

## 6. FEDERAL INVESTMENT

Investment spending is spending that yields long-term benefits. Its purpose may be to improve the efficiency of internal Federal agency operations or to increase the Nation's overall stock of capital for economic growth. The spending can be direct Federal spending or grants to State and local governments. It can be for physical capital, which yields a stream of services over a period of years, or for research and development or education and training, which are intangible but also increase income in the future or provide other long-term benefits.

Most presentations in the Federal budget combine investment spending with spending for current use.

This chapter focuses solely on Federal and federally financed investment.

In this chapter, investment is discussed in the following sections:

- a description of the size and composition of Federal investment spending;
- a discussion of the performance of selected Federal investment programs; and
- a presentation of trends in the stock of federally financed physical capital, research and development, and education.

### PART I: DESCRIPTION OF FEDERAL INVESTMENT

For more than fifty years, the Federal budget has included a chapter on Federal investment—defined as those outlays that yield long-term benefits—separately from outlays for current use. In recent years the discussion of the composition of investment has displayed estimates of budget authority as well as outlays.

The classification of spending between investment and current outlays is a matter of judgment. The budget has historically employed a relatively broad classification, encompassing physical investment, research, development, education, and training. The budget further classifies investments into those that are grants to State and local governments, such as grants for highways or education, and all other investments, called “direct Federal programs” in this analysis. This “direct Federal” category consists primarily of spending for assets owned by the Federal Government, such as defense weapons systems and general purpose office buildings, but also includes grants to private organizations and individuals for investment, such as capital grants to Amtrak or higher education loans directly to individuals.

Presentations for particular purposes could adopt different definitions of investment:

- To suit the purposes of a traditional balance sheet, investment might include only those physical assets owned by the Federal Government, excluding capital financed through grants and intangible assets such as research and education.
- Focusing on the role of investment in improving national productivity and enhancing economic growth would exclude items such as national defense assets, the direct benefits of which enhance national security rather than economic growth.
- Concern with the efficiency of Federal operations would confine the coverage to investments that reduce costs or improve the effectiveness of inter-

nal Federal agency operations, such as computer systems.

- A “social investment” perspective might broaden the coverage of investment beyond what is included in this chapter to include programs such as childhood immunization, maternal health, certain nutrition programs, and substance abuse treatment, which are designed in part to prevent more costly health problems in future years.

The relatively broad definition of investment used in this section provides consistency over time—historical figures on investment outlays back to 1940 can be found in the separate *Historical Tables* volume. Table 6–2 at the end of this section allows disaggregation of the data to focus on those investment outlays that best suit a particular purpose.

In addition to this basic issue of definition, there are two technical problems in the classification of investment data involving the treatment of grants to State and local governments and the classification of spending that could be shown in more than one category.

First, for some grants to State and local governments it is the recipient jurisdiction, not the Federal Government, that ultimately determines whether the money is used to finance investment or current purposes. This analysis classifies all of the outlays in the category where the recipient jurisdictions are expected to spend most of the money. Hence, the community development block grants are classified as physical investment, although some may be spent for current purposes. General purpose fiscal assistance is classified as current spending, although some may be spent by recipient jurisdictions on investment.

Second, some spending could be classified in more than one category of investment. For example, outlays for construction of research facilities finance the acqui-

sition of physical assets, but they also contribute to research and development. To avoid double counting, the outlays are classified in the category that is most commonly recognized as investment. Consequently, outlays for the conduct of research and development do not include outlays for research facilities, because these outlays are included in the category for physical investment. Similarly, spending for physical investment and research and development related to education and training is included in the categories of physical assets and the conduct of research and development.

When direct loans and loan guarantees are used to fund investment, the subsidy value is included as investment. The subsidies are classified according to their program purpose, such as construction or education and training. For more information about the treatment of Federal credit programs, refer to Chapter 7, "Credit and Insurance," in this volume.

This section presents spending for gross investment, without adjusting for depreciation.

### Composition of Federal Investment Outlays

#### Major Federal Investment

The composition of major Federal investment outlays is summarized in Table 6–1. They include major public physical investment, the conduct of research and development, and the conduct of education and training. Defense and nondefense investment outlays were \$429.8 billion in 2007. They are estimated to increase to \$482.1 billion in 2008 and \$494.2 billion in 2009. Major Federal investment outlays will comprise an estimated 16 percent of total Federal outlays in 2009 and 3.3 percent of the Nation's gross domestic product. Greater detail on Federal investment is available in Table 6–2 at the end of this section. That table includes both budget authority and outlays.

*Physical investment.* Outlays for major public physical capital investment (hereafter referred to as physical investment outlays) are estimated to be \$266.1 billion in 2009. Physical investment outlays are for construction and rehabilitation, the purchase of major equipment, and the purchase or sale of land and structures. Approximately two-thirds of these outlays are for direct physical investment by the Federal Government, with the remainder being grants to State and local governments for physical investment.

Direct physical investment outlays by the Federal Government are primarily for national defense. Defense outlays for physical investment are estimated to be \$155.0 billion in 2009. Almost all of these outlays, or an estimated \$143.2 billion, are for the procurement of weapons and other defense equipment, and the remainder is primarily for construction on military bases, family housing for military personnel, and Department of Energy defense facilities.

