SPECIAL ANALYSES AND PRESENTATIONS

7. FEDERAL INVESTMENT SPENDING AND CAPITAL BUDGETING

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. An Administration proposal for capital acquisition funds that is being developed is discussed in Chapter 1, "Budget and Performance Integration," in this volume.

In this chapter, investments are discussed in the following sections:

- a description of the size and composition of Federal investment spending;
- a presentation of trends in the stock of federally financed physical capital, research and development, and education;
- alternative capital budget and capital expenditure presentations; and
- projections of Federal physical capital outlays and recent assessments of public civilian capital needs, as required by the Federal Capital Investment Program Information Act of 1984.

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 and extends these estimates four years beyond the budget year, to 2008.

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 internal 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. The detailed tables at the end of this section allow 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 physical investment.

Second, some spending could be classified in more than one category of investment. For example, outlays for construction of research facilities finance the acquisition 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, physical investment and research and development related to education and training are 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 24, "Budget System and Concepts and Glossary."

This section presents spending for gross investment, without adjusting for depreciation. A subsequent section discusses depreciation, shows investment both gross and net of depreciation, and displays net capital stocks.

Composition of Federal Investment Outlays

Major Federal Investment

The composition of major Federal investment outlays is summarized in Table 7–1. 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 $312.5 billion in 2002. They are estimated to increase to $342.1 billion in 2003 and are projected to increase further to $355.5 billion in 2004. Major Federal investment outlays will comprise an estimated 16 percent of total Federal outlays in 2004 and 3.1 percent of the Nation's gross domestic product (GDP). Greater detail on Federal investment is available in Tables 7–2 and 7–3 at the end of this Part. Those tables include 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 $163.7 billion in 2004. Physical investment outlays are for construction and rehabilitation, the purchase of major equipment, and the purchase or sale of land and structures. More than three-fifths 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 increase from $70.0 billion in 2003 to $75.1 billion in 2004. Almost all of these outlays, or an estimated $68.1 billion in 2004, 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 $29.9 billion in 2004. These outlays include $16.8 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 Postal Service facilities; facilities for space and science programs, and Indian Health Service hospitals and clinics. Outlays for the acquisition of major equipment are estimated to be $12.7 billion in 2004. The largest amounts are for the air traffic control system. For the purchase or sale of land and structures, disbursements are estimated to exceed collections by $0.5 billion in 2004. These purchases are largely for buildings and land for parks and other recreation purposes.

Grants to State and local governments for physical investment are estimated to be $58.6 billion in 2004. Almost two-thirds of these outlays, or $39.0 billion, are to assist States and localities with transportation infrastructure, primarily highways. Other major grants for physical investment fund sewage treatment plants, community development, and public housing.

Conduct of research and development.—Outlays for the conduct of research and development are estimated to be $112.1 billion in 2004. 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 $62.9 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 $49.2 billion in 2004. 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 appears in Chapter 8, "Research and Development Funding," in this volume.

Conduct of education and training.—Outlays for the conduct of education and training are estimated to be $79.7 billion in 2004. 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 $48.3 billion

Table 7–1. COMPOSITION OF FEDERAL INVESTMENT OUTLAYS

(In billions of dollars)

	2002 Actual	Estimate	
		2003	2004
Federal Investment			
Major public physical capital investment:			
Direct Federal:			
National defense	68.3	70.0	75.1
Nondefense	29.5	31.3	29.9
Subtotal, direct major public physical capital investment	97.9	101.2	105.0
Grants to State and local governments	58.7	59.2	58.6
Subtotal, major public physical capital investment	156.5	160.5	163.7
Conduct of research and development:			
National defense	48.2	57.1	62.9
Nondefense	39.7	44.7	49.2
Subtotal, conduct of research and development	87.9	101.8	112.1
Conduct of education and training:			
Grants to State and local governments	39.2	46.2	48.3
Direct Federal	28.8	33.7	31.4
Subtotal, conduct of education and training	68.0	79.9	79.7
Major Federal investment outlays	**312.5**	**342.1**	**355.5**
MEMORANDUM			
Major Federal investment outlays:			
National defense	116.6	127.0	138.0
Nondefense	195.9	215.1	217.5
Total, major Federal investment outlays	312.5	342.1	355.5
Miscellaneous physical investments:			
Commodity inventories	0.7	–0.2	–0.2
Other physical investment (direct)	4.0	4.0	3.9
Total, miscellaneous physical investment	4.6	3.8	3.7
Total, Federal investment outlays, including miscellaneous physical investment	317.1	345.9	359.2

in 2004, three-fifths of the total. They include education programs for the disadvantaged and the disabled, vocational and adult education programs, training programs in the Department of Labor, and Head Start. Direct Federal education and training outlays are estimated to be $31.4 billion in 2004. Programs in this category are primarily aid for higher education through student financial assistance, loan subsidies, 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 Outlays

In addition to the categories of major Federal investment, several miscellaneous categories of investment outlays are shown at the bottom of Table 7–1. 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 the purchase and sale of other commodities such as oil and gas. Sales are estimated to exceed purchases by $0.2 billion in 2004.

Outlays for other miscellaneous physical investment are estimated to be $3.9 billion in 2004. This category includes primarily conservation programs. These are entirely direct Federal outlays.

Detailed Tables on Investment Spending

This section provides data on budget authority as well as outlays for major Federal investment. These estimates extend four years beyond the budget year to 2008. Table 7–2 displays budget authority (BA) and outlays (O) by major programs according to defense and nondefense categories. The greatest level of detail appears in Table 7–3, which shows budget authority and outlays divided according to grants to State and local governments and direct Federal spending. Miscellaneous investment is not included in these tables because it is generally unrelated to improving Government operations or enhancing economic activity.

