandum in Table 2-1). That stability resulted from a combination of planned reductions in the number of personnel and planned growth in pay that would have remained below the projected rate of inflation. Extending DoD's plans beyond the FYDP period, CBO estimates that compensation costs would have grown by an average of 1.0 percent per year in real terms and reached \$218 billion in 2032. That increase was based on the assumptions that personnel levels would not change after 2021 and that both military and civilian pay would increase after 2021 apace with CBO's forecast of the growth rate in the Bureau of Labor Statistics'

employment cost index (ECI).⁶ Combining DoD's estimates for 2017 through 2021 in the 2017 FYDP with CBO's extension of those estimates for 2022 through 2032 yielded an increase in costs in that category of 0.7 percent per year, on average, from 2017 through 2032.

Pay and Cash Benefits for Uniformed Service Members

Pay and cash benefits for military service members are funded through the appropriation for military personnel, which includes basic pay, reenlistment bonuses, food and housing allowances, and other elements. Basic pay, determined by the service member's pay grade and years of service, is the largest component of compensation. DoD's appropriation for military personnel also is charged for accrual payments to the Military Retirement Fund; those payments are calculated to account for future retirement benefits to current military personnel. (DoD also provides health care benefits to service members and their families; see "The Military Health System" on page 26.)

Unless the Congress or the President acts, by law, the military basic pay table is adjusted at the start of each calendar year on the basis of growth in the ECI for private-sector wages and salaries.⁷ For military pay raises during the FYDP period, DoD's 2017 plan included increases that would have fallen short of CBO's forecasts of growth in the ECI through 2021.

For calendar year 2017, DoD requested a pay raise of 1.6 percent for military personnel—0.5 percentage points below the ECI increase reported by the Bureau of Labor Statistics for 2015, the latest year for which data were available when the 2017 budget request was prepared. DoD's 2017 plan included raises of 1.6 percent for calendar years 2018 and 2019 as well and then 1.8 percent for calendar year 2020 and 2.1 percent for

4. See National Defense Authorization Act for Fiscal Year 2017 (November 30, 2016), <https://go.usa.gov/xX5GG> (PDF, 3.9 MB).

5. Compensation for some civilian employees—about \$9.3 billion in 2017, CBO estimates—is paid from other appropriations and not included in the totals for O&M. For instance, some civilians in military laboratories are paid from the appropriation for research, development, test, and evaluation, and some civilians in acquisition program offices are paid from the appropriation for procurement.

6. For more on ECI and the National Compensation Survey, see Bureau of Labor Statistics, "National Compensation Survey" (accessed December 13, 2016), www.bls.gov/ncs/summary.htm.

7. 37 U.S.C. 1009 (adjustments of monthly basic pay) states that the percentage increase in basic pay for a given calendar year is equal to the percentage increase in the ECI published by the Bureau of Labor Statistics for private-sector wages and salaries from the third calendar quarter three years before the effective date of the pay raise to the third calendar quarter two years before the effective date.

Box 2-1.

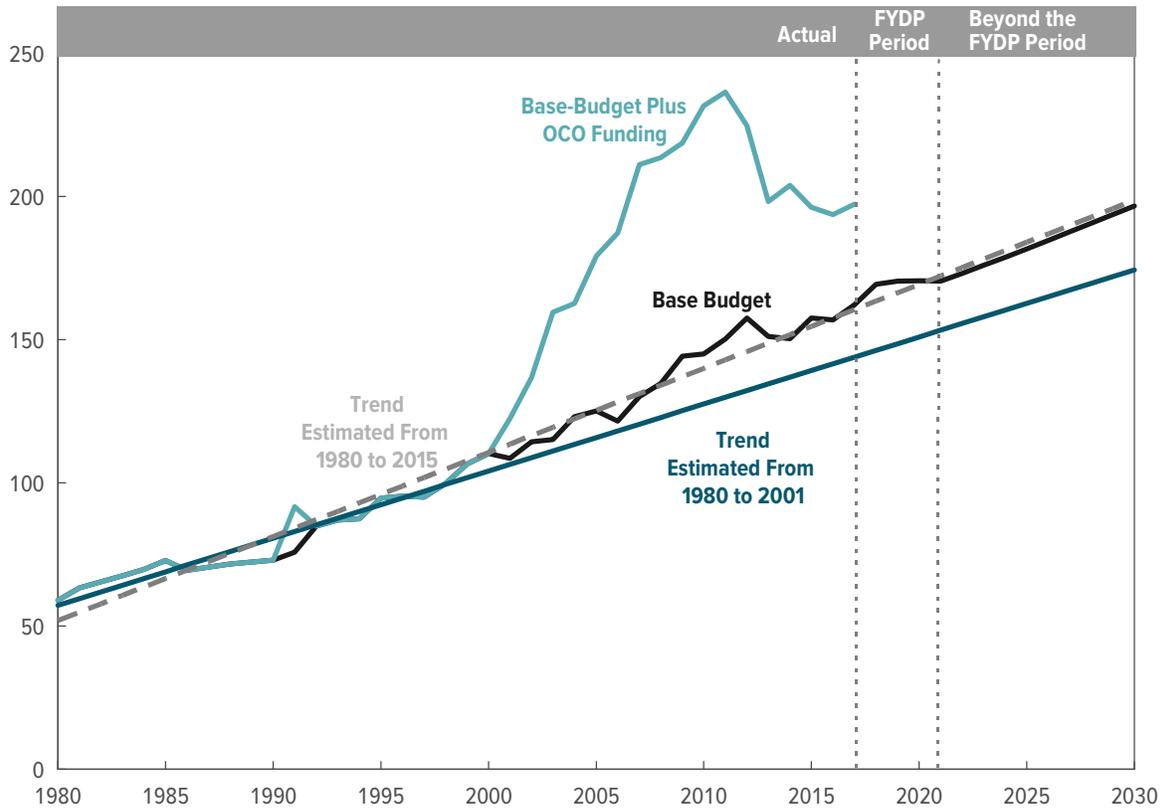
Historical and Projected Growth in Spending for Operation and Maintenance per Service Member

Appropriations for operation and maintenance (O&M) fund the day-to-day operations of the military, including equipment maintenance, training, civilian compensation, and most of the costs for military health care. O&M costs per active-duty service member have increased rapidly in the past and are projected to continue to do so in both the Department of Defense's (DoD's) 2017 Future Years Defense Program (FYDP) and the Congressional Budget Office's extension of that plan through 2032. If unabated, that growth can put pressure on other parts of DoD's budget, particularly forces and weapon systems.

O&M costs have been growing for decades. From 1980 to 2001 (the last year before the onset of major combat operations in Afghanistan and Iraq), O&M costs per active-duty service member doubled, rising from \$59,000 to \$122,000, in 2017 dollars (see the figure). The cost per active-duty service member grew steadily in most years, by an average of \$2,300, despite major shifts in defense funding, such as the military buildup of the 1980s and the reduction in forces at the end of the Cold War.

Cost of Operation and Maintenance per Active-Duty Service Member

Thousands of 2017 Dollars



Source: Congressional Budget Office.

No OCO funding is shown for 2018 and later.

FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

Continued

Box 2-1.

Continued

Historical and Projected Growth in Spending for Operation and Maintenance per Service Member

Growth patterns changed after 2001, when the onset of military operations in Afghanistan and Iraq caused DoD's total O&M costs to increase rapidly. After 2001, the total O&M budget included funding to support the forces engaged in those operations, as well as funding for the base budget to sustain the readiness of other U.S. forces. Several factors drive the high cost of O&M for combat operations, including repair of wear and tear on equipment used in those operations, higher costs to support deployed forces, and the large number of mobilized reserve and National Guard personnel. Adding the war-related costs to those in the base budget caused total O&M funding per active-duty service member to quickly depart from the historical trend from 1980 to 2001; by 2011, that quantity had essentially doubled again, reaching \$236,000 (in 2017 dollars).

Focusing on base-budget funding, however, is important in understanding longer-term trends. To estimate the base-budget costs between 2001 and 2015, CBO identified funds appropriated to cover war-related costs and removed them from the calculation of O&M per capita. That calculation yielded an O&M cost per active-duty service member in the base budget of \$157,000 in 2015 (in 2017 dollars)—about \$17,000 above what the trend between 1980 and 2001 would imply (see the solid black line in the figure). That higher cost reflects the accelerated spending on O&M per capita that occurred after 2001 in the base budget.

How O&M costs per active-duty service member might grow in the FYDP period and beyond is unclear. They could grow at a rate that reflects DoD's experience from 1980 through 2015. Or they could return to rates more in line with DoD's experience before the wars, as DoD's FYDP projects. If costs continued to grow at the rate that DoD experienced between 1980 and 2015, they would rise by about \$2,900 per year (see the dashed line in the figure). That higher rate may reflect a new, enduring trend in DoD's O&M costs, or it may reflect a shorter period of growth that occurred when defense budgets were flush and O&M spending in the base budget grew accordingly. DoD's 2017 plan suggests an expectation that growth in O&M costs will decelerate and return to rates much closer to what the department experienced from 1980 to 2001. According to DoD's estimates in the 2017 FYDP, O&M costs per active-duty service member would increase by an average of only \$2,100 per year, from \$162,000 in 2017 to \$170,000 in 2021 (in 2017 dollars). That projection suggests that DoD expected a yearly growth rate that is 12 percent below the 1980–2001 prewar trend and about 30 percent below the extended 1980–2015 trend.

CBO's projection of the total O&M costs of DoD's plans beyond the FYDP period does not use the historical trends in total O&M spending discussed here. Instead, the projection is based on estimates for civilian compensation and for the Military Health System that are calculated separately, as well as the historical trend for Other O&M for 1980 to 2015. Assuming that Other O&M costs follow the trend for 1980 to 2015, CBO projects that, under DoD's 2017 plans, total O&M costs per active-duty service member would reach \$203,000 in 2032, averaging growth of \$2,900 per year.

Other outcomes also are possible: For example, if Other O&M costs returned to a trend consistent with the years before the wars (1980 to 2001), O&M costs per active-duty service member would be lower and would reach \$197,000 per active-duty service member in 2032. Alternatively, if Other O&M costs returned to the faster growth observed from 2001 to 2015, O&M costs per active-duty service member would be higher and would reach \$208,000 per active-duty service member in 2032.

calendar year 2021.⁸ The fiscal year 2017 NDAA (enacted on December 23, 2016) included a pay raise in 2017 of 2.1 percent, 0.5 percent higher than DoD's original plan.⁹ CBO estimates that change would add \$1.5 billion to DoD's costs over the FYDP period and \$5.0 billion for 2017 through 2032.

CBO's estimate beyond 2021 is based on the assumption that military pay raises would equal the agency's forecast of the percentage increases in the ECI from 2022 through 2032. Increasing compensation at that rate is consistent with DoD's goals of maintaining competitive wages to reach goals for recruiting and retention.¹⁰

8. See Department of Defense, *Fiscal Year 2017 Budget Request: Overview* (February 2016), p. 6-6, <http://go.usa.gov/x9ecm> (PDF, 4.9 MB).

9. See National Defense Authorization Act for Fiscal Year 2017 (November 30, 2016), Conference Report to Accompany S. 2943, sec. 601, <https://go.usa.gov/xX5GG> (PDF, 3.9 MB).

10. DoD's goals for wages and compensation are stated in Department of Defense, *Report of the Eleventh Quadrennial Review of Military Compensation*, vol. 1 (June 2012), pp. 22, <https://go.usa.gov/xXN87> (PDF, 11 MB).

Table 2-2.

Plans for the Number of Military Personnel Under DoD's 2017 FYDP, 2016 to 2021

Thousands of Personnel

	2016	FYDP Period					Change in Personnel From 2016 to 2021	
		2017	2018	2019	2020	2021	Thousands	Percent
Army								
Active Force	475	460	450	450	450	450	-25	-5
Reserves	198	195	195	195	195	195	-3	-2
National Guard	342	335	335	335	335	335	-7	-2
Navy								
Active Force	327	323	322	324	324	323	-4	-1
Reserves	56	56	57	57	57	57	2	3
Marine Corps								
Active Force	182	182	182	182	182	182	0	0
Reserves	41	40	40	40	40	40	0	-1
Air Force								
Active Force	317	317	317	317	317	317	0	0
Reserves	69	69	69	69	69	69	-1	-1
National Guard	106	106	106	106	106	105	0	0
DoD Totals								
Active Force	1,301	1,282	1,271	1,273	1,273	1,272	-29	-2
Reserves	364	361	362	361	361	361	-3	-1
National Guard	448	441	441	441	441	440	-7	-2
Total Force	2,112	2,083	2,074	2,075	2,074	2,073	-39	-2

Source: Congressional Budget Office.

DoD measures the size of its force in terms of end strength—the number of military personnel as of the final day of a fiscal year.

DoD = Department of Defense; FYDP = Future Years Defense Program.

Retirement Benefits

In its 2017 plan, DoD proposed minor modifications to the retirement system put in place by the 2016 NDAA. That law changed the military retirement system by adding a defined contribution component, in which participants contribute to their own retirement saving, and by changing the rules for vesting in the system.¹¹ Proposed modifications in the 2017 plan included:

- Giving DoD the flexibility to use continuation pay (bonuses paid to service members who choose to remain in the military) selectively so the department can shape the profile of the military workforce instead of giving all service members continuation pay after 12 years of service (as would be the case under current law);
- Changing DoD's matching contributions to the federal retirement fund, the Thrift Savings Plan (TSP), from 4 percent to 5 percent;
- Changing when service members would vest in TSP from the first day of the third year of service to the first day of the fifth year of service; and
- Extending DoD's authority to make matching contributions to TSP for service members who serve beyond the current matching limit of 26 years of service.