Outlays for direct physical investment for nondefense purposes are estimated to be \$35.6 billion in 2009. These outlays include \$20.7 billion for construction and rehabilitation. This amount includes funds for water, power, and natural resources projects of the Corps of

Engineers, the Bureau of Reclamation within the Department of the Interior, and the Tennessee Valley Authority; construction and rehabilitation of veterans hospitals and Indian Health Service hospitals and clinics; facilities for space and science programs; Postal Service facilities; construction for the administration of justice programs (largely in the Department of Homeland Security); construction of office buildings by the General Services Administration; and construction for embassy security. Outlays for the acquisition of major equipment are estimated to be \$14.4 billion in 2009. The largest amounts are for the air traffic control system; weather and climate monitoring in the National Oceanic and Atmospheric Administration; law enforcement activities, largely in the Department of Homeland Security and the Federal Bureau of Investigation; and information systems in the Department of Veterans Affairs.

Grants to State and local governments for physical investment are estimated to be \$75.5 billion in 2009. Nearly three-quarters of these outlays, or \$55.0 billion, are to assist States and localities with transportation infrastructure, primarily highways. Other major grants for physical investment fund sewage treatment plants, community and regional development, and public housing.

*Conduct of research and development.* Outlays for the conduct of research and development are estimated to be \$139.9 billion in 2009. These outlays are devoted to increasing basic scientific knowledge and promoting research and development. They increase the Nation's security, improve the productivity of capital and labor for both public and private purposes, and enhance the quality of life. More than half of these outlays, an estimated \$82.7 billion, are for national defense. Physical investment for research and development facilities and equipment is included in the physical investment category.

Nondefense outlays for the conduct of research and development are estimated to be \$57.3 billion in 2009. These are largely for the National Aeronautics and Space Administration, the National Science Foundation, the National Institutes of Health, and research for nuclear and non-nuclear energy programs.

A more complete and detailed discussion of research and development funding can be found in Chapter 5, "Research and Development," in this volume.

*Conduct of education and training.* Outlays for the conduct of education and training are estimated to be \$88.2 billion in 2009. These outlays add to the stock of human capital by developing a more skilled and productive labor force. Grants to State and local governments for this category are estimated to be \$53.8 billion in 2009, approximately three-fifths of the total. They include education programs for the disadvantaged and individuals with disabilities, training programs in the Department of Labor, Head Start, and other education programs. Direct Federal education and training outlays are estimated to be \$34.4 billion in 2009. Programs in this category primarily consist of aid for higher education through student financial assistance, loan sub-

**Table 6-1. COMPOSITION OF FEDERAL INVESTMENT OUTLAYS**

(In billions of dollars)

Federal Investment	2007 Actual	Estimate	
		2008	2009
Major public physical capital investment:			
Direct Federal:			
National defense .....	107.8	141.0	155.0
Nondefense .....	30.8	37.4	35.6
Subtotal, direct major public physical capital investment .....	138.7	178.4	190.6
Grants to State and local governments .....	70.8	76.1	75.5
Subtotal, major public physical capital investment .....	209.4	254.5	266.1
Conduct of research and development:			
National defense .....	77.1	78.7	82.7
Nondefense .....	52.6	55.9	57.3
Subtotal, conduct of research and development .....	129.7	134.6	139.9
Conduct of education and training:			
Grants to State and local governments .....	53.7	55.5	53.8
Direct Federal .....	37.0	37.5	34.4
Subtotal, conduct of education and training .....	90.7	93.0	88.2
<b>Total, major Federal investment outlays .....</b>	<b>429.8</b>	<b>482.1</b>	<b>494.2</b>
<b>MEMORANDUM</b>			
Major Federal investment outlays:			
National defense .....	184.9	219.7	237.7
Nondefense .....	244.9	262.5	256.5
Total, major Federal investment outlays .....	429.8	482.1	494.2
Miscellaneous physical investment:			
Commodity inventories .....	-0.3	-*	-*
Other physical investment (direct) .....	3.0	3.3	2.9
Total, miscellaneous physical investment .....	2.7	3.3	2.9
Total, Federal investment outlays, including miscellaneous physical investment .....	432.5	485.4	497.1

\*less than \$50 million.

sidies, the veterans GI bill, and health training programs.

This category does not include outlays for education and training of Federal civilian and military employees. Outlays for education and training that are for physical investment and for research and development are in the categories for physical investment and the conduct of research and development.

### Miscellaneous Physical Investment

In addition to the categories of major Federal investment, several miscellaneous categories of investment outlays are shown at the bottom of Table 6-1. These items, all for physical investment, are generally unrelated to improving Government operations or enhancing economic activity.

Outlays for commodity inventories are for the purchase or sale of agricultural products pursuant to farm

price support programs and other commodities. Sales are estimated to exceed purchases by \$29 million in 2009.

Outlays for other miscellaneous physical investment are estimated to be \$2.9 billion in 2009. This category consists entirely of direct Federal outlays and includes primarily conservation programs.

### Detailed Table on Investment Spending

The following table provides data on budget authority as well as outlays for major Federal investment divided according to grants to State and local governments and direct Federal spending. Miscellaneous investment is not included because it is generally unrelated to improving Government operations or enhancing economic activity.