Table 7–2. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: DEFENSE AND NONDEFENSE PROGRAMS

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
NATIONAL DEFENSE								
Major public physical investment:								
Construction and rehabilitation	**BA**	**7,836**	**7,655**	**6,545**	**11,810**	**16,558**	**19,095**	**17,106**
	O	5,688	6,532	7,012	7,055	10,410	13,887	16,562
Acquisition of major equipment	**BA**	**62,901**	**71,603**	**74,589**	**78,758**	**85,877**	**96,197**	**105,404**
	O	62,675	63,453	68,103	71,949	78,429	87,833	96,237
Purchase or sale of land and structures	**BA**	**–20**	**–28**	**–29**	**–31**	**–32**	**–32**	**–32**
	O	–21	–28	–29	–31	–32	–32	–32
Subtotal, major public physical investment	**BA**	**70,717**	**79,230**	**81,105**	**90,537**	**102,403**	**115,260**	**122,478**
	O	68,342	69,957	75,086	78,973	88,807	101,688	112,767
Conduct of research and development	**BA**	**52,573**	**61,185**	**66,877**	**72,275**	**69,664**	**70,112**	**72,563**
	O	48,238	57,061	62,898	68,217	66,899	67,906	70,546
Conduct of education and training (civilian)	**BA**	**8**	**8**	**8**	**8**	**8**	**8**	**9**
	O	8	8	2	7	9	9	9
Subtotal, national defense investment	**BA**	**123,298**	**140,423**	**147,990**	**162,820**	**172,075**	**185,380**	**195,050**
	O	116,588	127,026	137,986	147,197	155,715	169,603	183,322
NONDEFENSE								
Major public physical investment:								
Construction and rehabilitation:								
Highways	**BA**	**33,672**	**30,557**	**29,615**	**30,442**	**31,518**	**32,422**	**33,334**
	O	30,117	28,442	28,583	29,701	30,443	31,378	32,199
Mass transportation	**BA**	**9,492**	**6,915**	**6,926**	**7,064**	**7,208**	**7,370**	**7,553**
	O	7,341	6,851	7,093	6,918	6,809	6,749	7,398
Rail transportation	**BA**	**21**	**21**	**1**	**1**	**1**	**1**	**1**
	O	14	18	55	27	8	7	1
Air transportation	**BA**	**3,187**	**3,428**	**3,418**	**3,418**	**3,419**	**3,419**	**3,420**
	O	2,874	3,269	3,325	3,400	3,462	3,471	3,468
Community development block grants	**BA**	**7,783**	**4,732**	**4,732**	**4,820**	**4,919**	**5,027**	**5,154**
	O	5,429	6,650	6,129	5,281	4,645	4,777	4,925
Other community and regional development	**BA**	**2,174**	**1,649**	**1,270**	**1,324**	**1,351**	**1,382**	**1,416**
	O	1,647	1,740	1,682	1,629	1,529	1,499	1,484
Pollution control and abatement	**BA**	**4,025**	**3,629**	**3,455**	**3,519**	**3,590**	**3,671**	**3,765**
	O	3,783	4,033	3,663	3,640	3,595	3,646	3,732
Water resources	**BA**	**4,134**	**2,967**	**2,861**	**2,908**	**2,969**	**3,039**	**3,118**
	O	3,827	3,420	3,153	2,833	3,126	3,079	3,152
Housing assistance	**BA**	**7,223**	**7,091**	**6,850**	**6,978**	**7,119**	**7,278**	**7,462**
	O	7,746	7,737	8,249	8,098	8,588	8,533	7,680
Energy	**BA**	**1,458**	**1,172**	**1,180**	**696**	**1,127**	**884**	**839**
	O	1,460	1,173	1,182	710	1,149	905	868
Veterans hospitals and other health	**BA**	**1,713**	**2,242**	**1,585**	**1,613**	**1,643**	**1,679**	**1,721**
	O	1,831	1,834	2,166	2,271	2,297	2,335	2,390
Postal Service	**BA**	**213**	**1,053**	**983**	**1,114**	**847**	**1,442**	**1,021**
	O	365	574	836	909	934	1,060	1,163
GSA real property activities	**BA**	**1,571**	**1,705**	**1,413**	**1,439**	**1,469**	**1,501**	**1,539**
	O	1,046	1,709	1,477	1,409	2,435	2,663	3,279
Other programs	**BA**	**8,290**	**6,964**	**5,992**	**6,302**	**6,385**	**6,540**	**6,707**
	O	7,676	8,418	6,607	6,524	6,506	6,531	6,706
Subtotal, construction and rehabilitation	**BA**	**84,956**	**74,125**	**70,281**	**71,638**	**73,565**	**75,655**	**77,050**
	O	75,156	75,868	74,200	73,350	75,526	76,633	78,445
Acquisition of major equipment:								
Air transportation	**BA**	**4,872**	**2,986**	**2,927**	**2,982**	**3,042**	**3,109**	**3,188**
	O	2,638	4,365	3,465	3,144	2,937	3,227	3,301
Postal Service	**BA**	**538**	**493**	**900**	**994**	**675**	**675**	**1,123**

Table 7–2. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: DEFENSE AND NONDEFENSE PROGRAMS—Continued