11. For more information, see Congressional Budget Office, cost estimate for H.R. 1735, *Ten-Year Budgetary Effects of Changes to the Military Retirement System*, cost estimate for sections 631–635 or H.R. 1735, as cleared by the Congress on October 7, 2015 (October 14, 2015), www.cbo.gov/publication/50893. The 2016 NDAA incorporated many recommendations, though with some variations, from a commission chartered by the 2013 NDAA; see Military Compensation and Retirement Modernization Commission, *Final Report* (January 2015), pp. 19–41, <http://tinyurl.com/mcrmc-finrep>.

Box 2-2.

Uncertainty About the Army's Future Size

Under the 2017 Future Years Defense Program (FYDP), the Army would have had an end strength of 980,000 soldiers (including the active, Reserve, and Guard components) from 2018 through 2021. However, two countervailing pressures cause considerable uncertainty in that plan. On the one hand, the cost of the plan described in the Department of Defense's (DoD's) 2017 FYDP greatly exceeded the funding allowed for 2018 through 2021 under the Budget Control Act of 2011 (BCA), as amended. The Army has stated that if the BCA funding caps remain in force, the service would have to reduce the number of personnel to 920,000. On the other hand, some policymakers and defense strategists have expressed concerns that the planned size of the Army (including all three components) is too small to meet current and future national security demands; in their view, the Army's end strength should be larger than indicated in the 2017 FYDP.

To show how changes in force size might affect DoD's spending, the Congressional Budget Office estimated the costs of two alternative scenarios for the size of the Army. DoD's 2017 plans called for reducing the Army's end strength from 1,015,000 soldiers in 2016 to 990,000 soldiers in 2017 and further to 980,000 soldiers by 2018. In the first alternative scenario, the Army would reduce personnel levels to 920,000 by 2019, the target DoD has set if it has to comply with the BCA caps. In the second scenario, the Army would grow to 1,018,000 soldiers, the number authorized by the Congress for 2017—about the size it was before operations began in Iraq and Afghanistan.

Decreasing the Size of the Army. Under this scenario, the size of the military would be reduced so that, by 2019, DoD's budget would satisfy the BCA cap for that year. The size of the Army would remain unchanged thereafter. According to DoD's estimates, Army end strength would drop from the current 980,000 soldiers to 920,000, including 420,000 full-time and 500,000 part-time soldiers (see the table).¹ In relation to DoD's 2017 plans, those changes would reduce the cost of operation and support by \$20.9 billion over the 2017–2021 period and by \$80.5 billion for the years from 2017 through 2032.

Scenarios for Army End Strength

	Year	Number of Personnel (Thousands)				Change in Costs (Billions of 2017 Dollars)	
		Active Component	National Guard	Reserve	Total Force	2017–2021	2017–2032
DoD's 2017 Plan	2018	450	335	195	980	n.a.	n.a.
Plan to Comply							
With BCA Caps	2019	420	315	185	920	-20.9	-80.5
2017 NDAA	2017	476	343	199	1,018	13.3	43.7

Sources: Department of the Army, Fiscal Year 2017 Army Budget Overview (February 2016), <http://go.usa.gov/xXXHV>; National Commission on the Future of the Army, *Report to the President and the Congress of the United States* (January 2016), www.ncfa.ncr.gov/.

NDAA = National Defense Authorization Act; n.a. = not applicable.

Increasing the Size of the Army. The National Defense Authorization Act for 2017, which President Obama signed on December 23, 2016, increased end strength limits for the Army to 1,018,000, or 28,000 more soldiers than DoD requested for 2017.² The enacted end strength would return the Army to roughly its 2001 end strength levels (see the table). Although still substantially smaller than it was during the Cold War, the Army under that scenario would be about the same size as in the late 1990s and early 2000s.³ If that end strength was maintained beyond 2017, CBO estimates the additional operation and support cost of the larger Army would be \$13.3 billion over the 2017–2021 period and \$43.7 billion from 2017 to 2032 compared with DoD's 2017 plan.

All estimates are based on an average annual cost per additional soldier, which includes military pay, benefits, and some costs for operation and maintenance that CBO expects would scale with the size of the force. In the 2017 FYDP, DoD estimated that annual cost would be \$144,000 for an active-component soldier and \$30,000 for an Army National Guard or Army Reserve soldier in 2018. To estimate the cost of a larger Army, CBO assumed that military pay would rise according to DoD's plan over the rest of the FYDP period and by the employment cost index thereafter.

1. See Department of Defense, *Estimated Impacts of Sequestration-Level Funding, United States Department of Defense Fiscal Year 2015 Budget Request* (April 2014), Tables 3-1 and 3-2, <http://go.usa.gov/x9gHv> (PDF, 2.2 MB).
2. See National Defense Authorization Act for Fiscal Year 2017, Conference Report to Accompany S. 2943, Sec. 401 and 411, <http://go.usa.gov/x9ecX> (PDF, 4 MB).
3. See Department of Defense, *National Defense Budget Estimates for FY 2017* (March 2016), Table 7-6, <http://go.usa.gov/x9HTU> (PDF, 11 MB).

DoD estimated that its proposed changes to the military retirement system would cost about \$400 million in 2017 but save \$1.9 billion over the 2017–2021 period.¹² CBO has not independently estimated how those changes would affect the overall cost of military retirement.

Compensation for DoD's Civilian Employees

DoD also employs roughly 780,000 full-time-equivalent civilian employees, most of whom are paid from the O&M appropriation. DoD's 2017 plan included increases in the wages and salaries of civilian employees at rates equal to those planned for basic pay for military personnel for all years in the FYDP period. DoD did not specify a pay raise for civilians after 2021. Consistent with long-standing practice of maintaining parity between military and civilian pay raises, CBO's estimate beyond 2021 incorporates the same percentage pay raises for civilians and military personnel—with both following the ECI.¹³ That projection is consistent with DoD's long-term goals of remaining competitive in the civilian labor market and maintaining the quality of its personnel.¹⁴ Indeed, on December 8, 2016, the President announced a pay raise for 2017 of 2.1 percent for all federal employees.¹⁵ That measure maintains pay parity with military personnel and is 0.5 percent higher than DoD's original plan. CBO estimates that the change will add \$1.0 billion to DoD's costs over the FYDP period and \$3.4 billion for 2017 through 2032.

The Military Health System

More than 9 million people are eligible for health care benefits through the MHS, which administers the TRICARE program. Eligible beneficiaries as of 2015 included 1.5 million military personnel from active components or activated members of the reserves or National Guard; 2.0 million family members of those personnel; 5.4 million military retirees, their family members, and survivors; and 0.4 million nonactivated

reservists. Beneficiaries may seek free or subsidized care from military treatment facilities, regional networks of civilian providers under contract with TRICARE, or other civilian providers. DoD also manages TRICARE for Life, a program that lawmakers authorized in the 2001 NDAA to supplement Medicare for beneficiaries eligible for both Medicare and military health benefits.¹⁶

In this report, CBO does not consider the costs of the health care or other benefits that veterans receive from the Department of Veterans Affairs (VA). VA's budget request for 2017 was \$182 billion, or one-third the size of DoD's base-budget request. That total included \$69 billion to provide health care to veterans who have service-connected disabilities or who meet certain other criteria for eligibility. Other VA benefits include monthly cash payments that compensate for service-connected disabilities and GI Bill benefits that reimburse some costs of higher education.¹⁷ TRICARE benefits are available to all the roughly 2 million retired service members—most of whom served for at least 20 years—and their eligible family members. VA benefits, however, are potentially available to the much larger population of 22 million veterans who received honorable or general discharges from their (typically shorter) military service.

DoD requested \$48 billion in O&S funding for the MHS in 2017, about 9 percent of the total funding requested for the department's base budget.¹⁸ Under DoD's assumptions in the 2017 FYDP, the costs of the MHS would have reached \$50 billion (in 2017 dollars) by 2021, suggesting growth well below historical experience of 1.2 percent annually (excluding the effects of inflation). Extending DoD's 2017 FYDP, CBO estimates that those costs would have reached \$67 billion by 2032 if their growth reflected anticipated national trends in health care costs after 2021 (see Figure 2-3).

12. See Department of Defense, *Fiscal Year 2017 Budget Request: Overview* (February 2016), pp. 6–6–6–7, <http://go.usa.gov/x9ecm> (PDF, 4.9 MB).

13. In all but 9 of the past 32 years, pay raises for military and civilian personnel were the same. The civilian raise was larger in 1994, whereas the military raise was larger in the other 8 years.

14. Department of Defense, *Fiscal Year 2017 Budget Request: Overview* (February 2016), p. 6–18, <http://go.usa.gov/x9ecm> (PDF, 4.9 MB).

15. See “Text of a Letter From the President to the Speaker of the House of Representatives and the President of the Senate,” <http://go.usa.gov/x9sjsx>.

16. For more on the MHS, see Congressional Budget Office, *Approaches to Reducing Federal Spending on Military Health Care* (January 2014), www.cbo.gov/publication/44993.

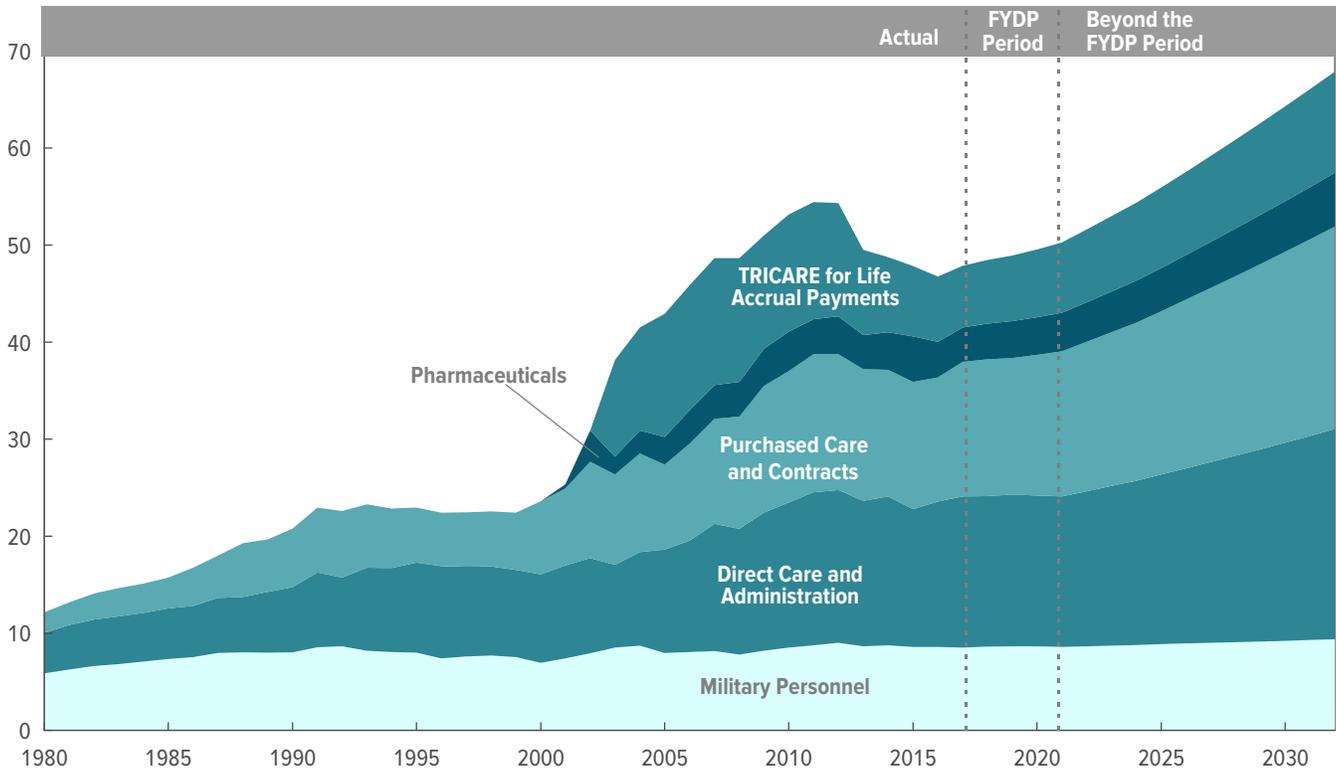
17. For more on VA's disability compensation program, see Congressional Budget Office, *Veterans' Disability Compensation: Trends and Policy Options* (August 2014), www.cbo.gov/publication/45615.

18. The \$48 billion in O&S funding cited in CBO's projection of O&S costs excludes the relatively small amounts that the MHS receives for procurement; military construction; and research, development, test, and evaluation (which together totaled \$2 billion in DoD's request for 2017). CBO's estimates for the corresponding appropriation totals in the following chapters include those costs.

Figure 2-3.

Costs of DoD's Plans for Its Military Health System Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Supplemental and emergency funding for overseas contingency operations is included for 2016 and earlier but not for later years.

Before 2001, pharmaceutical costs were not separately identifiable but were embedded in the costs of two categories: Purchased Care and Contracts and Direct Care and Administration. In 2001 and later years, most pharmaceutical costs are separately identifiable, but some are embedded in the category TRICARE for Life Accrual Payments.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

The implied growth rate—2.4 percent annually, on average, from 2017 through 2032—is considerably higher than the rate that CBO estimates for the other two major categories within O&S but below DoD's experience since 1999.