Table 6-2. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS

(In millions of dollars)

Description	Budget Authority			Outlays		
	2007 Actual	Estimate		2007 Actual	Estimate	
		2008	2009		2008	2009
<b>GRANTS TO STATE AND LOCAL GOVERNMENTS</b>						
Major public physical investments:						
Construction and rehabilitation:						
Transportation:						
Highways .....	37,176	38,606	28,432	34,373	38,184	40,023
Mass transportation .....	9,842	9,308	9,982	8,982	10,618	10,850
Rail transportation .....		50	100		12	20
Air transportation .....	3,671	-169	2,750	3,874	2,970	4,090
Subtotal, transportation .....	50,689	47,795	41,264	47,229	51,784	54,983
Other construction and rehabilitation:						
Pollution control and abatement .....	2,068	1,677	1,662	1,837	1,441	1,600
Community and regional development .....	4,978	8,024	3,331	12,110	13,036	9,549
Housing assistance .....	6,179	6,147	5,599	7,632	7,657	7,513
Other construction .....	340	444	322	492	438	370
Subtotal, other construction and rehabilitation .....	13,565	16,292	10,914	22,071	22,572	19,032
Subtotal, construction and rehabilitation .....	64,254	64,087	52,178	69,300	74,356	74,015
Other physical assets .....	1,475	1,531	1,262	1,462	1,771	1,470
Subtotal, major public physical capital .....	65,729	65,618	53,440	70,762	76,127	75,485
Conduct of research and development:						
Agriculture .....	424	293	202	332	318	324
Other .....	250	309	253	261	283	246
Subtotal, conduct of research and development .....	674	602	455	593	601	570
Conduct of education and training:						
Elementary, secondary, and vocational education .....	36,710	35,772	36,983	36,910	38,098	37,311
Higher education .....	500	475	337	504	558	494
Research and general education aids .....	764	794	595	760	802	524
Training and employment .....	3,320	3,479	3,086	3,223	3,194	3,222
Social services .....	10,350	10,416	9,653	10,160	10,390	9,707
Agriculture .....	455	458	436	430	475	511
Other .....	1,706	1,985	1,994	1,703	1,982	1,997
Subtotal, conduct of education and training .....	53,805	53,379	53,084	53,690	55,499	53,766
<b>Subtotal, grants for investment</b> .....	120,208	119,599	106,979	125,045	132,227	129,821
<b>DIRECT FEDERAL PROGRAMS</b>						
Major public physical investment:						
Construction and rehabilitation:						
National defense:						
Military construction and family housing .....	9,629	12,977	12,825	7,253	9,860	11,412
Atomic energy defense activities and other .....	555	381	394	630	379	384
Subtotal, national defense .....	10,184	13,358	13,219	7,883	10,239	11,796
Nondefense:						
International affairs .....	963	937	1,186	425	1,267	1,781
General science, space, and technology .....	2,139	2,401	1,385	3,125	3,491	2,897
Water resources projects .....	3,841	3,760	8,267	3,338	4,447	3,867
Other natural resources and environment .....	993	927	897	983	975	994
Energy .....	1,413	2,126	2,440	1,311	2,168	2,491
Postal Service .....	1,167	1,332	1,028	838	300	250
Transportation .....	123	93	102	145	147	116
Veterans hospitals and other health facilities .....	2,528	3,730	4,801	2,172	3,370	3,232
Administration of justice .....	2,043	2,088	1,261	636	1,479	2,117
GSA real property activities .....	1,330	1,254	1,322	1,432	1,353	1,604

Table 6-2. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS—Continued

(In millions of dollars)

Description	Budget Authority			Outlays		
	2007 Actual	Estimate		2007 Actual	Estimate	
		2008	2009		2008	2009
Other construction .....	1,625	1,552	1,008	1,834	1,712	1,355
Subtotal, nondefense .....	18,165	20,200	23,697	16,239	20,709	20,704
Subtotal, construction and rehabilitation .....	28,349	33,558	36,916	24,122	30,948	32,500
Acquisition of major equipment:						
National defense:						
Department of Defense .....	133,907	170,711	104,350	99,693	130,532	142,933
Atomic energy defense activities .....	408	329	318	281	299	288
Subtotal, national defense .....	134,315	171,040	104,668	99,974	130,831	143,221
Nondefense:						
General science and basic research .....	694	655	958	661	660	999
Space flight, research, and supporting activities .....	105	131	141	110	110	110
Postal Service .....	2,382	1,454	1,496	1,741	354	525
Air transportation .....	3,421	3,310	1,438	2,923	3,397	2,630
Water transportation (Coast Guard) .....	1,294	927	1,135	1,084	1,180	969
Other transportation (railroads) .....	1,293	1,325	800	1,274	1,417	800
Hospital and medical care for veterans .....	1,549	2,563	1,432	1,132	2,419	1,176
Law enforcement activities .....	1,815	1,886	2,079	1,330	1,750	1,959
Department of the Treasury (fiscal operations) .....	260	315	274	296	279	283
Department of Commerce (NOAA) .....	939	851	1,092	899	948	1,027
GSA general services funds .....	822	845	876	780	845	876
Other .....	1,904	2,785	3,259	1,987	2,715	3,083
Subtotal, nondefense .....	16,478	17,047	14,980	14,217	16,074	14,437
Subtotal, acquisition of major equipment .....	150,793	188,087	119,648	114,191	146,905	157,658
Purchase or sale of land and structures:						
National defense .....	-17	-33	-16	-31	-80	2
Natural resources and environment .....	176	195	126	214	224	193
General government .....	164	156	150	159	156	150
Other .....	13	310	19	6	243	76
Subtotal, purchase or sale of land and structures .....	336	628	279	348	543	421
Subtotal, major public physical investment .....	179,478	222,273	156,843	138,661	178,396	190,579
Conduct of research and development:						
National defense:						
Defense military .....	78,269	80,050	80,337	73,716	75,240	79,084
Atomic energy and other .....	3,328	3,415	3,565	3,362	3,439	3,590
Subtotal, national defense .....	81,597	83,465	83,902	77,078	78,679	82,674
Nondefense:						
International affairs .....	246	255	255	248	269	273
General science, space, and technology:						
NASA .....	9,129	9,472	8,116	8,508	9,408	9,597
National Science Foundation .....	3,992	4,029	4,758	3,569	4,005	4,156
Department of Energy .....	3,108	3,206	3,533	3,114	3,202	3,533
Other general science, space, and technology .....	843	693	737	1,014	693	735
Subtotal, general science, space, and technology .....	17,318	17,655	17,399	16,453	17,577	18,294
Energy .....	1,405	2,452	2,503	1,249	2,449	2,588
Transportation:						
Department of Transportation .....	678	747	815	682	734	729
NASA .....	705	604	446	614	608	560
Other .....	17	25	16	20	18	17
Subtotal, transportation .....	2,805	3,828	3,780	2,565	3,809	3,894