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
	O	651	512	642	704	683	719	786
Other	**BA**	**8,075**	**7,736**	**8,446**	**8,433**	**8,631**	**8,818**	**9,079**
	O	8,054	8,086	8,639	8,741	9,014	9,252	9,512
Subtotal, acquisition of major equipment	**BA**	**13,485**	**11,215**	**12,273**	**12,409**	**12,348**	**12,602**	**13,390**
	O	11,343	12,963	12,746	12,589	12,634	13,198	13,599
Purchase or sale of land and structures	**BA**	**628**	**497**	**352**	**19**	**340**	**338**	**339**
	O	761	631	498	130	609	637	720
Other physical assets (grants)	**BA**	**1,227**	**1,260**	**1,254**	**1,311**	**1,345**	**1,381**	**1,424**
	O	928	1,038	1,122	1,175	1,196	1,214	1,247
Subtotal, major public physical investment	**BA**	**100,296**	**87,097**	**84,160**	**85,377**	**87,598**	**89,976**	**92,203**
	O	88,188	90,500	88,566	87,244	89,965	91,682	94,011
Conduct of research and development:								
General science, space and technology	**BA**	**12,036**	**12,934**	**13,880**	**14,558**	**15,130**	**15,716**	**16,231**
	O	10,922	12,220	13,352	14,106	14,687	15,266	15,797
Energy	**BA**	**1,347**	**1,308**	**1,381**	**1,553**	**1,567**	**1,653**	**1,902**
	O	1,197	1,466	1,495	1,511	1,588	1,643	1,728
Transportation	**BA**	**1,835**	**1,804**	**1,857**	**1,814**	**1,844**	**1,863**	**1,869**
	O	1,577	1,804	1,960	1,898	1,843	1,875	1,886
Health	**BA**	**23,007**	**26,518**	**27,814**	**28,292**	**28,863**	**29,455**	**30,200**
	O	20,069	22,825	25,975	27,127	27,807	28,417	29,074
Natural resources and environment	**BA**	**2,053**	**2,191**	**2,187**	**2,225**	**2,271**	**2,323**	**2,382**
	O	1,856	1,717	1,861	1,907	1,942	1,904	1,952
All other research and development	**BA**	**4,396**	**4,274**	**4,221**	**4,437**	**4,543**	**4,676**	**4,805**
	O	4,052	4,668	4,567	4,669	4,555	4,657	4,799
Subtotal, conduct of research and development	**BA**	**44,674**	**49,029**	**51,340**	**52,879**	**54,218**	**55,686**	**57,389**
	O	39,673	44,700	49,210	51,218	52,422	53,762	55,236
Conduct of education and training:								
Education, training, employment and social services:								
Elementary, secondary, and vocational education	**BA**	**32,819**	**34,221**	**35,437**	**36,074**	**36,811**	**37,626**	**38,573**
	O	25,601	31,877	34,341	35,201	36,088	36,874	37,722
Higher education	**BA**	**20,145**	**22,587**	**22,238**	**20,727**	**20,584**	**20,741**	**21,148**
	O	18,404	22,968	20,551	19,946	19,761	19,887	20,189
Research and general education aids	**BA**	**2,400**	**2,391**	**2,505**	**2,550**	**2,601**	**2,659**	**2,728**
	O	2,541	2,581	2,459	2,510	2,561	2,616	2,677
Training and employment	**BA**	**5,421**	**4,985**	**5,695**	**5,804**	**5,923**	**6,056**	**6,207**
	O	6,213	5,875	5,428	5,550	5,631	5,790	5,921
Social services	**BA**	**9,940**	**10,048**	**10,089**	**10,285**	**10,499**	**10,729**	**11,000**
	O	9,518	10,065	10,014	10,205	10,411	10,625	10,876
Subtotal, education, training, and social services	**BA**	**70,725**	**74,232**	**75,964**	**75,440**	**76,418**	**77,811**	**79,656**
	O	62,277	73,366	72,793	73,412	74,452	75,792	77,385
Veterans education, training, and rehabilitation	**BA**	**2,619**	**2,716**	**2,999**	**3,388**	**3,512**	**3,621**	**3,737**
	O	2,396	3,005	3,245	3,417	3,503	3,586	3,726
Health	**BA**	**1,560**	**1,268**	**1,296**	**1,302**	**1,328**	**1,357**	**1,391**
	O	1,388	1,358	1,315	1,291	1,291	1,316	1,337
Other education and training	**BA**	**2,220**	**2,222**	**2,396**	**2,457**	**2,514**	**2,572**	**2,654**
	O	1,966	2,163	2,345	2,445	2,472	2,545	2,645
Subtotal, conduct of education and training	**BA**	**77,124**	**80,438**	**82,655**	**82,587**	**83,772**	**85,361**	**87,438**
	O	68,027	79,892	79,698	80,565	81,718	83,239	85,093
Subtotal, nondefense investment	**BA**	**222,094**	**216,564**	**218,155**	**220,843**	**225,588**	**231,023**	**237,030**
	O	195,888	215,092	217,474	219,027	224,105	228,683	234,340
Total, Federal investment	**BA**	**345,392**	**356,987**	**366,145**	**383,663**	**397,663**	**416,403**	**432,080**
	O	312,476	342,118	355,460	366,224	379,820	398,286	417,662