Major Budget Categories in the MHS

DoD's budget documents delineate medical costs in five major categories:

- *Military Personnel* covers the costs of pay and benefits for uniformed personnel assigned to work in the MHS. CBO's tally of the total cost of the MHS includes those costs, as does its measure of total pay and benefits for service members, but CBO's

projection of overall O&S costs counts them only once (see the memorandum in Table 2-1).¹⁹

- *Direct Care and Administration* covers the operation of military medical facilities and administrative and training activities. The category includes pay and benefits for civilian personnel assigned to work in those facilities but excludes pay and benefits for military personnel who work in those facilities (the Military Personnel category includes those costs).

19. For example, the same \$9 billion of funding for military personnel in the MHS in 2017 appears twice in Table 2-1, once under the military personnel appropriation and again as part of the cost of the MHS.

- *Purchased Care and Contracts* covers medical care delivered by providers in the private sector, both inside and outside the TRICARE network.
- *Pharmaceuticals* covers the costs of purchasing medicines dispensed at military medical facilities, at pharmacies inside and outside DoD's network, and through DoD's mail-order pharmacy program.
- *TRICARE for Life Accrual Payments* covers funds included in DoD's military personnel appropriation that are, in turn, credited to the Medicare-Eligible Retiree Health Care Fund. Outlays from that fund are used for two purposes: to reimburse military medical facilities for care provided to military retirees and their family members who are also eligible for Medicare, and to cover most of the out-of-pocket costs that those beneficiaries would otherwise incur when seeking care from private-sector Medicare providers. (Those accrual payments are included both in the cost of military personnel and in CBO's tally of the total cost of the MHS, but CBO's projection of overall O&S costs counts them only once.)
- Replace TRICARE Prime, Standard, and Extra (the "triple option" for which TRICARE was originally named) with two choices, an HMO-like plan and a PPO-like plan, for dependents of active-duty service members and for retirees and their non-Medicare-eligible dependents. Beneficiaries would see slightly higher fees and copayments that would rise automatically in future years with the growth rate of National Health Expenditures (a product of the Centers for Medicare & Medicaid Services). Retirees and their family members would have to pay an annual participation fee.
- Institute an annual fee for military retirees newly eligible for Medicare and who enroll in TRICARE for Life (the fee would not apply to participating retirees). The new fee would ramp up through 2020 and thereafter rise automatically with the growth rate of National Health Expenditures.
- Raise copayments for prescription drugs beyond the increases enacted in the 2016 NDAA as further incentives for beneficiaries to use medicines judiciously.²⁰

The costs of the MHS may be organized in various ways depending on the purpose of the analysis. One way is to remove the costs of civilian personnel from the accounts for direct care and administration to highlight the respective costs of military and civilian personnel in the MHS and elsewhere in DoD's base budget (see Table 2-1). However, in CBO's assessment, more useful projections are possible by using a taxonomy of costs that corresponds to the functions the MHS performs rather than to the budgetary accounts funding the system.

Therefore, CBO projects the costs of the MHS in four parts: military personnel; civilian personnel; a combination of direct care and administration (excluding civilian personnel), purchased care and contracts, and drugs; and TRICARE for Life accrual payments. The components in the third category are grouped because common factors such as the number of beneficiaries in the TRICARE program and cost trends in the nation's health care system as a whole tend to drive their costs.

DoD's Proposed Changes to TRICARE

To slow the growth of health care costs, DoD's 2017 budget included the following proposed changes to the TRICARE benefit, implementation of which would have begun in 2017 and been completed by 2020:

DoD estimated that the proposed changes would increase O&M costs in the first year of implementation (2017) by \$40 million, with costs for program consolidation overshadowing savings from increasing pharmacy and other fees. The department estimated that it would save \$280 million in TRICARE for Life accrual payments (from the military personnel appropriation) and \$313 million from the proposed increase in pharmacy copayments in that first year.²¹ Over the period from 2017 to 2021, O&M costs would have been reduced by

20. See Department of Defense, *Fiscal Year 2017 Budget Request: Overview* (February 2016), pp. 6-9-6-15, <http://go.usa.gov/x9ecm> (PDF, 4.9 MB). The 2016 NDAA allowed small increases in retail and mail-order pharmacy copayments; see Department of Defense, *TRICARE Pharmacy Copays Change February 1, 2016* (December 30, 2015), <http://go.usa.gov/x8HMQ>.

21. In a cost estimate for legislation (such as an NDAA that would authorize those changes), CBO would not generally credit the \$280 million savings in accrual payments in the first year. Because NDAAs often are not enacted until well into the first quarter of the fiscal year to which they apply, DoD's Office of the Actuary would have difficulty computing the new accrual rates in time for application until the next year. However, CBO includes those savings here because they were built into DoD's 2017 FYDP.

\$3.6 billion, and accrual payments by \$3.1 billion, according to DoD. Both DoD's estimates of costs in the 2017 FYDP and CBO's projection of costs beyond the FYDP period incorporated those savings.

In the 2017 NDAA, the Congress adopted most of DoD's proposals to reform TRICARE—specifically, those that would increase out-of-pocket costs for retirees. However, most of the enacted changes will affect only people who join the military after 2018. Because most of them will not retire for 20 years, any savings that accrue from the new system will not be realized until 2038—outside CBO's projection window.

Projected Costs for the MHS After 2021

CBO projects that the costs of operating the MHS would have grown more rapidly beyond the FYDP period than they were projected to grow during the FYDP under DoD's 2017 plan. Since 2013, the MHS has limited its cost growth—in contrast to the longer-term trend observed since 1999, when TRICARE in its current form was fully implemented. Because of complex interactions among several factors, the exact reason for the slower growth since 2013 is hard to identify. Those factors include reductions in the size of the military over that period, a nationwide slowdown in the growth of health care costs, decisions about military medical readiness levels, and changes in how programs are administered.

Under the 2017 FYDP, DoD expected that health care costs would continue to grow slowly through 2021, in part because of the policy initiatives that it had proposed to the Congress. Beyond the FYDP period, however, CBO expects costs to grow faster than DoD expected during the FYDP period for three reasons. First, the private sector supplies about half of the care funded through TRICARE, and CBO expects that those costs will rise faster than inflation in the general economy. In fact, in its 2017 plan, DoD requested that future TRICARE fees and copayments be indexed to changes in total U.S. health care spending. That request suggests that the department believed its spending on health care would grow at the national rate in later years.²² Second, the number of military retirees who use TRICARE is expected to continue increasing, so DoD will soon pay for more beneficiaries each year. Finally, in 2008,

22. DOD has requested indexing to the per capita rise in National Health Expenditures, the official estimate of total U.S. health care spending.

TRICARE began receiving a special discount, known as the Federal Ceiling Price, for covered drugs sold by retail pharmacies. Although that discount pricing slowed cost growth from its historical levels, further reductions from manufacturers are unlikely. For those reasons, CBO estimates that after 2021 the growth rate in military health care spending for direct care and administration, purchased care and contracts, and pharmaceuticals will match that of national health care spending for the U.S. population younger than 65.

CBO's projection beyond 2021 for military MHS employees' pay and benefits (which are paid from the military personnel appropriation) is based on the same series of annual increases as for all other military personnel (discussed above). Compensation for military and civilian personnel in MHS does not contribute significantly to the overall increase in costs that CBO projects for the MHS. That compensation is smaller than in most of the other major categories and is projected to grow more slowly.

In extending DoD's estimates of the costs of direct care and administration, purchased care and contracts, and pharmaceuticals, CBO used the estimates from DoD's FYDP for 2017 through 2021. CBO projects that, after 2021, the costs per beneficiary in those three categories would grow at the same rate that CBO projects for health care costs nationwide (apart from the Medicare program, which differs in important ways from the rest of the health care system). Under CBO's extension of the 2017 FYDP, the real annual growth in costs per beneficiary over the 2017–2032 period would have averaged 2.2 percent for direct care and administration, 2.8 percent for purchased care and contracts, and 3.0 percent for pharmaceuticals.²³

For TRICARE for Life accrual payments (also paid from the military personnel appropriation), CBO's projection is derived from data supplied by DoD's Office of the Actuary. That office's projection implied that accrual payments would have grown at an average annual rate per

23. In nominal terms, those average annual growth rates for the 2017–2032 period would have been 4.3 percent for direct care and administration, 4.8 percent for purchased care and contracts, and 5.1 percent for drugs. The calculation of the growth rate for drugs excludes some pharmacy costs that are not paid explicitly from O&M funds but are embedded in the accrual payments for TRICARE for Life.

service member of about 5.5 percent (excluding the effects of inflation) between 2017 and 2032 under DoD's 2017 plan.

Other O&M Costs

The rest of O&S spending is for a category CBO refers to as Other O&M, which amounted to about \$120 billion, 58 percent of total O&M or 35 percent of the O&S funding DoD requested for fiscal year 2017. Funding for that category pays for all O&M activities except for the MHS and compensation for DoD's civilians. Some functions in Other O&M include professional and other services, equipment maintenance, property maintenance, transportation, and fuel. CBO also included in that category appropriations for most revolving and management funds, about \$1.4 billion in the budget for fiscal year 2017.

A variety of functions contribute to the costs in the Other O&M category. Therefore, it was not practical for CBO to build an estimate beyond the FYDP period from the bottom up—that is, to develop estimates for the costs of the various components involved and then add those estimates—as the agency did to project the costs of compensation and military health care. Instead, CBO used a top-down approach to project Other O&M costs for the years beyond the FYDP period.

The top-down approach to projecting spending for Other O&M is based on observing the changes in Other O&M per capita—Other O&M spending divided by the total number of active-duty military personnel. Because it isolates changes in Other O&M costs over time from changes in the size of the force, the Other O&M per capita metric better represents the expected changes in costs from the Other O&M category. That per capita metric is used to project growth in costs and does not reflect the incremental cost of adding one more service member.

Other O&M costs per active-duty service member have grown steadily since 1980. Costs in that category were projected to increase by an average annual rate of 1.3 percent from 2017 through 2032 (excluding the effects of inflation) under DoD's estimates in the 2017 FYDP and CBO's extension of those estimates.

Under the 2017 FYDP, DoD estimated that costs within the Other O&M category would increase from

\$120 billion in 2017 to \$128 billion in 2018 and then remain nearly constant, reaching \$130 billion in 2021. The average rate of growth was about 1.9 percent per year in real terms over the FYDP period. CBO projected costs in the Other O&M category beyond the FYDP period by using the historical trend in the growth of those costs per active-duty service member from 1980 to 2015—about \$1,600 per person per year. By that method, CBO estimates that Other O&M costs would reach \$152 billion in 2032 under DoD's 2017 plans, growing at an average annual rate of about 1.5 percent after 2021.

The growth rate that CBO used to project Other O&M costs is slower than DoD's experience from 2001 to 2015. Growth in Other O&M costs in the base budget over those years accelerated sharply, diverging from the historical trend of the preceding two decades. However, DoD's 2017 plan suggested that it is expecting the faster growth that has characterized the period after 2001 to be ending. According to the department's estimates, growth toward the end of the FYDP period would occur more slowly than it did between 1980 and 2001. To account for the cyclical nature of Other O&M spending, CBO used the trend observed from 1980 to 2015 to project those costs from 2022 to 2032.

The sources of historical growth in Other O&M costs cannot be readily determined from total budget data; several factors could have caused that growth. For example, DoD may have used O&M funds to hire more contractors over time to perform services and carry out functions that did not exist in earlier years or that military personnel had previously performed.

Another factor, the increasing costs to operate and maintain weapon systems, may also have contributed to rising Other O&M costs. Such increases may have occurred either because aging weapon systems may become more expensive to operate (particularly near the end of their service life) or because new, more modern weapon systems may be more expensive to maintain and operate than the systems they replace. The average ages of many of DoD's weapon systems have increased since the 1990s because the replacement rate has slowed in recent decades. Alternatively, the more modern systems that DoD deploys may be more expensive to operate throughout their service life than were their predecessors because modern systems are more capable and technically

complex. That effect may result in upward pressure on Other O&M costs across generations of weapon systems.

Still other factors, harder to identify, may have contributed to the growth in Other O&M costs. For example, recent CBO analyses suggest that greater spending for equipment maintenance and property maintenance services provided by contractors probably contributed to the growth in Other O&M costs.²⁴

Why O&S Costs Under DoD's Plans Could Have Been Higher Than the Department Estimated

In extending DoD's 2017 plans for O&S costs to the decade beyond the FYDP period, CBO used DoD's estimate of costs in 2021 as the starting point. For later years, CBO projected costs based on DoD's estimates, where available, or estimates of costs for the general economy otherwise. For example, the calculation of costs for military pay is based on DoD's 2017 FYDP for 2017 through 2021 and on CBO's forecast of the ECI of the general economy for 2022 through 2032.

In the past, however, DoD has misestimated the prices of various elements of its plans or has not been permitted by the Congress to implement some of the policies that underpinned its budget submission and associated cost estimates. As a result, the O&S costs of DoD's plans have often turned out to be different from (usually higher than) estimated costs.

CBO examined how different prices or policies related to O&S activities might affect the total costs projected for DoD's 2017 plans through 2032. That analysis focused on three areas in which the deviations between DoD's assumptions and recent history or current events created the largest uncertainty in DoD's planned costs and policies: military pay raises, civilian pay raises, and military health care.

To show how such differences affect outcomes, CBO prepared alternative projections of O&S costs under different assumptions.

Military Pay Increases With the ECI Instead of the Lower 2017 FYDP Rate

According to DoD's 2017 FYDP, pay raises for uniformed service members through 2021 would have been lower than CBO's projection of the percentage increases in the ECI. Under current law, military pay raises are benchmarked to the ECI unless a different amount is approved in legislation for a particular budget year. Possibly in response to the fiscal constraints of the Budget Control Act, pay raises over the past few years have been lower than the ECI benchmark.