**Table 6–2. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS—Continued**

(In millions of dollars)

Description	Budget Authority			Outlays		
	2007 Actual	Estimate		2007 Actual	Estimate	
		2008	2009		2008	2009
Health:						
National Institutes of Health .....	28,165	28,570	28,555	27,058	27,688	28,371
All other health .....	686	561	562	846	469	548
Subtotal, health .....	28,851	29,131	29,117	27,904	28,157	28,919
Agriculture .....	1,418	1,544	1,411	1,433	1,476	1,424
Natural resources and environment .....	1,916	1,908	1,965	1,632	1,645	1,714
National Institute of Standards and Technology .....	400	385	418	394	456	453
Hospital and medical care for veterans .....	892	960	884	808	924	888
All other research and development .....	1,078	1,100	1,088	829	1,234	1,114
Subtotal, nondefense .....	54,678	56,511	56,062	52,018	55,278	56,700
Subtotal, conduct of research and development .....	136,275	139,976	139,964	129,096	133,957	139,374
Conduct of education and training:						
Elementary, secondary, and vocational education .....	1,359	1,412	1,375	1,460	1,605	1,325
Higher education .....	26,455	26,029	23,135	24,538	24,572	21,500
Research and general education aids .....	1,898	2,015	2,252	1,971	1,833	2,008
Training and employment .....	2,207	1,735	1,936	2,102	1,960	2,200
Health .....	1,410	1,463	959	1,404	1,410	1,256
Veterans education, training, and rehabilitation .....	3,266	3,773	3,582	3,456	3,719	3,897
General science and basic research .....	917	927	1,001	900	1,026	1,008
International affairs .....	513	520	551	477	494	535
Other .....	641	671	638	703	925	701
Subtotal, conduct of education and training .....	38,666	38,545	35,429	37,011	37,544	34,430
<b>Subtotal, direct Federal investment .....</b>	<b>354,419</b>	<b>400,794</b>	<b>332,236</b>	<b>304,768</b>	<b>349,897</b>	<b>364,383</b>
<b>Total, Federal investment .....</b>	<b>474,627</b>	<b>520,393</b>	<b>439,215</b>	<b>429,813</b>	<b>482,124</b>	<b>494,204</b>

## PART II: PERFORMANCE OF FEDERAL INVESTMENT

*Introduction.* In recent years there has been increased emphasis on improving the performance of Government programs. This emphasis began with the Government Performance and Results Act of 1993, which requires agencies to prepare strategic plans and annual performance plans, and then report on their actual performance results annually.

This Administration set out to ensure that agencies worked to improve their performance, not just report on it. Beginning in the 2004 Budget, the Administration began to assess every Federal program by a method known as the Program Assessment Rating Tool, or PART. The Administration set a target of assessing all Federal programs over five years. With this budget, the sixth year of using the PART, the Administration has assessed more than 1,000 programs, approximately 98 percent of the Federal budget.

The PART assesses each program in four components (purpose, planning, management, and results/accountability) and gives a score for each of the components. The scores for each component are then weighted—results/accountability carries the greatest weight—and

the program is given an overall score. A program is rated Effective if it receives an overall score of 85 percent or more, Moderately Effective if the score is 70 to 84 percent, Adequate if the score is 50 to 69 percent, and Inadequate if the score is 49 percent or lower. The program may receive a rating “Results Not Demonstrated” if it does not have a good long-term and annual performance measure or does not have data to report on its measures. Chapter 2 of this volume discusses the PART concepts in more detail.

This section summarizes the results of the PART for direct investment programs, defined to include capital assets, research and development, and education and training. Because an entire program is assessed, not just the investment portion of the program, the assessments for some programs may cover more than just the investment spending. The funding amounts in this section are estimates from the 2007 spring update of PART programs. PART assessments of programs that are grants to State and local governments are not summarized in this chapter but are summarized in Chapter

8, “Aid to State and Local Governments,” in this volume.