Table 7–3. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
GRANTS TO STATE AND LOCAL GOVERNMENTS								
Major public physical investments:								
Construction and rehabilitation:								
Transportation:								
Highways	**BA**	**33,672**	**30,557**	**29,615**	**30,442**	**31,518**	**32,422**	**33,334**
	O	30,115	28,438	28,582	29,701	30,443	31,378	32,199
Mass transportation	**BA**	**9,492**	**6,915**	**6,926**	**7,064**	**7,208**	**7,370**	**7,553**
	O	7,341	6,851	7,093	6,918	6,809	6,749	7,398
Rail transportation	**BA**	.....	.....	.....	.....	.....	.....	.....
	O	2	.....	1	.....	.....	.....	.....
Air transportation	**BA**	**3,173**	**3,400**	**3,400**	**3,400**	**3,400**	**3,400**	**3,400**
	O	2,860	3,244	3,299	3,383	3,447	3,456	3,453
Subtotal, transportation	**BA**	**46,337**	**40,872**	**39,941**	**40,906**	**42,126**	**43,192**	**44,287**
	O	40,318	38,533	38,975	40,002	40,699	41,583	43,050
Other construction and rehabilitation:								
Pollution control and abatement	**BA**	**2,852**	**2,575**	**2,220**	**2,261**	**2,307**	**2,358**	**2,419**
	O	2,538	2,891	2,409	2,373	2,300	2,295	2,329
Other natural resources and environment	**BA**	**77**	**40**	**23**	**23**	**24**	**24**	**25**
	O	61	78	73	31	26	16	17
Community development block grants	**BA**	**7,783**	**4,732**	**4,732**	**4,820**	**4,919**	**5,027**	**5,154**
	O	5,429	6,650	6,129	5,281	4,645	4,777	4,925
Other community and regional development	**BA**	**1,668**	**1,219**	**866**	**913**	**931**	**952**	**976**
	O	1,268	1,345	1,273	1,211	1,110	1,074	1,055
Housing assistance	**BA**	**7,188**	**7,057**	**6,816**	**6,943**	**7,084**	**7,242**	**7,425**
	O	7,720	7,704	8,216	8,063	8,557	8,502	7,647
Other construction	**BA**	**225**	**216**	**218**	**222**	**226**	**230**	**235**
	O	319	925	367	325	315	318	323
Subtotal, other construction and rehabilitation	**BA**	**19,793**	**15,839**	**14,875**	**15,182**	**15,491**	**15,833**	**16,234**
	O	17,335	19,593	18,467	17,284	16,953	16,982	16,296
Subtotal, construction and rehabilitation	**BA**	**66,130**	**56,711**	**54,816**	**56,088**	**57,617**	**59,025**	**60,521**
	O	57,653	58,126	57,442	57,286	57,652	58,565	59,346
Other physical assets	**BA**	**1,345**	**1,337**	**1,291**	**1,348**	**1,383**	**1,420**	**1,464**
	O	1,008	1,103	1,189	1,222	1,238	1,252	1,287
Subtotal, major public physical capital	**BA**	**67,475**	**58,048**	**56,107**	**57,436**	**59,000**	**60,445**	**61,985**
	O	58,661	59,229	58,631	58,508	58,890	59,817	60,633
Conduct of research and development:								
Agriculture	**BA**	**259**	**256**	**275**	**281**	**285**	**292**	**300**
	O	248	255	259	264	272	272	278
Other	**BA**	**576**	**631**	**599**	**573**	**585**	**558**	**574**
	O	306	377	496	510	525	535	545
Subtotal, conduct of research and development	**BA**	**835**	**887**	**874**	**854**	**870**	**850**	**874**
	O	554	632	755	774	797	807	823
Conduct of education and training:								
Elementary, secondary, and vocational education	**BA**	**30,926**	**33,014**	**34,133**	**34,739**	**35,450**	**36,236**	**37,148**
	O	23,459	30,308	32,940	33,665	34,455	35,193	36,000
Higher education	**BA**	**449**	**382**	**382**	**389**	**397**	**406**	**417**
	O	444	577	394	395	400	407	417
Research and general education aids	**BA**	**634**	**637**	**651**	**664**	**677**	**692**	**711**
	O	702	755	634	674	686	701	718
Training and employment	**BA**	**3,827**	**3,459**	**4,139**	**4,218**	**4,305**	**4,401**	**4,511**
	O	4,706	4,287	3,855	4,064	4,160	4,299	4,396
Social services	**BA**	**9,567**	**9,697**	**9,725**	**9,914**	**10,122**	**10,345**	**10,607**
	O	9,183	9,539	9,676	9,861	10,061	10,269	10,512
Agriculture	**BA**	**450**	**418**	**422**	**430**	**439**	**448**	**460**
	O	435	448	458	434	442	445	455
Other	**BA**	**281**	**339**	**342**	**353**	**370**	**384**	**402**
	O	267	282	321	326	337	349	364