The increases in pay that took effect between calendar years 2001 and 2010, however, all exceeded the corresponding percentage change in the ECI by at least 0.5 percentage points. For example, for calendar years 2007 through 2010, DoD requested a pay raise equal to the percentage increase in the ECI (the value that would have prevailed by default without Congressional action), but the Congress acted and the President acceded to pay raises equal to the percentage increase in the ECI plus 0.5 percentage points. For calendar years 2011 through 2013, DoD continued to request pay raises equal to the recent percentage increases in the ECI, and those raises were enacted. In calendar years 2014 and 2015, the ECI benchmarks were 1.8 percent, but DoD requested and lawmakers enacted pay raises of only 1.0 percent. In 2016, the pay raise of 1.3 percent was 1.0 percentage point below the ECI increase of 2.3 percent.

CBO explored what might happen if pay raises returned to the pace of the ECI in future years, which could happen for two reasons. First, the ECI remains the statutory benchmark for the military pay raise, as established in 2007. Second, despite both positive and negative deviations from that benchmark, the average pay raise for military personnel from 2007 through 2016 matched the average percentage increase in the ECI. In contrast to DoD's plan, pay raises could match CBO's forecast of growth in the ECI for each year of the FYDP, from 2017 through 2021, and continue through the end of CBO's projection in 2032. Under that assumption, the projected costs (in 2017 dollars) for military compensation would be \$13.1 billion higher from 2017 to 2021 and—because those higher pay raises would compound with later pay raises—\$73.6 billion higher for 2017 through 2032 than indicated in the 2017 FYDP (see Table 2-3).

24. See Derek Trunkey, "Trends in Operation and Maintenance Spending by the Department of Defense" (presentation to the 91st Annual Conference of the Western Economic Association International, Portland, Oregon, July 1, 2016), www.cbo.gov/publication/51731.

Table 2-3.

Changes in Operation and Support Costs With Respect to the 2017 FYDP Under Alternative Policy Assumptions

Billions of 2017 Dollars

	Average Annual Increase		Total Increase		
	2017–2021	2022–2032	2017–2021	2022–2032	2017–2032
Increase Military Pay at the Rate of the ECI Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	2.6	5.5	13.1	60.5	73.6
Increase Civilian Pay at the Rate of the ECI Minus 0.5 Percentage Points (Current Statute) Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	1.0	2.4	4.8	26.3	31.2
Increase Civilian Pay at the Rate of the ECI Instead of the Lower Rate Assumed by DoD for 2017 Through 2021	1.7	3.6	8.3	39.8	48.0
Do Not Implement DoD's Proposal to Consolidate TRICARE Plans and Increase Various Fees	0.7	1.3	3.4	14.2	17.6
Do Not Implement DoD's Proposal to Raise Pharmacy Copayments	0.4	0.5	1.9	5.7	7.6
Do Not Implement DoD's Proposal to Institute TRICARE for Life Annual Enrollment Fees	0.3	0.4	1.4	3.9	5.3

Source: Congressional Budget Office.

DoD = Department of Defense; ECI = employment cost index for wages and salaries in the private sector, as reported by the Bureau of Labor Statistics; FYDP = Future Years Defense Program.

Civilian Pay Increases Faster Than the Rate in DoD's 2017 FYDP

Two statutes govern raises for federal civilian workers. One sets the national pay schedules, linked to the ECI minus 0.5 percentage points.²⁵ The other allows targeted pay increases to account for regional differences in the cost of living.²⁶ Over the past decade, from 2007 to 2016, the total civilian pay raise (which includes both the increase tied to the ECI and the increase tied to locality) has averaged 0.7 percentage points less than the percentage increase in the ECI.²⁷ Over the past quarter of

a century, from 1991 to 2016, the total civilian pay raise has been higher, averaging about the same as the percentage increase in the ECI.

CBO examined two alternative projections for civilian pay raises. The first projection follows the statute governing adjustment of civilian pay schedules: The civilian pay raise in each year from 2017 through 2021 would equal the percentage increase in the ECI minus 0.5 percentage points. After 2021, the civilian pay raise would equal the full percentage increase in the ECI. The second alternative projection incorporates the assumptions that parity exists between the civilian and military pay raises and that those pay raises correspond to CBO's forecast of growth in the ECI for 2017 through 2032. Both alternatives for civilian pay imply larger pay raises than DoD incorporated in its 2017 FYDP, which

25. 5 U.S.C. §5303 (annual adjustment to pay schedules) states that the percentage increase in basic pay for a given calendar year is equal to one-half of one percentage point less than the percentage increase in the ECI for private-sector wages and salaries from the third calendar quarter three years before the effective date of the pay raise to the third calendar quarter two years before the effective date.

26. 5 U.S.C. §5304 (locality-based comparability payments) governs changes in locality pay increases.

27. See Department of Defense, "National Defense Budget Estimate for FY 2017" (March 2016), Table 5-12, p. 73, <http://go.usa.gov/x9HTU> (PDF, 11 MB).

fell short of CBO's forecast of ECI growth by more than 0.5 percentage points each year from 2017 through 2021.

Under the first alternative, the projected costs for civilian compensation (in 2017 dollars) were \$4.8 billion higher for 2017 to 2021 and \$31.2 billion higher for 2017 through 2032 than in the 2017 FYDP (see Table 2-3). Under the second alternative, the projected costs were \$8.3 billion higher for 2017 to 2021 and \$48.0 billion higher for 2017 through 2032 than indicated in the 2017 FYDP.

Proposed Policy Changes for the Military Health System Are Not Adopted

In the 2017 FYDP, the MHS's costs were projected to grow at an average annual rate of 1.2 percent above the rate of inflation from 2017 to 2021. DoD's estimate incorporated the assumption that the Congress would adopt the cost-reduction measures the department proposed in its 2017 budget submission. The Congress, however, had rejected similar proposals each year between 2007 and 2011 and again between 2013 and 2016.²⁸ In the 2016 NDAA, for example, the Congress allowed a modest one-time increase to pharmacy copayments. But

lawmakers rejected DoD's 2016 proposals to consolidate the three TRICARE plans and to introduce new fees for emergency department care and for enrolling in TRICARE for Life.²⁹

DoD's budget request for 2017 called for a different consolidation (from three TRICARE plans to two) and a different set of increases in fees and copayments, as described above. On the basis of DoD's estimates of the savings from the proposed initiatives, CBO estimates how much costs would increase if lawmakers did not approve those initiatives (see Table 2-3). First, rejecting the consolidation of the three TRICARE plans and associated fees (other than pharmacy fees) would have avoided \$57 million in implementation costs in 2017 but, on balance, would have increased projected costs by \$3.4 billion in relation to the 2017 FYDP for 2017 to 2021. Second, rejecting the increases in pharmacy copayments would have increased projected costs by \$209 million in O&M funding and \$1.7 billion in accrual payments (from the military personnel account) for a total of \$1.9 billion over the FYDP period. Finally, rejecting the new enrollment fee for TRICARE for Life would have increased projected costs by \$1.4 billion over the FYDP period.

28. For the legislative history through 2011 of cost-sharing proposals for TRICARE, see Congressional Budget Office, *Costs of Military Pay and Benefits in the Defense Budget* (November 2012), Appendix C, www.cbo.gov/publication/43574.

29. The pharmacy copayments are addressed in the NDAA for Fiscal Year 2016, sec. 702.

Projected Acquisition Costs

Acquisition funding comprises the appropriations for procurement and for research, development, test, and evaluation. Those appropriations are used, for example, to develop and buy new weapon systems and other major equipment, upgrade the capabilities or extend the service life of existing weapon systems, and research technologies for future weapon systems. For 2017, the Obama Administration requested \$174 billion for acquisition in the base budget: \$103 billion for procurement and \$71 billion for RDT&E. That amounted to one-third of its total request for the Department of Defense, excluding funding for overseas contingency operations. For 2017, \$9.9 billion of the \$59 billion requested for OCO was for acquisition—almost entirely for procurement.¹

CBO analyzed DoD's estimates of the costs of its acquisition plans during the five years covered by the 2017 Future Years Defense Program and extended those estimates through 2032 by using DoD's estimates of costs as a basis. To do so, CBO assessed long-term funding for procurement and RDT&E, including the costs for more than 200 weapon systems and major upgrades to existing systems.

In DoD's estimation, the costs (in 2017 dollars) to implement its 2017 plans for acquisition would have jumped to \$187 billion in 2018 but then edged down, averaging \$182 billion over the final three years of the 2017 FYDP (see Figure 3-1). The annual average for 2018 through 2021 would have been 5 percent larger than the amount requested for 2017. Also, the distribution of acquisition costs would have shifted slightly more toward procurement, rather than RDT&E, over that period. By 2021, procurement funding would

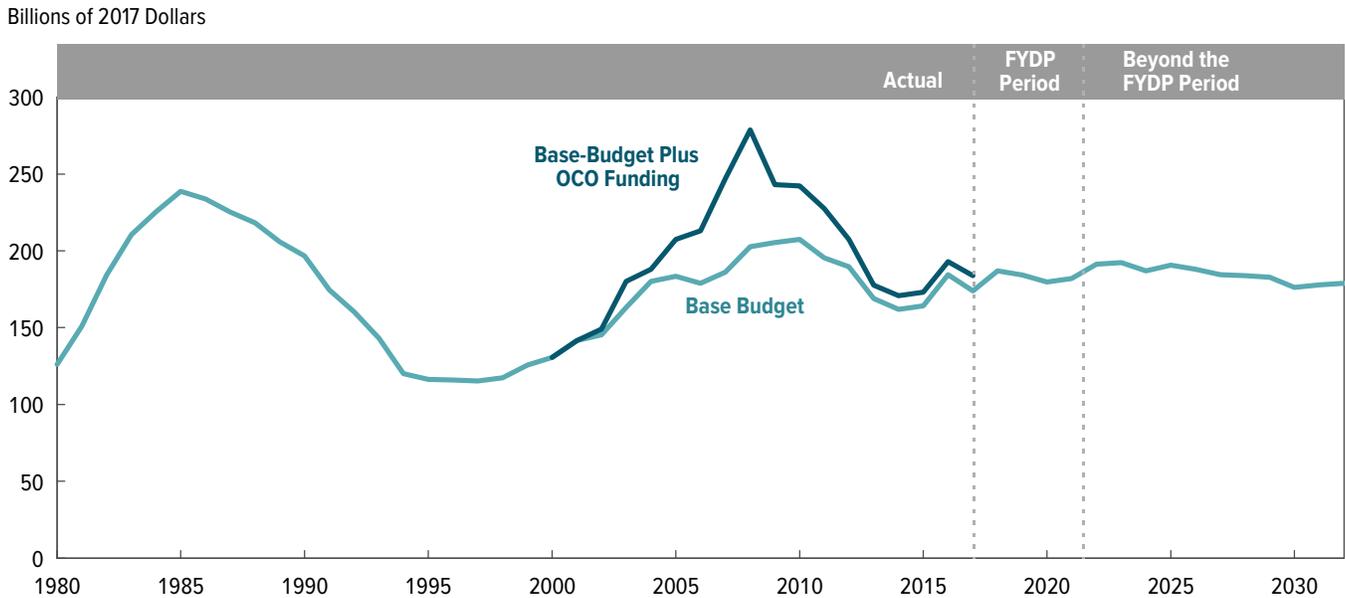
have been about 12 percent higher and RDT&E funding 7 percent lower than the amount DoD requested for 2017. The distribution of costs for acquisition among the services over that time would have remained similar.

According to CBO's analysis, the cost of the acquisition plans associated with DoD's 2017 FYDP would have been higher still in the years beyond the FYDP period. CBO used DoD's 2017 cost estimates for its major weapons programs as a basis for its projection. By CBO's estimates, the costs of DoD's 2017 acquisition plans would have increased by 5 percent to \$191 billion from 2021 to 2022, the first year after the FYDP period, and then averaged \$187 billion for 2023 through 2029. Costs would have decreased thereafter, averaging \$178 billion over the last three years of CBO's projection period. By that time, many of the department's current modernization programs (in particular, several Navy and Marine Corps aircraft programs) would have been completed. DoD has not, however, articulated detailed plans for many modernization programs that might be needed toward the end of CBO's projection period. CBO's analysis included several such programs—for example, new fighter programs for the Navy and Air Force and new armored vehicles for the Army. However, the projected costs after 2029 might not have declined if modernization efforts for the late 2020s proved to be more extensive than those captured in CBO's analysis.

The projected costs of DoD's 2017 acquisition plans would be higher still if DoD's cost estimates for its programs were low, as has often been the case. Under the alternative assumption that acquisition costs would generally follow the historical pattern instead of DoD's estimates, CBO projects costs for DoD's 2017 acquisition plans that were 2.7 percent higher than what DoD estimated over the FYDP period and 6.1 percent higher for 2022 through 2032. Furthermore, the Trump Administration has signaled that it might substantially change the acquisition plans described in the 2017 FYDP. Specifics have not been formally unveiled, but measures

1. For 2001 to 2016, more than \$374 billion in OCO and other supplemental funds was appropriated for acquisition. Those funds have been used for various purposes, including replacing equipment destroyed in battle and buying new types of equipment, such as mine-resistant vehicles, for use in Iraq and Afghanistan.

Figure 3-1.
Costs of DoD's Acquisition Plans Under the 2017 FYDP



Source: Congressional Budget Office.