This section summarizes 241 programs:

- Programs for capital assets are essentially those identified in the PART system as “capital assets and service acquisition” (93 programs);
- Programs for research and development are essentially those identified in the PART system as “research and development” (117 programs); and
- Programs for education and training (31 programs) are primarily programs in the Department of Education (e.g., Federal Pell Grants) that are not grants to State and local governments. This category also includes programs in other agencies, such as the Montgomery GI Bill in the Depart-

ment of Veterans Affairs, the Health Professions program in the Department of Health and Human Services, and the Job Corps program in the Department of Labor.

Information on these and other programs assessed by PART is at *www.ExpectMore.gov*.

*Summary of ratings.* Table 6–3 shows that, for the 241 investment programs that have been rated by PART, the average rating was “Moderately Effective”. Of these programs:

- 53 were rated Effective;
- 82 were rated Moderately Effective;
- 62 were rated Adequate;
- 7 were rated Ineffective; and
- 37 were rated Results Not Demonstrated.

**Table 6–3. SUMMARY OF PART RATINGS AND SCORES FOR DIRECT FEDERAL INVESTMENT PROGRAMS**

(Excludes grants to State and local governments for investment)

Criteria	Type of Investment			
	Physical capital	Research and development	Education and training	All investment programs
Average scores				
Purpose .....	84%	92%	78%	87%
Planning .....	81%	83%	72%	80%
Management .....	84%	87%	73%	84%
Results/Accountability .....	56%	59%	36%	55%
Weighted Average <sup>1</sup> .....	69%	74%	55%	70%
Average Rating .....	Adequate	Moderately Effective	Adequate	Moderately Effective
Number of Programs				
Ratings <sup>2</sup>				
Effective .....	19	32	2	53
Moderately effective .....	32	47	3	82
Adequate .....	23	23	16	62
Ineffective .....	2	2	3	7
Results not demonstrated .....	17	13	7	37
Total number of investment programs rated .....	93	117	31	241

<sup>1</sup> Weighted as follows: Purpose (20 percent), Planning (10 percent), Management (20 percent), Results/Accountability (50 percent).

<sup>2</sup> The rating of effective indicates a score of 85 percent or more; moderately effective, 70–84 percent; adequate, 50–69 percent; and ineffective, 49 percent or less.

*Assessments of individual programs.* The ratings of ten of the largest physical capital and education and training investment programs are summarized here. Information on research and development is in Chapter 5, “Research and Development” in this volume.

### Capital Assets

*Department of Defense (DoD).* Air Combat Program (\$13.6 billion in 2007). Rating: *Moderately Effective*. The purpose of this program is to enable DoD to successfully wage war in the air by developing and producing a variety of tactical fighter and strike aircraft.

DoD’s management of the overall air combat program is currently based on the extensive system of regulations governing how individual acquisition programs are managed. Through these regulations DoD tracks the progress of individual programs and can hold managers accountable for their programs. DoD’s individual programs within the overall air combat program are delivering aircraft at targeted rates, but in several cases, such as the F/A–22, at greater cost than projected.

*Department of Defense.* Navy Shipbuilding (\$13.2 billion in 2007). Rating: *Adequate*. This program buys new

ships and overhauls existing ships. New ships are built at six privately-owned shipyards. Overhauls of existing ships are performed at both privately-owned and publicly-owned shipyards. The Navy currently has 280 ships in the fleet.

The Navy has specific cost, schedule, and performance goals for each shipbuilding program. The Navy conducts periodic reviews of programs at major milestones of development and uses a structured reporting regime to help monitor the status of ship cost, schedule, and performance. The Navy has experienced cost increases and schedule slips on some ship construction programs, although overall performance is adequate.

*Department of Defense.* Future Combat Systems/Modularity Land Warfare (\$10.0 billion in 2007). Rating: *Moderately Effective*. The Army's complementary transformation initiatives, Modularity and the Future Combat Systems, are designed to provide regional combatant commanders and soldiers with a lighter, faster, more survivable and rapidly deployable force with which to fight and win the United States' current and future land conflicts.

Although the Future Combat Systems program is currently on schedule and on cost, the program's long schedule, significant cost, and technological complexity put Future Combat Systems at substantial risk of cost and schedule overruns as the program moves from research and development to acquisition.

*Department of Defense.* Missile Defense (\$9.4 billion in 2007). Rating: *Adequate*. The mission of the Missile Defense Agency (MDA) is to defend the United States, deployed forces, and allies from ballistic missile attack. MDA is researching, developing and fielding a global, integrated and multi-layered Ballistic Missile Defense System (BMDS), comprising multiple sensors, interceptors and battle management capabilities.

MDA's strategic planning, resource allocation and management oversight activities are properly aligned to accomplish stated mission objectives. MDA budget requests and human resource management activities are explicitly tied to appropriate performance goals. MDA leaders regularly review and evaluate a wide array of performance data to inform and guide their decisionmaking.

*Department of Defense.* Marine Corps Expeditionary Warfare. (\$9.3 billion in 2007). Rating: *Moderately Effective*. Expeditionary warfare is the temporary use of Marine Corps force in foreign countries. The expeditionary warfare program consists of specific investment programs for aviation assets, amphibious ships, weapons systems, equipment, vehicles, ammunition, and research and development.