Table 7–3. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS—Continued

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
Subtotal, conduct of education and training	BA	**46,134**	**47,946**	**49,794**	**50,707**	**51,760**	**52,912**	**54,256**
	O	39,196	46,196	48,278	49,419	50,541	51,663	52,862
Subtotal, grants for investment	BA	**114,444**	**106,881**	**106,775**	**108,997**	**111,630**	**114,207**	**117,115**
	O	98,411	106,057	107,664	108,701	110,228	112,287	114,318
DIRECT FEDERAL PROGRAMS								
Major public physical investment:								
Construction and rehabilitation:								
National defense:								
Military construction and family housing	BA	**7,112**	**6,865**	**5,727**	**10,865**	**15,452**	**17,969**	**15,966**
	O	4,981	5,874	6,222	6,131	9,331	12,752	15,410
Atomic energy defense activities and other	BA	**724**	**790**	**818**	**945**	**1,106**	**1,126**	**1,140**
	O	707	658	790	924	1,079	1,135	1,152
Subtotal, national defense	BA	**7,836**	**7,655**	**6,545**	**11,810**	**16,558**	**19,095**	**17,106**
	O	5,688	6,532	7,012	7,055	10,410	13,887	16,562
Nondefense:								
International affairs	BA	**1,550**	**1,440**	**1,690**	**1,721**	**1,756**	**1,796**	**1,841**
	O	910	1,179	1,284	1,534	1,621	1,668	1,725
General science, space, and technology	BA	**2,384**	**2,098**	**2,423**	**2,453**	**2,507**	**2,574**	**2,639**
	O	2,595	2,290	2,411	2,451	2,530	2,563	2,628
Water resources projects	BA	**4,057**	**2,927**	**2,838**	**2,885**	**2,945**	**3,015**	**3,093**
	O	3,767	3,343	3,081	2,803	3,101	3,064	3,136
Other natural resources and environment	BA	**1,796**	**1,549**	**1,736**	**1,778**	**1,812**	**1,857**	**1,903**
	O	1,790	1,754	1,879	1,856	1,843	1,879	1,945
Energy	BA	**1,458**	**1,172**	**1,180**	**696**	**1,127**	**884**	**839**
	O	1,460	1,173	1,182	710	1,149	905	868
Postal Service	BA	**213**	**1,053**	**983**	**1,114**	**847**	**1,442**	**1,021**
	O	365	574	836	909	934	1,060	1,163
Transportation	BA	**312**	**282**	**268**	**273**	**232**	**237**	**243**
	O	239	392	353	308	266	278	285
Housing assistance	BA	**35**	**34**	**34**	**35**	**35**	**36**	**37**
	O	26	33	33	35	31	31	33
Veterans hospitals and other health facilities	BA	**1,613**	**2,142**	**1,483**	**1,509**	**1,537**	**1,571**	**1,610**
	O	1,816	1,819	2,151	2,256	2,281	2,319	2,374
Federal Prison System	BA	**675**	**245**	**–188**	.....	.....	.....	.....
	O	795	315	185	140	20	.....	.....
GSA real property activities	BA	**1,571**	**1,705**	**1,413**	**1,439**	**1,469**	**1,501**	**1,539**
	O	1,046	1,709	1,477	1,409	2,435	2,663	3,279
Other construction	BA	**3,162**	**2,767**	**1,605**	**1,647**	**1,681**	**1,717**	**1,764**
	O	2,694	3,161	1,886	1,653	1,663	1,638	1,663
Subtotal, nondefense	BA	**18,826**	**17,414**	**15,465**	**15,550**	**15,948**	**16,630**	**16,529**
	O	17,503	17,742	16,758	16,064	17,874	18,068	19,099
Subtotal, construction and rehabilitation	BA	**26,662**	**25,069**	**22,010**	**27,360**	**32,506**	**35,725**	**33,635**
	O	23,191	24,274	23,770	23,119	28,284	31,955	35,661
Acquisition of major equipment:								
National defense:								
Department of Defense	BA	**62,795**	**71,464**	**74,478**	**78,644**	**85,760**	**96,077**	**105,280**
	O	62,572	63,337	67,982	71,821	78,298	87,698	96,098
Atomic energy defense activities	BA	**106**	**139**	**111**	**114**	**117**	**120**	**124**
	O	103	116	121	128	131	135	139
Subtotal, national defense	BA	**62,901**	**71,603**	**74,589**	**78,758**	**85,877**	**96,197**	**105,404**
	O	62,675	63,453	68,103	71,949	78,429	87,833	96,237
Nondefense:								
General science and basic research	BA	**492**	**479**	**581**	**619**	**618**	**615**	**636**
	O	490	528	528	561	607	621	623
Space flight, research, and supporting activities	BA	**704**	**679**	**940**	**994**	**1,040**	**1,087**	**1,125**
	O	653	651	833	991	1,057	1,108	1,155
Energy	BA	**116**	**116**	**117**	**117**	**118**	**118**	**118**
	O	116	116	117	117	118	118	118
Postal Service	BA	**538**	**493**	**900**	**994**	**675**	**675**	**1,123**
	O	651	512	642	704	683	719	786

Table 7–3. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS—Continued

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
Air transportation	BA	**4,872**	**2,986**	**2,927**	**2,982**	**3,042**	**3,109**	**3,188**
	O	2,638	4,365	3,465	3,144	2,937	3,227	3,301
Water transportation (Coast Guard)	BA	**428**	**511**	**565**	**576**	**587**	**600**	**615**
	O	316	480	448	428	481	507	533
Other transportation (railroads)	BA	**826**	**521**	**900**	**917**	**935**	**956**	**980**
	O	1,067	595	900	917	935	956	980
Hospital and medical care for veterans	BA	**665**	**642**	**410**	**418**	**426**	**436**	**447**
	O	1,253	1,156	921	940	959	981	1,006
Department of Justice	BA	**897**	**879**	**876**	**890**	**909**	**929**	**953**
	O	752	818	865	896	873	893	914
Department of the Treasury	BA	**636**	**600**	**656**	**516**	**526**	**537**	**551**
	O	517	652	672	504	520	531	544
GSA general supply fund	BA	**709**	**676**	**711**	**732**	**762**	**771**	**815**
	O	657	676	711	732	762	771	815
Other	BA	**2,484**	**2,556**	**2,653**	**2,617**	**2,672**	**2,730**	**2,799**
	O	2,153	2,349	2,577	2,608	2,660	2,728	2,784
Subtotal, nondefense	BA	**13,367**	**11,138**	**12,236**	**12,372**	**12,310**	**12,563**	**13,350**
	O	11,263	12,898	12,679	12,542	12,592	13,160	13,559
Subtotal, acquisition of major equipment	BA	**76,268**	**82,741**	**86,825**	**91,130**	**98,187**	**108,760**	**118,754**
	O	73,938	76,351	80,782	84,491	91,021	100,993	109,796
Purchase or sale of land and structures:								
National defense	BA	**–20**	**–28**	**–29**	**–31**	**–32**	**–32**	**–32**
	O	–21	–28	–29	–31	–32	–32	–32
International affairs	BA	.....	**1**	.....	.....	.....	.....	.....
	O	.....	1	1	1	1	1	1
Privatization of Elk Hills	BA	.....	.....	.....	**–323**	.....	.....	.....
	O	.....	.....	.....	–323	.....	.....	.....
Other	BA	**628**	**496**	**352**	**342**	**340**	**338**	**339**
	O	761	630	497	452	608	636	719
Subtotal, purchase or sale of land and structures	BA	**608**	**469**	**323**	**–12**	**308**	**306**	**307**
	O	740	603	469	99	577	605	688
Subtotal, major public physical investment	BA	**103,538**	**108,279**	**109,158**	**118,478**	**131,001**	**144,791**	**152,696**
	O	97,869	101,228	105,021	107,709	119,882	133,553	146,145
Conduct of research and development:								
National defense:								
Defense military	BA	**49,190**	**57,383**	**62,604**	**67,832**	**65,089**	**65,377**	**67,720**
	O	44,903	53,396	58,680	63,715	62,227	63,076	65,586
Atomic energy and other	BA	**3,383**	**3,802**	**4,273**	**4,443**	**4,575**	**4,735**	**4,843**
	O	3,335	3,665	4,218	4,502	4,672	4,830	4,960
Subtotal, national defense	BA	**52,573**	**61,185**	**66,877**	**72,275**	**69,664**	**70,112**	**72,563**
	O	48,238	57,061	62,898	68,217	66,899	67,906	70,546
Nondefense:								
International affairs	BA	**279**	**297**	**306**	**312**	**319**	**324**	**335**
	O	250	245	343	340	339	346	353
General science, space and technology:								
NASA	BA	**6,312**	**7,023**	**7,550**	**8,104**	**8,545**	**8,988**	**9,329**
	O	5,816	6,523	7,349	7,837	8,265	8,648	9,040
National Science Foundation	BA	**3,275**	**3,427**	**3,709**	**3,784**	**3,861**	**3,945**	**4,047**
	O	2,803	3,221	3,398	3,612	3,713	3,851	3,924
Department of Energy	BA	**2,444**	**2,461**	**2,511**	**2,558**	**2,610**	**2,667**	**2,735**
	O	2,298	2,461	2,511	2,551	2,601	2,656	2,720
Other general science, space and technology	BA	**5**	**23**	**110**	**112**	**114**	**116**	**120**
	O	5	15	94	106	108	111	113
Subtotal, general science, space and technology	BA	**12,315**	**13,231**	**14,186**	**14,870**	**15,449**	**16,040**	**16,566**
	O	11,172	12,465	13,695	14,446	15,026	15,612	16,150
Energy	BA	**1,347**	**1,308**	**1,381**	**1,553**	**1,567**	**1,653**	**1,902**
	O	1,197	1,466	1,495	1,511	1,588	1,643	1,728