Base-budget data include supplemental and emergency funding before 2001. For 2001 to 2017, supplemental and emergency funding for OCO is shown separately from the base-budget data. No OCO funding is shown for 2018 and later.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified; OCO = overseas contingency operations.

such as curtailing or canceling some major programs as well as significantly increasing others have been mentioned. If implemented, those changes would result in even larger differences in costs from the plans in DoD's 2017 FYDP.

How CBO Projected Acquisition Costs

Developing and procuring a weapon system typically takes many more than the five years covered by the FYDP. Therefore, large parts of DoD's acquisition plans extend well beyond that period. Although DoD releases some information about its longer-term plans (in, for example, documents such as Selected Acquisition Reports and the Navy's 30-year shipbuilding plan), it does not offer a projection of what its total acquisition costs might be beyond the FYDP period.

To project acquisition costs beyond the FYDP period, CBO used one approach for major programs and another for smaller programs and more general activities in research and technology development. For major weapon systems or major upgrades to existing systems, CBO estimated costs on a program-by-program basis. Some of those systems are in or nearing production (for example,

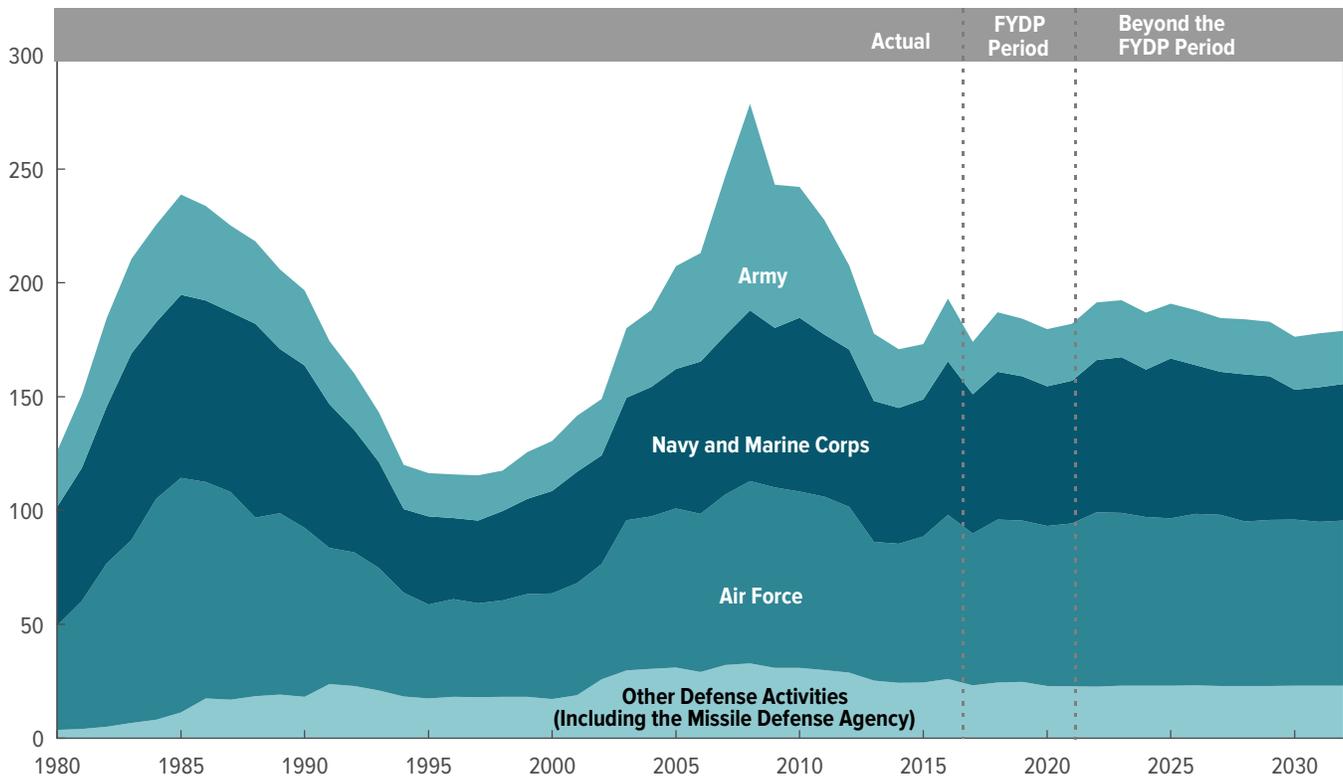
the Marine Corps CH-53K helicopter), and some are in early stages of development (for example, a new long-range bomber for the Air Force). Others (for instance, a replacement for the Navy's F/A-18E/F fighter) have no detailed schedules. But the services or CBO identified those systems as necessary—either to replace systems that would reach the end of their service life during or shortly beyond the projection period or to develop new capabilities to meet the services' stated policy goals.

Where possible, CBO used information from DoD to estimate the costs and schedules to develop and procure future systems. Sometimes no such information was available (such as for systems that will not enter development until near the end of CBO's projection period). CBO then based its cost estimates on the assumption that the services would replace retiring weapon systems with similar but technologically modern ones. For smaller programs and general research and development activities, CBO based its projections on policies either stated or implied in DoD's planning documents or on historical relationships between total acquisition funding and the funding for large programs.

Figure 3-2.

Costs of DoD's 2017 Acquisition Plans, by Military Service

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category shows total funding (including overseas contingency operations) for 1980 to 2016 and planned base-budget funding from 2017 to 2032.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

CBO grouped the acquisition costs into several categories. Costs for procurement are grouped into categories that correspond closely with the services' appropriation accounts. For example, CBO's category for Air Force aircraft corresponds generally with the "Aircraft Procurement, Air Force" appropriation account. Because CBO's categories are service specific, they are described in the individual service sections below. Each service's costs for RDT&E are presented as a separate category.

How Acquisition Costs Are Distributed Across the Services

In the Obama Administration's plans for 2017, the Army was slated to receive 13 percent of the budget request for acquisition; the Department of the Navy (including the Marine Corps), 35 percent; and the Air Force, 38 percent.² The remaining requested funding was for defensewide activities. The distribution of costs for acquisition among the services remained about the

same over the 2017 FYDP period (see Figure 3-2). The Army's and Air Force's shares of acquisition costs would have increased slightly with correspondingly small decreases for the Navy and for defensewide activities. Using DoD's estimates of costs as a basis, CBO projects that, under 2017 plans, the services' shares of acquisition would have varied by no more than a few percentage points in the years beyond the FYDP period.

The Army

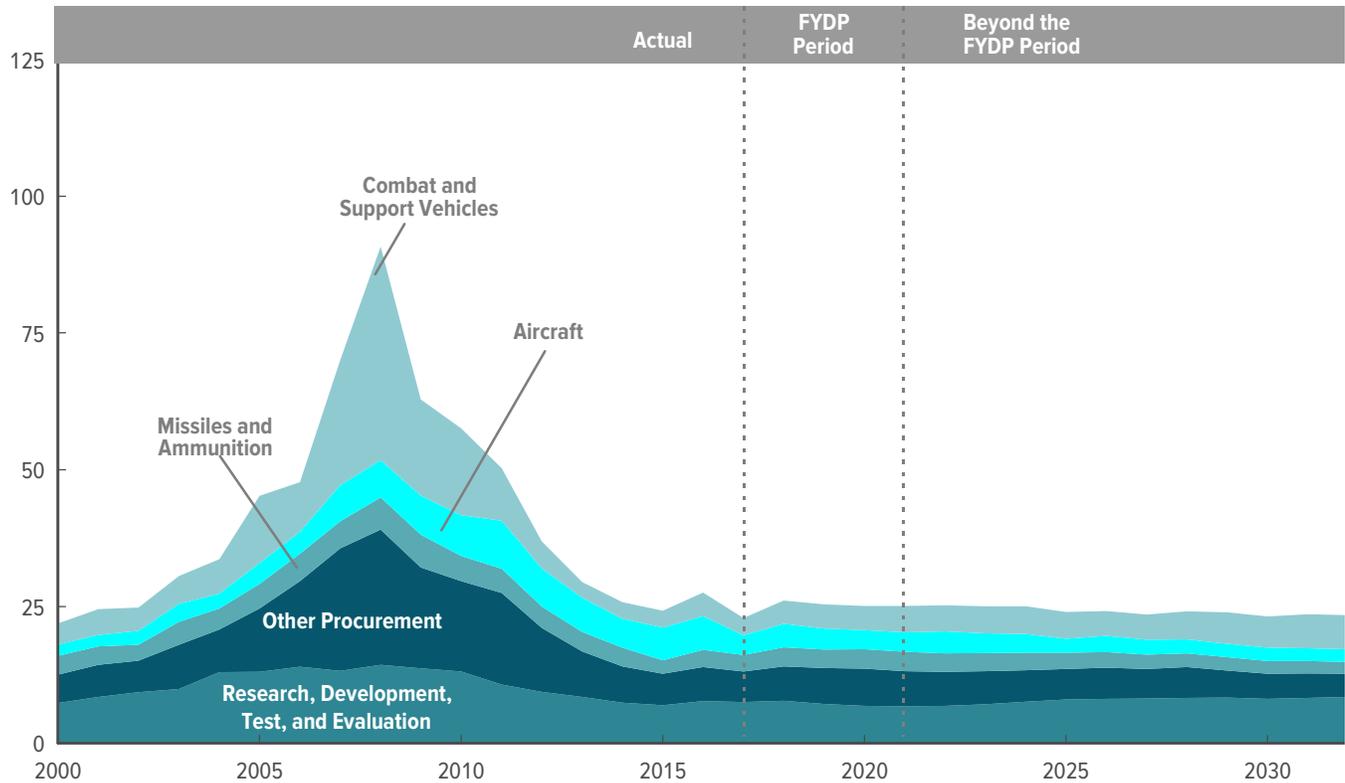
The Army's 2017 request for acquisition funding included \$23 billion in the base budget plus \$3 billion for OCO. According to DoD's estimates, acquisition costs for the Army's base-budget plans would have increased to \$26 billion (in 2017 dollars) in 2018 but

2. Historically, significant funds included in appropriations for the Air Force have been slated for use by organizations outside the service. The Air Force section in this chapter discusses those "Non-Blue" funds.

Figure 3-3.

Costs of the Army's Acquisition Plans Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category shows total funding (including overseas contingency operations) for 2000 to 2016 and planned base-budget funding from 2017 to 2032. DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

dropped back to an average of \$25 billion for the last three years of the FYDP period. Using DoD's estimates as a basis, CBO projects that the Army's acquisition costs would have remained steady in the years beyond the FYDP period, averaging just over \$24 billion through 2032.

To analyze acquisition costs for the Army, CBO assessed the service's major existing programs and potential programs through 2032. CBO grouped those costs into one category for RDT&E and four for procurement. The procurement categories are based on general types of weapon systems and equipment: combat and support vehicles, aircraft, missiles and ammunition, and other procurement (see Figure 3-3). The Army's four procurement categories roughly align with its procurement account titles.³

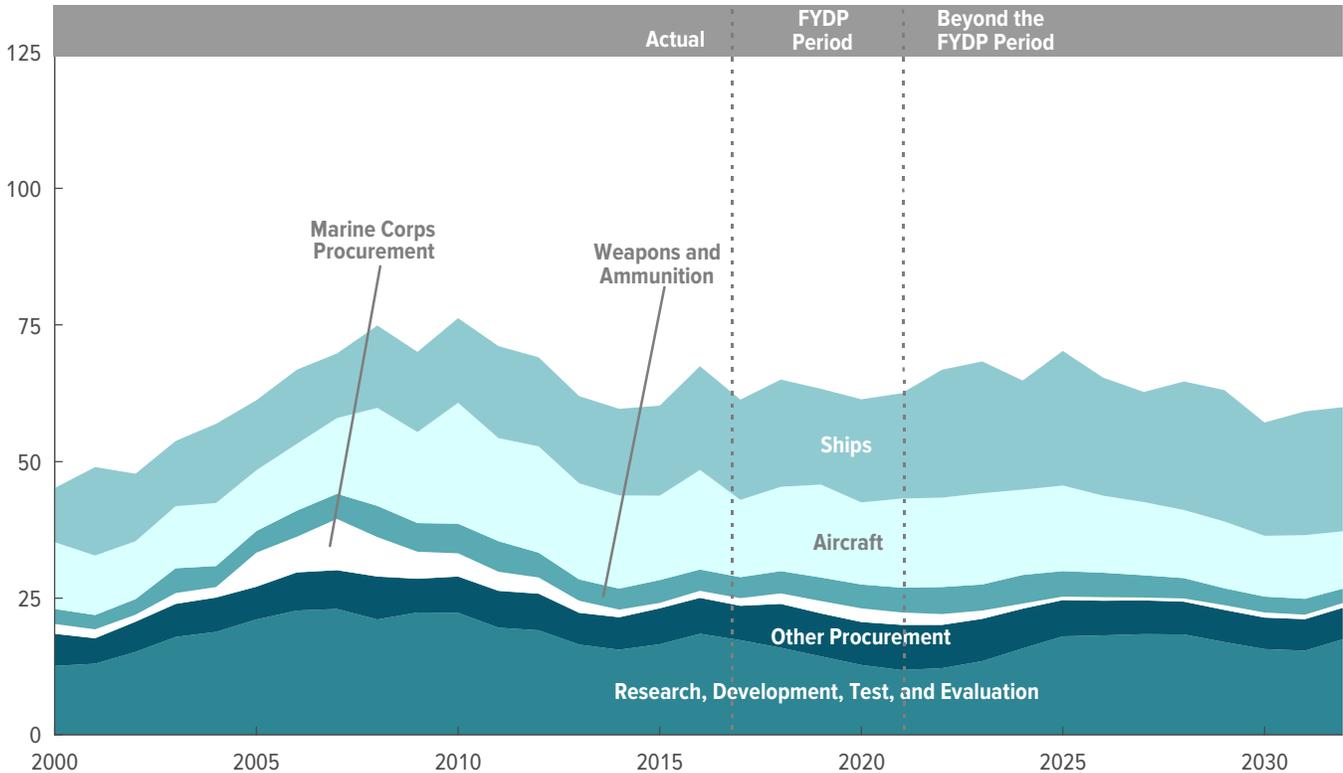
CBO's projections include the estimated costs for more than 20 major weapons programs. For example, the aircraft category includes continued funding to upgrade many of the Army's helicopters and continued purchases of UH-60M Blackhawk helicopters. In its estimate of aircraft costs toward the end of the projection period, CBO assumed that the Army would develop and field a new scout helicopter. The agency also assumed that a new transport aircraft program would grow out of the Joint Multi-Role Rotorcraft technology development efforts that the Army funds now. Similarly, costs for combat vehicles in CBO's projection include near-term

3. They differ, however, in that CBO combines funding for support vehicles (which is part of the "Other Procurement, Army" account) with the "Procurement of Wheeled and Tracked Vehicles, Army" account, and CBO combines the "Missile Procurement, Army" and "Procurement of Ammunition, Army" accounts.