The Department of Defense (DoD) has articulated a limited number of long-term performance measures for the expeditionary warfare program in response to an earlier assessment. DoD has identified goals related to Joint and Coalition Proficiency, Operational Reach, Force Projection, Sustainability, and Operational and Organizational Adaptability for the expeditionary warfare capability.

*Department of Defense.* Rotary Wing Program (\$8.8 billion in 2007). Rating: *Adequate*. The purpose of the Department of Defense's (DoD's) rotary wing aircraft fleet is to develop and procure an inventory of rotary wing aircraft that provides the capabilities needed to satisfy the mission requirements of US forces. Each type of rotary wing aircraft satisfies specific mission requirements to enable US forces to respond effectively to the full spectrum of military operations. Targets and timeframes for fielding new rotary wing aircraft have been developed for all programs, and are considered ambitious in light of the engineering challenges associated with developing and building rotary wing aircraft. The heavy use of rotary wing aircraft in the Global War on Terror has increased the need to field new and upgraded aircraft as quickly as possible to support forces in theaters of operations.

*Tennessee Valley Authority.* Tennessee Valley Authority Power (\$8.8 billion in 2007). Rating: *Moderately Effective*. The Tennessee Valley Authority (TVA) is the Nation's largest public power company. Through 158 locally owned distributors, TVA provides power to nearly 8.5 million residents of the Tennessee Valley. Some of TVA's former performance measures such as cents/KWH are no longer tracked. It is unclear how some of the new efficiency measures tracked by TVA relate to program performance.

*Department of Defense (DoD).* Military Construction Programs (\$7.5 billion in 2007). Rating: *Moderately Effective*. This program funds buildings, structures, utilities, and land to meet defense requirements on military installations to improve quality of life and enhance military capabilities. The military construction program spans 2,965 domestic sites and 766 overseas sites. At any given time over 1,500 projects are underway. Projects proposed for funding in the President's Budget are selected as a result of a rigorous competitive and selective process. Each project undergoes requirement, solutions and costs analysis prior to formal programming into the Budget.

The military construction program is executed by DoD construction agents—United States Army Corps of Engineers, Naval Facilities Engineering Command, and Air Force Center for Environmental Excellence. The program accounts for the full cost of projects, which include planning and designing a project, project costs, and supervision, inspection, and overhead of the project.

*Department of Defense (DoD).* Airlift Program (\$6.9 billion in 2007). Rating: *Moderately Effective*. The purpose of this program is to enable DoD to move large amounts of personnel and materiel to, and within, remote locations in short periods of time by developing and producing a variety of airlift aircraft. The program has a long-term goal of providing a strategic airlift capacity of 54.5 million ton miles per day. DoD is attempting to achieve that goal through the construction of airlift aircraft—primarily the Air Force's C-17.

The airlift investment program is nearing completion of the first phase of the C-17 program which has increased airlift capabilities. However, the program has

still not met its target capacity. Attainment of the inter-theater airlift capability is dependent on fielding new C-17s, retiring the aging C-141 fleet, and eventual fielding of C-5 Reliability Enhancement & Reengining Program (RERP) aircraft. Deliveries of the C-130J will increase intra-theater capabilities.

### Education

*Department of Education.* Federal Pell Grants (\$13.7 billion in 2007). Rating: *Adequate*. This program helps ensure access to postsecondary education for undergraduate students by providing need-based grants that,

in combination with other sources of student aid, help meet education costs. The program also promotes life-long learning by encouraging low-income adults to return to school.

The program has meaningful performance measures and outcome data on these measures such as the degree to which Pell Grants are targeted to low-income students. New measures such as enrollment and graduation rates among low-income and minority students have also been added. The program has met its current long-term performance goals and new measures will help track other key program goals.

## PART III: FEDERALLY FINANCED CAPITAL STOCKS

Federal investment spending creates a “stock” of capital that is available for future productive use. Each year, Federal investment outlays add to this stock of capital. At the same time, however, wear and tear and obsolescence reduce it. This section presents very rough measures over time of three different kinds of capital stocks financed by the Federal Government: public physical capital, research and development (R&D), and education.

Federal spending for physical assets adds to the Nation’s capital stock of tangible assets, such as roads, buildings, and aircraft carriers. These assets deliver a flow of services over their lifetime. The capital depreciates as the asset ages, wears out, is accidentally damaged, or becomes obsolete.

Federal spending for the conduct of R&D adds to an “intangible” asset, the Nation’s stock of knowledge. Spending for education adds to the stock of human capital by providing skills that help make people more productive. Although financed by the Federal Government, the R&D or education can be carried out by Federal or State government laboratories, universities and other nonprofit organizations, local governments, or private industry. R&D covers a wide range of activities, from the investigation of subatomic particles to the exploration of outer space; it can be “basic” research without particular applications in mind, or it can have a highly specific practical use. Similarly, education includes a wide variety of programs, assisting people of all ages beginning with pre-school education and extending through graduate studies and adult education. Like physical assets, the capital stocks of R&D and education provide services over a number of years and depreciate as they become outdated.