Table 7–3. FEDERAL INVESTMENT BUDGET AUTHORITY AND OUTLAYS: GRANT AND DIRECT FEDERAL PROGRAMS—Continued

(in millions of dollars)

Description		2002 Actual	Estimate					
			2003	2004	2005	2006	2007	2008
Transportation:								
Department of Transportation	**BA**	**626**	**471**	**533**	**544**	**558**	**573**	**588**
	O	502	502	559	531	497	517	530
NASA	**BA**	**997**	**976**	**993**	**932**	**939**	**934**	**916**
	O	956	976	976	971	939	938	924
Subtotal, transportation	**BA**	**2,970**	**2,755**	**2,907**	**3,029**	**3,064**	**3,160**	**3,406**
	O	2,655	2,944	3,030	3,013	3,024	3,098	3,182
Health:								
National Institutes of Health	**BA**	**22,117**	**25,585**	**26,872**	**27,371**	**27,924**	**28,537**	**29,258**
	O	19,374	22,067	25,172	26,309	26,965	27,561	28,202
All other health	**BA**	**695**	**661**	**678**	**690**	**704**	**720**	**739**
	O	612	644	658	664	676	691	706
Subtotal, health	**BA**	**22,812**	**26,246**	**27,550**	**28,061**	**28,628**	**29,257**	**29,997**
	O	19,986	22,711	25,830	26,973	27,641	28,252	28,908
Agriculture	**BA**	**1,327**	**1,297**	**1,293**	**1,455**	**1,502**	**1,569**	**1,606**
	O	1,260	1,361	1,330	1,355	1,374	1,432	1,494
Natural resources and environment	**BA**	**1,836**	**1,976**	**2,000**	**2,035**	**2,077**	**2,124**	**2,178**
	O	1,755	1,616	1,761	1,804	1,837	1,796	1,842
National Institute of Standards and Technology	**BA**	**422**	**360**	**318**	**323**	**330**	**338**	**345**
	O	396	426	455	402	352	358	364
Hospital and medical care for veterans	**BA**	**1,124**	**1,186**	**1,230**	**1,252**	**1,278**	**1,306**	**1,340**
	O	1,107	1,176	1,222	1,353	1,271	1,299	1,330
All other research and development	**BA**	**1,033**	**1,091**	**982**	**1,000**	**1,020**	**1,042**	**1,077**
	O	788	1,369	1,132	1,098	1,100	1,108	1,143
Subtotal, nondefense	**BA**	**43,839**	**48,142**	**50,466**	**52,025**	**53,348**	**54,836**	**56,515**
	O	39,119	44,068	48,455	50,444	51,625	52,955	54,413
Subtotal, conduct of research and development	**BA**	**96,412**	**109,327**	**117,343**	**124,300**	**123,012**	**124,948**	**129,078**
	O	87,357	101,129	111,353	118,661	118,524	120,861	124,959
Conduct of education and training:								
Elementary, secondary, and vocational education	**BA**	**1,893**	**1,207**	**1,304**	**1,335**	**1,361**	**1,390**	**1,425**
	O	2,142	1,569	1,401	1,536	1,633	1,681	1,722
Higher education	**BA**	**19,696**	**22,205**	**21,856**	**20,338**	**20,187**	**20,335**	**20,731**
	O	17,960	22,391	20,157	19,551	19,361	19,480	19,772
Research and general education aids	**BA**	**1,766**	**1,754**	**1,854**	**1,886**	**1,924**	**1,967**	**2,017**
	O	1,839	1,826	1,825	1,836	1,875	1,915	1,959
Training and employment	**BA**	**1,594**	**1,526**	**1,556**	**1,586**	**1,618**	**1,655**	**1,696**
	O	1,507	1,588	1,573	1,486	1,471	1,491	1,525
Health	**BA**	**1,540**	**1,248**	**1,276**	**1,282**	**1,307**	**1,336**	**1,369**
	O	1,368	1,338	1,295	1,272	1,272	1,297	1,317
Veterans education, training, and rehabilitation	**BA**	**2,619**	**2,716**	**2,999**	**3,388**	**3,512**	**3,621**	**3,737**
	O	2,396	3,005	3,245	3,417	3,503	3,586	3,726
General science and basic research	**BA**	**887**	**938**	**914**	**931**	**950**	**971**	**996**
	O	666	867	901	905	922	941	958
National defense	**BA**	**8**	**8**	**8**	**8**	**8**	**8**	**9**
	O	8	8	2	7	9	9	9
International affairs	**BA**	**389**	**256**	**361**	**367**	**376**	**384**	**393**
	O	372	289	333	377	372	379	388
Other	**BA**	**606**	**642**	**741**	**767**	**777**	**790**	**818**
	O	581	823	690	766	768	806	864
Subtotal, conduct of education and training	**BA**	**30,998**	**32,500**	**32,869**	**31,888**	**32,020**	**32,457**	**33,191**
	O	28,839	33,704	31,422	31,153	31,186	31,585	32,240
Subtotal, direct Federal investment	**BA**	**230,948**	**250,106**	**259,370**	**274,666**	**286,033**	**302,196**	**314,965**
	O	214,065	236,061	247,796	257,523	269,592	285,999	303,344
Total, Federal investment	**BA**	**345,392**	**356,987**	**366,145**	**383,663**	**397,663**	**416,403**	**432,080**
	O	312,476	342,118	355,460	366,224	379,820	398,286	417,662