Figure 3-4.

Costs of the Navy's and Marine Corps' Acquisition Plans Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category shows total funding (including overseas contingency operations) for 2000 to 2016 and planned base-budget funding from 2017 to 2032.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

efforts such as upgrading existing vehicles and developing and procuring a new vehicle—the Armored Multi-Purpose Vehicle—to replace the M-113 armored troop transport vehicle, and acquiring the Joint Light Tactical Vehicle to replace many of the Army's Humvees. Costs to replace today's Bradley infantry fighting vehicle were included toward the end of the projection period.

The Navy and Marine Corps

The Obama Administration's 2017 budget request for the Navy and Marine Corps contained \$61 billion for acquisition in the base budget and \$789 million for acquisition for OCO. Under DoD's 2017 FYDP, acquisition costs for the Navy and the Marine Corps would have risen to \$65 billion in 2018 and then averaged \$62 billion over the last three years of the FYDP period. CBO's analysis (based on DoD's estimates) indicates that implementing the Navy and Marine Corps'

acquisition plans would have cost substantially more in the years immediately after 2021, rising by 7 percent to \$67 billion in 2022, averaging about that amount through 2029, and then declining.

To analyze future acquisition costs for the Navy and the Marine Corps, CBO assessed the services' larger existing programs and potential programs through 2032 and grouped them into one category for RDT&E and five for procurement. The procurement categories correspond to the accounts that constitute the Navy's procurement budget: ships, aircraft, weapons and ammunition, Marine Corps procurement, and other procurement (see Figure 3-4). Although Marine Corps procurement exists as a separate category, the other categories also contain procurement funding for the Marine Corps—most notably aircraft and aircraft munitions.

The more than \$4 billion increase CBO estimates in 2022 was almost entirely due to increases in the category for ship procurement.⁴ According to the Navy's estimates, the costs of the programs included in CBO's category for ships would have averaged more than \$22 billion per year in the 11 years beyond the FYDP period—almost \$4 billion per year more than what the average would have been over the 5 years of the FYDP. That increase results largely from plans the Navy had to buy more major warships. The number purchased annually increased from roughly 8 during the 2017 FYDP to about 10 for 2022 through 2025 and back down to about 8 over the rest of the projection period. Planned purchases from 2017 through 2032 included 3 aircraft carriers, 9 ballistic missile submarines, 23 attack submarines, 46 surface combatants, and 15 amphibious warfare ships in addition to a variety of support ships. Funding for the other major procurement categories would have been steadier after the FYDP period. However, aircraft costs would have steadily declined after 2025 as procurement of several types of aircraft (including the KC-130J tanker, the CH-53K heavy-lift helicopter, and the E-2D surveillance aircraft) wound down. Procurement of the F-35B was projected to end in 2030 and the F-35C, in 2031.

The average annual costs for RDT&E would have decreased from 2017 through 2023 under 2017 plans. Those costs then would have increased significantly from 2023 through 2029 for the development of a new carrier-based multirole fighter to replace the fleet's existing F/A-18 Super Hornets. However, instead of developing a new aircraft, future Navy plans might call for buying more F-35Cs. Doing so would result in a lower projection of RDT&E costs than CBO's analysis reflects. Aircraft procurement costs also would change if the Navy opted to buy more F-35Cs instead of developing a new fighter beginning late in the 2020s.

The Air Force

The Obama Administration requested \$67 billion for acquisition in the Air Force's 2017 base budget and \$5 billion in acquisition for OCO. As with the other services, the costs under the Air Force's 2017 plans would have increased in 2018 and then remained steady over the rest of the FYDP period. According to the FYDP,

the Air Force's acquisition costs would have risen to \$72 billion in 2018 and averaged \$71 billion for 2019 through 2021. According to CBO's analysis, implementing the Air Force's 2017 acquisition plans would have cost substantially more in the years immediately after the end of the FYDP period, with a 7 percent jump to \$77 billion in 2022. Costs for the Air Force's acquisition plans would have then averaged \$74 billion for 2022 through 2032.

To project acquisition costs for the Air Force, CBO included major existing programs and potential programs through 2032. The agency grouped costs into one category for RDT&E, four for procurement, and one for activities outside the Air Force that are funded through Air Force acquisition. The procurement categories generally correspond with the accounts that make up the Air Force's procurement budget: aircraft, missiles and ammunition, space systems, and other procurement (see Figure 3-5). The final category represents appropriated funds passed through the Air Force to other agencies, typically in the intelligence community. Although those outside activities are not strictly an Air Force cost, their funding affects the size of the Air Force's budget.

The sharp increase in acquisition costs CBO projects for 2022—nearly \$5 billion—is attributable mostly to increases in the aircraft procurement and space procurement categories. About half of that increase results from plans to buy more F-35As annually. Sixty aircraft were planned for 2021, and 80 per year were planned for 2022 through the end of the projection period (and beyond). Using the Air Force's cost estimates as a basis, CBO projects that the programs in the aircraft category would have cost, on average, about \$21 billion per year in the 11 years beyond the FYDP period—almost 40 percent more per year than the average during the FYDP period. In addition to more F-35s, CBO's projection of the Air Force's 2017 plans included the expectation that the service would start production of a new long-range bomber, a new high-performance trainer, a replacement for the Joint STARS airborne surveillance aircraft, and a combat search-and-rescue helicopter.

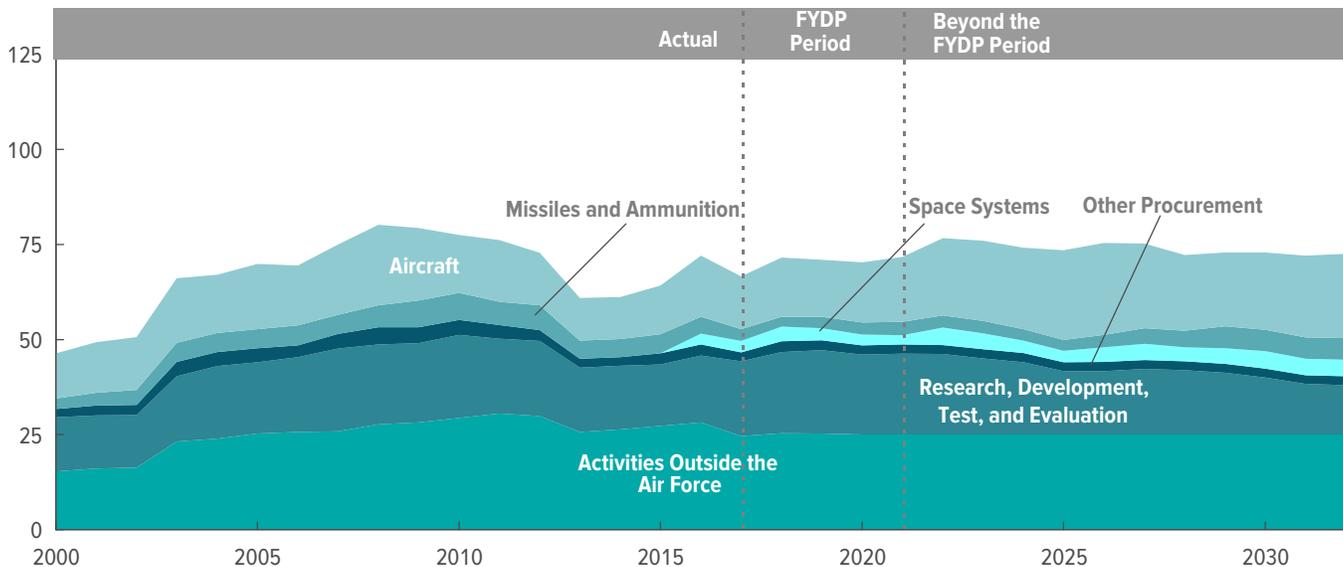
The increase in projected procurement costs for space systems in the years beyond the FYDP results mostly from plans to buy more GPS III navigation satellites and the Evolved-Expendable Launch Vehicles used to put them (and other space systems) into orbit. Procurement for systems in CBO's missiles category would have remained steady through 2026 but then nearly tripled as

4. For more on the Navy's shipbuilding plans, see Congressional Budget Office, *An Analysis of the Navy's Fiscal Year 2017 Shipbuilding Plan* (February 2017), www.cbo.gov/publication/52324.

Figure 3-5.

Costs of the Air Force's Acquisition Plans Under the 2017 FYDP

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category shows total funding (including overseas contingency operations) for 2000 to 2016 and planned base-budget funding from 2017 to 2032.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

plans called for two nuclear missiles—an intercontinental ballistic missile to replace today's Minuteman III and a long-range standoff missile to replace today's air-launched cruise missile—to enter production.

Other Defense Activities, Including Those of the Missile Defense Agency

DoD's budget also includes funding for acquisition by components other than the Army, Navy, and Air Force. Those specialized agencies perform advanced research, develop missile defenses, oversee special operations, and manage financial and information systems. For the 2017 base budget, DoD requested \$23 billion for acquisition related to those activities. According to DoD, acquisition costs for defensewide activities would have averaged about that same amount over the other four years of the 2017 FYDP, and CBO projects little change through 2032.

To analyze defensewide acquisition costs beyond the 2017 FYDP period, CBO considered separately costs for the Missile Defense Agency (MDA) and costs for defense organizations other than MDA. CBO assumed that costs for the latter category would have remained constant in

real terms through 2032 at about \$16 billion—the costs for 2021 indicated in the 2017 FYDP (see Figure 3-6). For MDA, CBO estimated costs for major programs individually. The 2017 budget request for MDA was \$6.9 billion for acquisition (\$5.9 billion for RDT&E and \$989 million for procurement). Under DoD's cost estimates, the funding needed to implement MDA's current plans would have decreased to \$6.6 billion at the end of the FYDP period. Funding would have averaged a slightly higher \$6.8 billion per year through 2032. That slight increase in projected costs was due primarily to procuring missile defense systems—in particular, elements of the sea-based Aegis ballistic missile defense system.

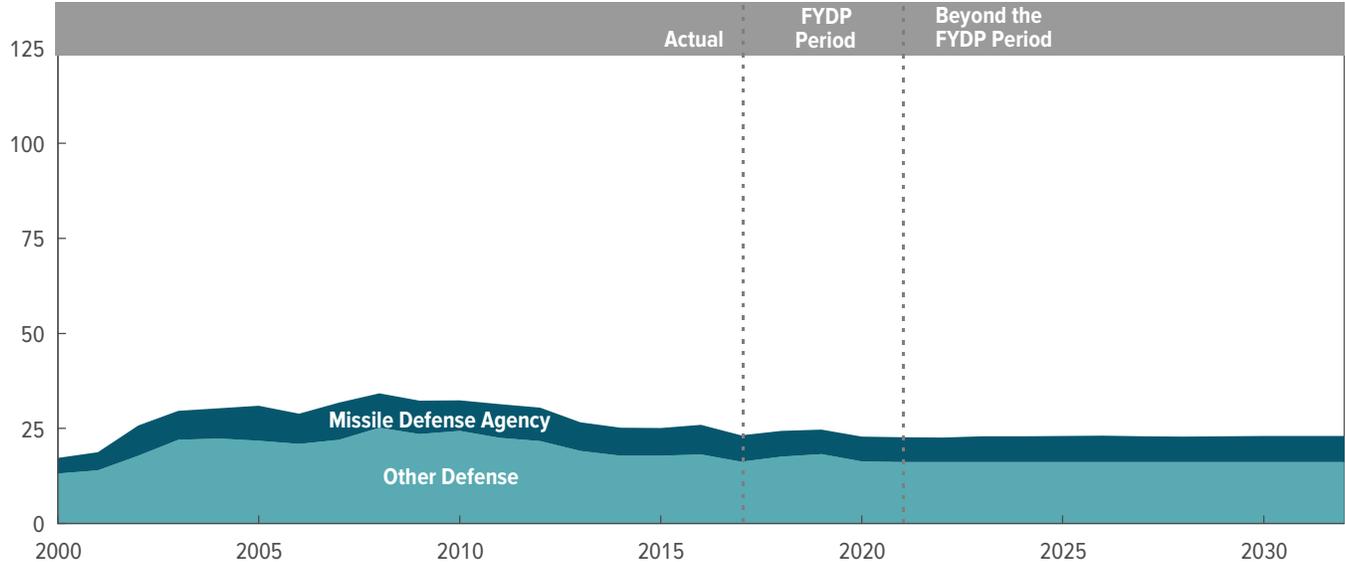
Why DoD's 2017 Acquisition Plans Would Have Cost More After 2021

The steep increase in acquisition costs projected for the years beyond the 2017 FYDP period suggests that those plans would have created a classic bow wave of major weapon system acquisition costs. A budgetary bow wave results from deferring acquisition when budgets are constrained while planning for substantial acquisition in later years. Bow waves beyond the FYDP period had been

Figure 3-6.