For this analysis, physical and R&D capital stocks are estimated using the perpetual inventory method. Each year’s Federal outlays are treated as gross investment, adding to the capital stock; depreciation reduces the capital stock. Gross investment less depreciation is net investment. The estimates of the capital stock are equal to the sum of net investment in the current and prior years. Conversely, the year-to-year change in the capital stock estimates is annual net investment. A limitation of the perpetual inventory method is that the original investment spending may not accurately

measure the current value of the asset created, even after adjusting for inflation, because the value of existing capital changes over time due to changing market conditions. However, alternative methods for measuring asset value, such as direct surveys of current market worth or indirect estimation based on an expected rate of return, are especially difficult to apply to assets that do not have a private market, such as highways or weapons systems.

In contrast to physical and R&D stocks, the estimate of the education stock is based on the replacement cost method. Data on the total years of education of the U.S. population are combined with data on the current cost of education and the Federal share of education spending to yield the cost of replacing the Federal share of the Nation’s stock of education.

It should be stressed that these estimates are rough approximations, and provide a basis only for making broad generalizations. Errors may arise from uncertainty about the useful lives and depreciation rates of different types of assets, incomplete data for historical outlays, and imprecision in the deflators used to express costs in constant dollars. The methods used to estimate capital stocks are discussed further in the technical note at the end of Chapter 13, “Stewardship,” in this volume. Additional detail about these methods appeared in a methodological note in Chapter 7, “Federal Investment Spending and Capital Budgeting,” in the *Analytical Perspectives* volume of the 2004 Budget.

### The Stock of Physical Capital

This section presents data on stocks of physical capital assets and estimates of the depreciation of these assets.

*Trends.* Table 6–4 shows the value of the net federally financed physical capital stock since 1960, in constant fiscal year 2000 dollars. The total stock grew at a 2.2 percent average annual rate from 1960 to 2007, with periods of faster growth during the late 1960s and the 1980s. The stock amounted to \$2,385 billion in 2007 and is estimated to increase to \$2,483 billion by 2009. In 2007, the national defense capital stock accounted for \$727 billion, or 30 percent of the total, and nondefense stocks for \$1,658 billion, or 70 percent of the total.

**Table 6-4. NET STOCK OF FEDERALLY FINANCED PHYSICAL CAPITAL**

(In billions of 2000 dollars)

Fiscal Year	Total	National Defense	Total Non-defense	Direct Federal Capital			Capital Financed by Federal Grants				
				Total	Water and Power	Other	Total	Transportation	Community and Regional	Natural Resources	Other
Five year intervals:											
1960 .....	849	608	242	95	59	36	146	89	27	21	10
1965 .....	937	589	348	123	74	49	225	158	32	22	13
1970 .....	1,101	630	470	146	88	58	324	230	47	26	21
1975 .....	1,137	545	592	166	102	64	426	282	76	42	25
1980 .....	1,258	494	763	195	123	72	568	342	121	79	27
1985 .....	1,462	572	890	222	136	86	668	397	146	100	26
1990 .....	1,740	722	1,018	256	147	109	762	462	158	113	28
1995 .....	1,882	714	1,168	297	157	141	871	534	168	123	46
Annual data:											
2000 .....	1,979	635	1,345	337	160	178	1,007	618	183	131	75
2001 .....	2,023	631	1,391	351	163	188	1,040	640	186	132	81
2002 .....	2,078	636	1,442	366	165	201	1,076	666	189	134	87
2003 .....	2,138	646	1,492	380	166	213	1,112	690	193	135	94
2004 .....	2,198	662	1,536	390	168	223	1,146	714	196	136	100
2005 .....	2,256	680	1,575	400	168	232	1,176	736	198	137	105
2006 .....	2,316	701	1,614	410	169	240	1,205	758	199	138	109
2007 .....	2,385	727	1,658	422	171	252	1,236	779	205	139	113
2008 est .....	2,413	753	1,660	422	173	250	1,238	780	206	138	113
2009 est .....	2,483	785	1,698	432	173	259	1,266	802	209	139	117

Real stocks of defense and nondefense capital show very different trends. Nondefense stocks have grown consistently since 1970, increasing from \$470 billion in 1970 to \$1,658 billion in 2007. With the investments proposed in the budget, nondefense stocks are estimated to grow to \$1,698 billion in 2009. During the 1970s, the nondefense capital stock grew at an average annual rate of 5.0 percent. In the 1980s, however, the growth rate slowed to 2.9 percent annually, with growth continuing at about that rate since then.

Real national defense stocks began in 1970 at a relatively high level, and declined steadily throughout the decade as depreciation from investment in the Vietnam era exceeded new investment in military construction and weapons procurement. Starting in the early 1980s, a large defense buildup began to increase the stock of defense capital. By 1987, the defense stock exceeded its earlier Vietnam-era peak. In the early 1990s, however, depreciation on the increased stocks and a slower pace of defense physical capital investment began to reduce the stock from its previous levels. The increased defense investment in the last few years has reversed this decline, increasing the stock from a low of \$631 billion in 2001 to \$785 billion in 2009.

Another trend in the Federal physical capital stocks is the shift from direct Federal assets to grant-financed assets. In 1960, 39 percent of federally financed nondefense capital was owned by the Federal Government, and 61 percent was owned by State and local governments but financed by Federal grants. Expansion in Federal grants for highways and other State and local capital, coupled with slower growth in direct Federal investment for water resources, for example, shifted the composition of the stock substantially. In 2007, 25 per-

cent of the nondefense stock was owned by the Federal Government and 75 percent by State and local governments.