Part II: FEDERALLY FINANCED CAPITAL STOCKS

Federal investment spending creates a "stock" of capital that is available in the future for 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 research and development 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 research and development or education can be carried out by Federal or State government laboratories, universities and other nonprofit organizations, local governments, or private industry. Research and development 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. 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.

Additional detail about the methods used to estimate capital stocks appears in a methodological note at the end of this section. 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 Stock of Physical Capital

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

Trends.—Table 7–4 shows the value of the net federally financed physical capital stock since 1960, in constant fiscal year 1996 dollars. The total stock grew at a 2.2 percent average annual rate from 1960 to 2002, with periods of faster growth during the late 1960s and the 1980s. The stock amounted to $2,016 billion in 2002 and is estimated to increase to $2,119 billion by 2004. In 2002, the national defense capital stock accounted for $638 billion, or 32 percent of the total, and nondefense stocks for $1,378 billion, or 68 percent of the total.

Table 7–4. NET STOCK OF FEDERALLY FINANCED PHYSICAL CAPITAL

(In billions of 1996 dollars)

Fiscal Year	Total	National Defense	Nondefense								
			Total Non-defense	Direct Federal Capital			Capital Financed by Federal Grants				
				Total	Water and Power	Other	Total	Trans-portation	Commu-nity and Regional	Natural Resources	Other
Five year intervals:											
1960	806	572	234	98	61	36	136	82	25	20	9
1965	892	554	338	128	78	51	209	146	30	21	12
1970	1,044	589	455	155	94	61	301	213	44	25	19
1975	1,091	521	570	176	109	67	394	261	71	39	23
1980	1,216	484	732	206	130	76	526	317	112	73	25
1985	1,422	569	853	234	143	90	619	368	135	92	24
1990	1,696	721	975	269	154	114	706	429	147	105	26
1995	1,832	712	1,119	311	164	146	809	496	156	115	43
Annual data:											
2000	1,922	635	1,286	351	167	183	936	574	170	121	70
2001	1,963	632	1,330	364	170	194	966	595	173	123	76
2002	2,016	638	1,378	378	172	206	1,001	619	176	124	81
2003 est.	2,068	643	1,426	392	173	219	1,033	640	180	126	88
2004 est.	2,119	651	1,468	404	174	230	1,064	661	183	127	93

Real stocks of defense and nondefense capital show very different trends. Nondefense stocks have grown consistently since 1970, increasing from $455 billion in 1970 to $1,378 billion in 2002. With the investments proposed in the budget, nondefense stocks are estimated to grow to $1,468 billion in 2004. During the 1970s, the nondefense capital stock grew at an average annual rate of 4.9 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 1986, the defense stock exceeded its earlier Vietnam-era peak. In recent years, depreciation on the increased stocks, together with a slower pace of defense physical capital investment allowed by the collapse of the Soviet Union and the closure or realignment of unneeded military bases, reduced the stock from its previous levels. The increased defense investment in this budget would reverse this decline, increasing the stock from an estimated $638 billion in 2002 to $651 billion in 2004.

Another trend in the Federal physical capital stocks is the shift from direct Federal assets to grant-financed assets. In 1960, 42 percent of federally financed nondefense capital was owned by the Federal Government, and 58 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 2002, 27 percent of the nondefense stock was owned by the Federal Government and 73 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 30 percent since the mid-1980s.

Table 7–5 shows nondefense physical capital outlays both gross and net of depreciation since 1960. Total nondefense net investment has been consistently positive over the period covered by the table, indicating that new investment has exceeded depreciation on the existing stock. For some categories in the table, however, net investment has been negative in some years, indicating that new investment has not been sufficient to offset estimated depreciation. The net investment in this table is the change in the net nondefense physical capital stock displayed in Table 7–4.