Costs of DoD's 2017 Acquisition Plans Other Than Those for the Military Services

Billions of 2017 Dollars



Source: Congressional Budget Office.

Each category shows total funding (including overseas contingency operations) for 2000 to 2016 and planned base-budget funding from 2017 to 2032.

DoD = Department of Defense; FYDP = Future Years Defense Program; FYDP Period = 2017 through 2021, the period for which DoD's plans are fully specified.

common in DoD's plans for many years, particularly during periods of flat or declining budgets. For most of the first decade of the 2000s, however, bow waves largely disappeared because budgets grew steadily and DoD expected that steady growth to continue. However, with the limited growth of appropriations under the Budget Control Act of 2011, especially in the near term, a substantial bow wave is again apparent in the 2017 FYDP.

According to CBO's analysis of the 2017 FYDP and longer-term DoD plans, DoD's acquisition costs would have risen from \$182 billion (in 2017 dollars) in 2021 to \$191 billion in 2022, an increase of 5 percent in the first year beyond the FYDP period. Costs would have remained at or near \$190 billion through 2026 before dropping to around \$178 billion for the last three years of the projection period. The average from 2022 to 2032 would have been about 6 percent higher than the amount requested for 2017. The Navy and the Air Force would have accounted for essentially all the increase indicated for the middle years of the 2020s; acquisition costs would have remained steady for the Army and increased slowly for MDA.

The steep increase in acquisition costs projected for the Navy and Air Force resulted primarily from an increase in projected procurement funding for major weapon systems—in particular, ships for the Navy and aircraft and space systems for the Air Force. The increase in procurement quantities for major weapon systems was indicated explicitly by defined purchase schedules in documents such as Selected Acquisition Reports and implicitly in more general policy statements such as the Air Force's plans to field a new bomber and high-performance trainer in the 2020s. Without defined schedules for such systems, CBO postulated notional schedules that were consistent with the services' general plans at the time. Using DoD's estimates as a basis, CBO projects that in 2022 the Navy's procurement costs for ships would have increased by \$4.2 billion (22 percent) under the Navy's 2017 plans. The Air Force's costs to procure aircraft would have increased by \$3.3 billion (19 percent); procurement costs for space systems would have increased by \$2.1 billion (86 percent).

For the Navy, the projected increase in costs includes \$1.5 billion more in funding for the new ballistic missile submarine in 2022. Also, the Navy's plans called for

producing one more attack submarine and one more LX(R) amphibious ship in 2022 than in 2021.

For the Air Force, the sharp rise in costs in 2022 would have resulted from buying more F-35A fighters (80 aircraft in 2022, up from 60 in 2021), C-130 variants (14 aircraft in 2022, up from 4 in 2021), and combat search-and-rescue helicopters (14 aircraft in 2022, up from 10 in 2021). Plans in 2017 also indicated that procurement funding for the new bomber, trainer, and a replacement for the Joint STARS airborne surveillance aircraft would begin in about 2022. Although the quantities of those last three systems would be low, the unit prices of the initial production aircraft are expected to be much higher than average unit prices over the production run, as is typical for the initial purchases of most systems.

Because the annual procurement quantities in the services' 2017 plans (or CBO's estimates thereof) for those ships and aircraft were small to begin with, dropping to even smaller quantities might have seriously reduced the efficiency of production lines and significantly increased unit costs. Therefore, avoiding the bow wave in the projection of costs to procure major systems probably would have required delaying the start of at least one program. Several variables affect whether such delay would have been possible: How much service life remained for the systems being replaced? What would it cost to extend the service life of existing systems? And could the military accept a gap in capability if an existing system was retired before a replacement could be fielded?

Why Acquisition Costs Would Probably Have Been Higher Than DoD Estimated

CBO projected long-term costs for acquisition by using DoD's 2017 estimates of development costs, long-range plans for purchase rates and quantities, and current pricing assumptions for the procurement of major weapons. The choice to use DoD's pricing assumptions was intended to reflect DoD's goals and expectations.

However, the costs of developing and procuring weapons have risen regularly, despite DoD's efforts. Costs can end up higher than early estimates for reasons both external and internal to the offices managing development programs.

Reasons for cost growth external to those offices could include:

- Changing economic conditions, such as the costs for labor and raw materials;
- Changes in performance requirements, which can result in the need for costly design changes during development; and
- Lower-than-anticipated annual funding, which can increase total costs by stretching programs over longer periods and by disrupting established plans and schedules.

Internal causes of cost growth could include:

- Overly optimistic initial cost estimates and
- Underestimation of the technical challenges of a new system.

With an eye to such issues, DoD and the Congress have recently changed how weapon systems are developed and purchased. However, how successful those changes will be at controlling cost growth is not yet clear.

To examine how cost growth in acquisition programs might have affected the total costs of DoD's 2017 plans, CBO prepared an alternative estimate under the assumption that DoD's past cost growth pattern would repeat. To prepare that alternative estimate, CBO applied cost-growth factors based on experience to the large weapons programs included in DoD's plans. (The appendix discusses CBO's method and the underlying research literature.)

Using estimates under the historical-cost scenario instead of DoD's estimated costs for major programs, CBO projects total acquisition costs that are higher by 2.7 percent—an average of \$4.2 billion per year—over the FYDP period and by 6.1 percent—an average of \$9.7 billion per year—for 2022 through 2032 than the projection based on DoD's cost estimates (see Table 3-1). In general, the percentage increases were higher for the 11 years beyond the FYDP period because a larger proportion of projected costs in those later years were for

Table 3-1.

Increase in Acquisition Costs If Cost Growth in Major Programs Follows Historical Patterns

	Average Annual Increase (Billions of 2017 dollars)		Total Increase (Percent)	
	2017–2021	2022–2032	2017–2021	2022–2032
Army	0.8	1.6	3.2	6.6
Navy and Marine Corps	1.6	4.4	2.5	6.8
Air Force ^a	1.5	3.0	3.3	6.1
Other DoD	0.5	0.8	2.2	3.4
Total DoD	4.2	9.7	2.7	6.1

Source: Congressional Budget Office.

DoD = Department of Defense.

a. Funds passed through the Air Force budget to other organizations within DoD, known as the "Non-Blue" portion of the Air Force's appropriations, are excluded.

systems not in production today, which are more likely to experience rising costs.

In absolute terms, the CBO-estimated increase for the Army was smaller than that for the other military departments because the Army has a substantially smaller budget for acquisition. However, it was closer on a percentage basis (about 7 percent) for the years beyond the FYDP period because the cost to develop new Army helicopters and ground combat vehicles has grown significantly in the past. (Indeed, Army systems such as the Crusader artillery system, the Comanche helicopter, the Armed Reconnaissance Helicopter, the Future Combat System of ground vehicles, and the Ground Combat Vehicle were canceled before they entered production partly because of rising costs.) The potential 3.3 percent cost growth in the acquisition costs of the Air Force during the FYDP period was concentrated toward the end of that period. At that point, purchases were slated to ramp up for several new aircraft such as the long-range bomber, high-performance trainer, and combat rescue helicopter. Those systems contributed to

the relatively high growth projected for Air Force spending after 2021.

To offset the effect of cost increases on its yearly budgets, DoD might delay the start of programs, stretch their schedules, and buy smaller quantities. Such program changes, however, often result in even higher average unit costs, and overall program costs could be higher as well. DoD often produces smaller quantities than it originally projected, as occurred with the F-22 fighter (from the 648 initially planned to 188 produced) and the B-2 bomber (from the 132 initially planned to 21 produced). The collapse of the Soviet Union also factored into a reassessment of the desired inventory of those aircraft. Similarly, early plans for the F-35 fighter called for annual purchases at a peak rate of 194 aircraft. The schedule in 2017 plans called for a peak annual rate of 125 aircraft. Producing smaller quantities or delaying programs would reduce the annual costs of current plans. But such a revised plan would differ from the overall defense plan that CBO is analyzing.

Projected Costs of Military Construction and Family Housing

The Department of Defense's budgets for military construction and family housing support the infrastructure of military installations. Together, those budgets make up a small portion of DoD's costs. In the 2017 budget, the total request for military construction was \$6.3 billion (\$6.1 billion in the base budget and \$0.2 billion in the request for overseas contingency operations). The request for family housing was \$1.3 billion. Those requests constituted only 1.2 percent and 0.3 percent, respectively, of DoD's total base-budget request.

Military Construction

Appropriations for military construction pay for the planning, design, construction, and major restoration of military facilities. Those appropriations also pay for the base realignment and closure (BRAC) process, including environmental assessments of sites designated for closure and construction projects needed to help consolidate personnel and units.

Projected Costs

Excluding funding for BRAC, DoD's 2017 plans for military construction called for \$5.9 billion in 2017 and \$7.6 billion in 2018, as well as an average of \$6.0 billion in the last three years of the period spanned by the 2017 Future Years Defense Program. On average, the estimated cost of military construction during the FYDP period was lower than the \$7.0 billion the department received for military construction in 2016. That cost was significantly below the \$8.2 billion in funding that DoD received, on average, since 1980, excluding funding for OCO and BRAC. Infrastructure degrades slowly, and activities to sustain, modernize, and restore it can help mitigate that degradation. Therefore, DoD's plans under the constrained budgets projected in the 2017 FYDP prioritized funding for training and readiness over funding for military construction.¹

In projecting costs for military construction beyond the FYDP period, CBO assumed costs would have reverted to the historical average observed between 1980 and 2016, excluding funding provided for BRAC or provided as part of additional funding for OCO. CBO projected that construction costs would rise slightly faster than economywide inflation. Adjusting for that difference, CBO estimates that costs for military construction (not including BRAC) would have grown from \$8.5 billion in 2022 to \$9.6 billion in 2032 under DoD's 2017 plans.

DoD's 2017 plans for military construction included a total of about \$3 billion in funding from 2017 through 2021 for BRAC. That amount included about \$2 billion for a 2019 round of BRAC. DoD expected that the BRAC round would cost about \$7 billion to implement over seven years (with implementation starting in 2019 and ending around 2025) and result in savings of about \$2 billion per year starting in 2020.² CBO's projections reflect those plans and estimates of costs and savings.

DoD's plans for military construction also included expenditures associated with past rounds of BRAC. Between 2017 and 2021, DoD's plans called for an average of about \$160 million annually to cover ongoing environmental and caretaking costs for properties closed through the BRAC process that have not yet been converted to other uses. After 2021, CBO projects, those annual costs will remain constant at about \$150 million.

1. See Testimony of Pete Potochney, Performing the Duties of Assistant Secretary of Defense (Energy, Installations, and Environment), before the Subcommittee on Military Construction of the House Appropriations Committee, Hearing on the Installation, Environment, and BRAC Budget Overview (March 3, 2016), <http://go.usa.gov/x9Hsc> (PDF, 0.5 MB).

2. Ibid.

Why Costs Might Have Been Higher Than DoD Estimated

Plans in the 2017 FYDP for military construction between 2017 and 2021 might not have prevented DoD's facilities from deteriorating in the long term. According to DoD, those plans would have resulted in significant costs at a later date to repair and replace facilities.³ Alternatively, if DoD had planned for military construction in the FYDP period at a level equal to the historical average since 1980, it would have cost another \$11 billion over the FYDP period, or on average, more than \$2 billion more per year.

In recent years, the Congress has not supported DoD's proposals for a future round of BRAC. If such opposition continued, projected costs for implementing a new BRAC round would be \$7 billion less between 2019 and 2025. However, the \$2 billion in annual savings that DoD estimates would result from BRAC also would not occur.

3. See Testimony of Pete Potochney, Performing the Duties of Assistant Secretary of Defense (Energy, Installations, and Environment), before the Subcommittee on Military Construction of the House Appropriations Committee, Hearing on the Installation, Environment, and BRAC Budget Overview (March 3, 2016), <http://go.usa.gov/x9Hsc> (PDF, 0.5 MB).

Family Housing

Appropriations for family housing pay for DoD to build, operate, maintain, and lease military family housing. Those appropriations also support DoD's Homeowners Assistance Fund, which compensates eligible military and civilian personnel who lose money when selling their primary home under certain conditions.

DoD's annual costs for family housing would have averaged about \$1.4 billion per year from 2017 to 2021 under the 2017 FYDP. After 2021, CBO projects, those costs would have stayed the same. Appropriations for family housing have fallen sharply since 2007: Under a DoD program to have private companies build housing on bases, the funding to build most housing units comes primarily from private financing that DoD does not initially record in the federal budget. That financing reduces DoD's up-front costs to build and operate family housing. But it also increases the annual amounts that the department must later pay to military personnel who receive the basic allowance for housing and who rent those housing units. Those larger housing allowances appear in military personnel costs in the budget for operation and support.