The growth in the stock of physical capital financed by grants has come in several areas. The growth in the stock for transportation is largely grants for highways, including the Interstate Highway System. The growth in community and regional development stocks occurred largely following the enactment of the community development block grant in the early 1970s. The value of this capital stock has grown only slowly in the past few years. The growth in the natural resources area occurred primarily because of construction grants for sewage treatment facilities. The value of this federally financed stock has increased about 40 percent since the mid-1980s.

### The Stock of Research and Development Capital

This section presents data on the stock of research and development (R&D) capital, taking into account adjustments for its depreciation.

*Trends.* As shown in Table 6-5, the R&D capital stock financed by Federal outlays is estimated to be \$1,166 billion in 2007 in constant 2000 dollars. Roughly half is the stock of basic research knowledge; the remainder is the stock of applied research and development.

The nondefense stock accounted for about three-fifths of the total federally financed R&D stock in 2007. Although investment in defense R&D has exceeded that of nondefense R&D in nearly every year since 1981, the nondefense R&D stock is actually the larger of the two, because of the different emphasis on basic research and applied research and development. Defense R&D

spending is heavily concentrated in applied research and development, which depreciates much more quickly than basic research. The stock of applied research and development is assumed to depreciate at a ten percent geometric rate, while basic research is assumed not to depreciate at all.

The defense R&D stock rose slowly during the 1970s, as gross outlays for R&D trended down in constant dollars and the stock created in the 1960s depreciated. Increased defense R&D spending from 1980 through 1990 led to a more rapid growth of the R&D stock. Subsequently, real defense R&D outlays tapered off, depreciation grew, and, as a result, the real net defense R&D stock stabilized at around \$420 billion. Renewed

spending for defense R&D in recent years has begun to increase the stock, and it is projected to increase to \$483 billion in 2009.

The growth of the nondefense R&D stock slowed from the 1970s to the 1980s, from an annual rate of 3.8 percent in the 1970s to a rate of 2.1 percent in the 1980s. Gross investment in real terms fell during much of the 1980s, and about three-fourths of new outlays went to replacing depreciated R&D. Since 1988, however, nondefense R&D outlays have been on an upward trend while depreciation has edged down. As a result, the net nondefense R&D capital stock has grown more rapidly.

**Table 6-5. NET STOCK OF FEDERALLY FINANCED RESEARCH AND DEVELOPMENT <sup>1</sup>**

(In billions of 2000 dollars)

Fiscal Year	National Defense			Nondefense			Total Federal		
	Total	Basic Research	Applied Research and Development	Total	Basic Research	Applied Research and Development	Total	Basic Research	Applied Research and Development
Five year intervals:									
1970 .....	261	16	245	215	67	148	475	82	393
1975 .....	276	21	255	262	97	165	538	118	421
1980 .....	279	25	255	311	131	179	590	156	434
1985 .....	321	30	291	339	174	165	659	204	455
1990 .....	403	36	366	383	228	154	785	264	521
1995 .....	423	43	380	461	293	168	883	336	548
Annual data:									
2000 .....	423	48	375	542	367	175	965	416	550
2001 .....	421	50	370	563	386	177	984	436	548
2002 .....	420	52	368	587	406	181	1,006	458	549
2003 .....	423	53	370	613	427	186	1,036	480	555
2004 .....	428	54	374	639	449	190	1,067	503	564
2005 .....	442	56	386	660	469	191	1,102	525	577
2006 .....	454	57	397	681	489	192	1,136	546	590
2007 .....	464	58	406	702	509	193	1,166	567	599
2008 est .....	473	59	414	723	530	193	1,196	589	607
2009 est .....	483	61	422	745	551	194	1,228	612	616

<sup>1</sup> Excludes stock of physical capital for research and development, which is included in Table 6-4.

### The Stock of Education Capital

This section presents estimates of the stock of education capital financed by the Federal Government.

As shown in Table 6-6, the federally financed education stock is estimated at \$1,473 billion in 2007 in constant 2000 dollars. The vast majority of the Nation's education stock is financed by State and local governments, and by students and their families themselves. This federally financed portion of the stock represents

about 3 percent of the Nation's total education stock.<sup>1</sup> Nearly three-quarters is for elementary and secondary education, while the remainder is for higher education.

The federally financed education stock has grown steadily in the last few decades, with an average annual growth rate of 5.1 percent from 1970 to 2007. The expansion of the education stock is projected to continue under this budget, with the stock rising to \$1,662 billion in 2009.

<sup>1</sup>For estimates of the total education stock, see table 13-5 in Chapter 13, "Stewardship."

**Table 6-6. NET STOCK OF FEDERALLY FINANCED EDUCATION CAPITAL**

(In billions of 2000 dollars)

Fiscal Year	Total Education Stock	Elementary and Secondary Education	Higher Education
Five year intervals:			
1960 .....	71	51	20
1965 .....	102	74	28
1970 .....	234	184	50
1975 .....	349	282	67
1980 .....	482	379	103
1985 .....	577	434	143
1990 .....	733	546	188
1995 .....	878	641	237
Annual data:			
2000 .....	1,135	827	308
2001 .....	1,189	864	325
2002 .....	1,236	899	337
2003 .....	1,279	932	347
2004 .....	1,327	959	368
2005 .....	1,364	993	371
2006 .....	1,414	1,016	399
2007 .....	1,473	1,063	410
2008 est .....	1,565	1,140	425
2009 est .....	1,662	1,226	436