Appendix: How CBO Projects Acquisition Cost Growth

The Congressional Budget Office’s alternative estimate for the costs of the Department of Defense’s (DoD’s) acquisition plans reflects the agency’s assessment of how the costs of those plans might differ if DoD’s pattern of cost growth repeats. For most of DoD’s acquisition portfolio, CBO used findings from a body of literature in which researchers analyzed cost growth in past large (major) defense programs. For analyses of some acquisition programs (mostly Navy ships), CBO has developed estimates of likely cost growth. In such cases, CBO used those detailed estimates in lieu of a history-based approach that would rely instead on average cost growth within a broad class of related programs.¹ This appendix describes how CBO developed history-based estimates of cost growth, relying on historical costs of completed programs. CBO does not address potential cost growth in smaller (minor) acquisition programs under the assumption that DoD and the services would have greater flexibility to respond to growth in those areas (by adjusting schedules or modifying program objectives) without substantially affecting overall defense plans. Because the historical cost growth data that underpin this analysis represent averages for major programs over many systems, CBO reports growth only for each service’s entire portfolio of major weapon systems.

DoD’s Phases of Development for Weapon Systems and Associated Cost Growth

DoD has established a system of milestones by which to manage its acquisition programs. Those milestones mark the beginnings of key phases of development:

- Milestone A initiates the Technology Maturation and Risk Reduction phase.
- Milestone B initiates the Engineering and Manufacturing Development (EMD) phase—in which a system is designed and developed, all technologies and capabilities are fully integrated into a single system, and preparations are made for manufacturing (including developing manufacturing processes, designing for mass production, and managing cost).
- Milestone C initiates the Production and Deployment phase.²

Cost growth is typically measured in relation to cost estimates made at Milestone B, the beginning of the EMD phase. Most studies of cost growth begin with the cost estimates contained in the Selected Acquisition Report (SAR) released closest to the date of the system’s Milestone B approval and the beginning of the EMD phase. Those studies then compare the Milestone B estimates with the actual cost of the completed programs. When program offices prepare their SARs at the Milestone B juncture, they generally project cost streams for the research, development, test, and evaluation (RDT&E) phase as well as the procurement phase.

Some acquisition programs also involve small amounts of funding for military construction (for example, to build new aircraft hangars). But most studies of cost growth ignore such costs. Also, program offices estimate the costs of operation and support (O&S) for weapon systems after they enter service, but those costs often are poorly estimated at Milestone B. Indeed, most studies of cost

1. In an example of a system-specific approach to cost growth, CBO estimated the cost of most new Navy ships on the basis of the relationship between the weight and the actual cost of analogous ships already completed. CBO then adjusted the estimate for production efficiencies that occur as more ships of the same type are built simultaneously at a given shipyard and efficiencies that occur as more ships are built during a production run.

2. See Department of Defense, “Operation of the Defense Acquisition System,” DoD Instruction 5000.02 (updated January 7, 2015), <https://go.usa.gov/xXN98> (PDF, 133 KB).

growth do not include those costs. CBO treats O&S costs separately and did not apply the cost growth factors described here to its projections of O&S costs.

Research on the Cost Growth of Weapon Systems

For several decades, the RAND Corporation has researched the cost growth of weapon systems, forming a substantial body of literature. RAND's compilations from 2006 and 2007 serve as a good overview of its research to that date as well as other literature in the field. They summarize many of the key findings from that literature, such as how often cost growth occurs, when costs grow, and what the average cost growth is for different weapon systems.³ Much of the work on cost growth in weapon systems has been based on statistical analyses of SARs to determine the nature, magnitude, timing, and causes of cost growth. Many of those analyses have used the full set of completed SARs since 1969, when the SAR reporting requirement was introduced, whereas others have focused on more recent programs. (Some of that research indicates that cost growth has changed since the advent of the SARs.) With the phenomenon of cost growth firmly established and with relatively stable estimates of its magnitude, most of the more recent research by RAND has examined the causes of cost growth for particular acquisition programs.⁴

Another long line of research by the Institute for Defense Analyses (IDA) complements RAND's work on such cost growth. IDA's research, as summarized in a study published in 2014, also is based on data from SARs. In that study, cost growth is similar to that reported by RAND.⁵

CBO's History-Based Cost Growth Approach

CBO applies its history-based cost growth analytic method to the major weapon systems in DoD's acquisition portfolio for which the agency has not analyzed costs. That approach includes three primary steps:

1. *Apply historical cost-growth factors to a service's portfolio of major weapon system programs.* CBO divides DoD's estimates of the costs for major weapon programs in each service into the years covered by DoD's Future Years Defense Program (FYDP) and the years of CBO's projection beyond the FYDP. The agency then separates those estimates into categories by type of system—roughly corresponding to those in Figures 3-3, 3-4, and 3-5—and applies historical cost-growth factors specific to each category. The calculated amounts are further summed to derive a grand total for each service.
2. *Adjust to account for systems in different stages of development or production.* CBO reduces those total growth amounts to account for the fact that DoD's cost estimates for ongoing programs already incorporate whatever cost growth has occurred to date because the cost growth factors used in the first step are measured with respect to initial cost estimates.
3. *Adjust growth estimates for the FYDP period.* CBO reduces the amount of growth it reports for the FYDP period to account for inflexibility in near-term budgets (especially the current budget year) and a lag between when cost-growth issues within a program are recognized and when they are incorporated into cost estimates for that program.

CBO's approach results in a simplified representation of potential cost growth. It does not try to account for how other consequences of cost growth affect the program, such as lengthening program schedules (by extending development time or by purchasing fewer systems each year over a longer period) or reducing the total quantity of weapons purchased. Also, CBO calculates and reports the growth as a percentage increase to planned costs for

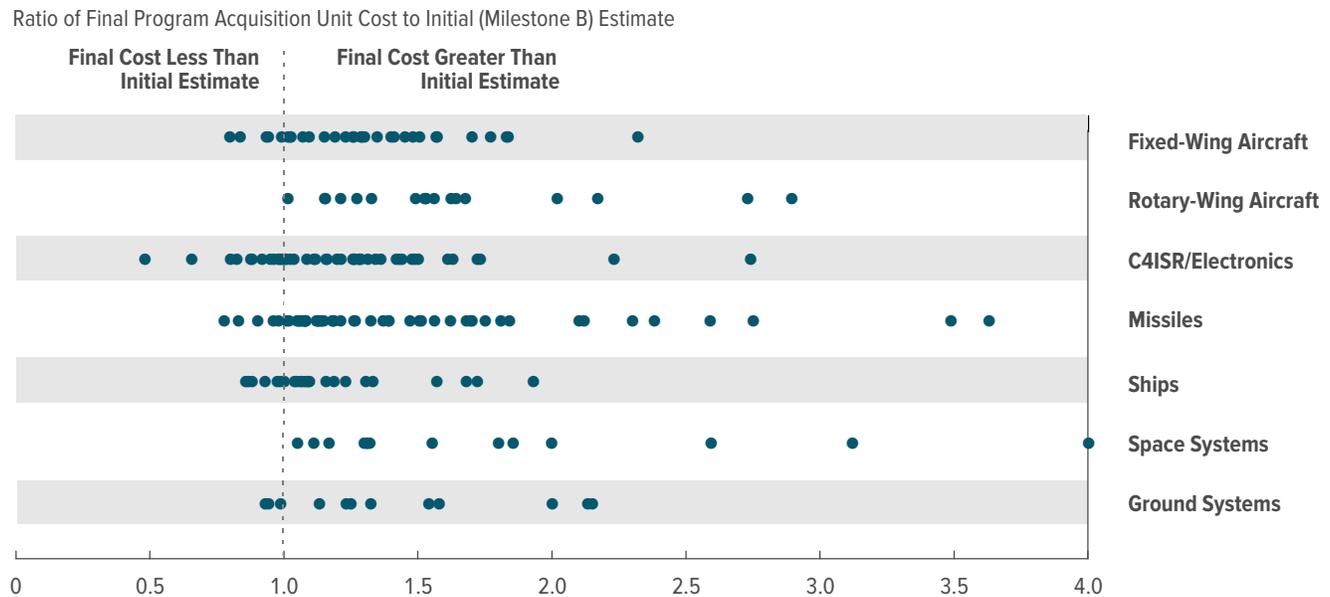
3. See Mark V. Arena and others, *Historical Cost Growth of Completed Weapon System Programs* (prepared by the RAND Corporation for the United States Air Force, 2006), www.rand.org/pubs/technical_reports/TR343.html; and Obaid Younossi and others, *Is Weapon System Cost Growth Increasing? A Quantitative Assessment of Completed and Ongoing Programs* (prepared by the RAND Corporation for the United States Air Force, 2007), www.rand.org/pubs/monographs/MG588.html.

4. See, for example, Irv Blickstein and others, *Methodologies in Analyzing the Root Causes of Nunn-McCurdy Breaches* (RAND Corporation, 2012), www.rand.org/pubs/technical_reports/TR1248.html.

5. See David L. McNicol and Linda Wu, *Evidence on the Effect of DoD Acquisition Policy and Process on Cost Growth of Major Defense Acquisition Programs* (Institute for Defense Analyses, September 2014), www.acq.osd.mil/parca/docs/ida-p5126.pdf (826 KB).

Figure A-1.

Comparison of Final Costs of Weapons Programs With Initial Estimates



Source: Congressional Budget Office, using data from the Institute for Defense Analyses and the RAND Corporation.

Program Acquisition Unit Cost is the cost for development and procurement divided by the number of units purchased. The initial estimate is the one made at Milestone B, when the system enters engineering and manufacturing development.

C4ISR = command, control, communications, computers, intelligence, surveillance, and reconnaissance.

each period, even though actual cost growth may not be as smoothly distributed.

In the first step of the approach, CBO uses average factors for total program cost growth that are specific to each of seven types of weapon systems—fixed-wing aircraft, rotary-wing aircraft, communications equipment and electronics, ground systems, missiles, ships, and space systems—because different weapon systems have historically incurred different amounts of cost growth. Although experience also has shown substantial variation in cost growth even among systems of the same type, CBO applies the cost-growth factors to the total of all systems of a given type (see Figure A-1). It then totals its estimates of cost growth to the level of a particular service’s entire portfolio of major weapon systems.

In the second step, CBO adjusts to account for systems’ being in different stages of development or production. One limitation of the historical cost-growth data is that they usually reflect average growth only in relation to a system’s Milestone B cost estimate. CBO’s analysis of DoD’s acquisition portfolio, however, includes systems in all stages of acquisition. Those stages include systems

already in production (typically those with the smallest potential for cost growth) and systems not yet formally proposed but that CBO anticipates DoD will develop and even start buying by 2032 to replace existing older systems (for which no Milestone B cost estimate exists). To account for that range in system maturity, CBO’s second step incorporates additional data from the research mentioned above that describes how cost growth occurs for major programs, on average, between Milestone B and their completion.

CBO’s analysis of DoD’s 2017 FYDP spans 16 years, from 2017 through 2032. Some of the acquisition programs in DoD’s 2017 plans span that entire period (such as the F-35 fighter), some started before 2017 but would end before 2032 (the CH-53K helicopter), some are projected to start during that period but continue beyond 2032 (a replacement for the Minuteman III missile), and some are projected to occur entirely within that period (CBO’s projection of the program to replace the JSTARS surveillance aircraft). To account for each possibility, CBO adjusted its estimate of cost growth for each service to reflect portfolios consisting of programs that are, on average, about half completed. Because most

cost growth occurs early in a program, that simplifying assumption effectively reduces the cost growth for the services' portfolios of large acquisition programs to about 28 percent of what the average cost growth would be if Milestone B for all the large programs within those portfolios was to occur in 2017. That percentage varies among categories of weapon systems because different systems have tended to have different proportions of RDT&E and procurement costs incurred at different times during acquisition programs.

In the third step, CBO makes two more adjustments to the cost-growth estimates described above. First, CBO estimates no cost growth in the budget year (the first year of the FYDP). The rationale for that adjustment is that acquisition programs will almost always be required to operate within their planned budgets during the budget year, so that any cost growth will be reflected in later years. Second, CBO also constrains cost increases in the three years after the budget year because plans for those years are based on better information about costs and available funding for the near term than are plans for the more distant future. For example, planned budgets in the near term are likely to already incorporate the effects of identified cost-growth issues as well as some knowledge about what funds will probably be made available for acquisition programs (as described, for example, in the FYDP). Later years are more likely to be affected by as yet unidentified development or manufacturing problems and overly optimistic assumptions about the funding that

would be available. To reflect that general tendency, CBO reduces the estimated cost growth by 75 percent in the second year of the FYDP, by 50 percent in the third year, and by 25 percent in the fourth year. CBO does not apply such reductions to the final year of the FYDP or to the years beyond the FYDP period.

An example of DoD's acquisition portfolio for fixed-wing aircraft shows how CBO applied its history-based approach: Between 2017 and 2032, DoD plans to buy many types of fixed-wing aircraft, including fighters, bombers, airlifters, tankers, reconnaissance aircraft, and trainers. On the basis of DoD's estimates, the projected acquisition costs of aircraft that CBO categorized as being major fixed-wing programs totaled \$147 billion over the FYDP years and \$371 billion for 2022 through 2032. In the first step, CBO applied to those two totals the cost-growth factor for fixed-wing aircraft at Milestone B (a factor of roughly 1.3, or about 30 percent). In the second step, CBO applied a downward adjustment (a factor of 0.32 here, reducing the growth to 9 percent) to account for growth that has already occurred in many of the fixed-wing aircraft programs. The result is an estimated cost growth of about \$13 billion for fixed-wing aircraft over the FYDP years and \$34 billion for 2022 to 2032. Finally, CBO adjusted downward the total for the FYDP years—to about \$7 billion in that example—because funding for the budget year has already been requested and because near-term program activities are more certain.

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About This Document

This report was prepared at the request of the Chairman and Ranking Member of the Senate Committee on the Budget. In keeping with the Congressional Budget Office's mandate to provide objective, impartial analysis, the report makes no recommendations.

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Keith Hall
Director

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