Table 7–5. COMPOSITION OF GROSS AND NET FEDERAL AND FEDERALLY FINANCED NONDEFENSE PUBLIC PHYSICAL INVESTMENT

(In billions of 1996 dollars)

Fiscal Year	Total nondefense investment			Direct Federal investment					Investment financed by Federal grants						
							Composition of net investment					Composition of net investment			
	Gross	Depreciation	Net	Gross	Depreciation	Net	Water and power	Other	Gross	Depreciation	Net	Transportation (mainly highways)	Community and regional development	Natural resources and environment	Other
Five year intervals:															
1960	22.7	4.7	18.1	7.0	2.2	4.7	2.5	2.3	15.7	2.4	13.3	12.6	0.1	0.1	0.5
1965	32.5	6.9	25.6	10.1	3.0	7.1	3.3	3.8	22.3	3.8	18.5	15.5	2.1	0.4	0.5
1970	32.1	9.4	22.6	6.9	3.8	3.1	2.3	0.8	25.1	5.6	19.5	11.9	5.1	0.9	1.6
1975	32.9	11.6	21.3	9.0	4.3	4.8	3.6	1.2	23.8	7.4	16.5	7.0	4.3	4.5	0.7
1980	46.9	14.6	32.4	11.0	4.9	6.0	3.9	2.2	36.0	9.6	26.4	12.3	7.5	6.8	–0.2
1985	45.4	17.8	27.7	13.7	6.4	7.4	2.6	4.8	31.7	11.4	20.3	13.0	4.1	3.2	–0.1
1990	46.3	22.3	24.0	16.2	9.2	7.0	2.4	4.5	30.1	13.1	17.1	11.9	1.7	2.1	1.4
1995	59.9	26.3	33.5	19.5	11.4	8.2	1.8	6.3	40.3	15.0	25.4	15.2	2.8	2.0	5.4
Annual data:															
2000	71.0	30.9	40.2	25.7	13.5	12.2	1.6	10.6	45.4	17.4	28.0	18.1	2.7	1.6	5.7
2001	76.0	32.2	43.8	27.5	14.3	13.2	2.6	10.6	48.5	17.9	30.6	20.9	2.8	1.5	5.4
2002	82.0	33.7	48.2	29.3	15.2	14.1	1.9	12.2	52.7	18.5	34.1	24.0	3.0	1.3	5.8
2003 est.	82.8	35.5	47.3	30.6	16.3	14.3	1.1	13.2	52.1	19.2	33.0	21.2	4.0	1.6	6.1
2004 est.	79.4	37.0	42.3	28.9	17.2	11.6	0.8	10.8	50.5	19.8	30.7	20.4	3.3	1.2	5.8

The Stock of Research and Development Capital

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

Trends.—As shown in Table 7–6, the R&D capital stock financed by Federal outlays is estimated to be $951 billion in 2002 in constant 1996 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 2002. Although investment in defense R&D has exceeded that of nondefense R&D in 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 $400 billion. Renewed spending for defense R&D in this budget is projected to increase the stock to $413 billion in 2004.

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 7–6. NET STOCK OF FEDERALLY FINANCED RESEARCH AND DEVELOPMENT [1]

(In billions of 1996 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	247	15	233	204	63	140	451	78	373
1975	262	19	242	249	92	157	511	112	399
1980	265	24	242	295	125	170	560	148	412
1985	304	29	276	321	165	156	626	194	432
1990	381	34	347	362	217	146	744	251	493
1995	395	38	357	406	254	152	801	291	509
Annual data:									
2000	398	46	353	512	347	164	910	393	517
2001	396	48	349	531	365	167	927	412	515
2002	397	50	347	554	383	171	951	432	518
2003 est.	404	52	352	580	403	177	984	455	529
2004 est.	413	54	360	610	425	185	1,023	478	545

[1] Excludes stock of physical capital for research and development, which is included in Table 7-4.

The Stock of Education Capital

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

As shown in Table 7–7, the federally financed education stock is estimated at $1,120 billion in 2002 in constant 1996 dollars, rising to $1,248 billion in 2004. 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.[1] Nearly three-quarters is for elementary and secondary education, while the remaining one quarter is for higher education.

Table 7–7. NET STOCK OF FEDERALLY FINANCED EDUCATION CAPITAL

(In billions of 1996 dollars)

Fiscal Year	Total Education Stock	Elementary and Secondary Education	Higher Education
Five year intervals:			
1960	67	48	19
1965	93	67	26
1970	213	167	46
1975	307	247	60
1980	434	338	96
1985	535	399	137
1990	704	519	184
1995	802	582	220
Annual data:			
2000	1,040	759	281
2001	1,075	776	300
2002	1,120	803	317
2003 est.	1,187	848	339
2004 est.	1,248	891	358

Despite a slowdown in growth during the early 1980s, the federally financed education stock grew at an average annual rate of 5.3 percent from 1970 to 2002, and the expansion of the stock is projected to continue under this budget.

Note on Estimating Methods

This note provides further technical detail about the estimation of the capital stock series presented in Tables 7–4 through 7–7.

As stated previously, the capital stock estimates are very rough approximations. Sources of possible error include:

[1] For estimates of the total education stock, see table 3–4 in Chapter 3, "Stewardship."

Methodological issues.—The stocks of physical capital and research and development are estimated with the perpetual inventory method. A fundamental assumption of this method is that each dollar of investment spending adds a dollar to the value of the capital stock in the period in which the spending takes place, and adds a dollar, less depreciation and adjusted for inflation, to the stock in future years. In reality, the initial value of the asset created could be more or less than the investment spending. As an extreme example, in cases where a project is canceled before completion, the spending on the project may not result in the creation of any asset at all. Moreover, even if the initial asset value is equal to investment spending, the value could rise or fall in real terms over time due to changing market conditions.

The historical outlay series.—The historical outlay series for physical capital was based on budget records since 1940 and was extended back to 1915 using data from selected sources. There are no consistent outlay data on physical capital for this earlier period, and the estimates are approximations. In addition, the historical outlay series in the budget for physical capital extending back to 1940 may be incomplete. The historical outlay series for the conduct of research and development began in the early 1950s and required selected sources to be extended back to 1940. In addition, separate outlay data for basic research and applied R&D were not available for any years and had to be estimated from obligations and budget authority. For education, data for Federal outlays from the budget were combined with data for non-Federal spending from the institution or jurisdiction receiving Federal funds, which may introduce error because of differing fiscal years and confusion about whether the Federal Government was the original source of funding.

Price adjustments.—The prices for the components of the Federal stock of physical, R&D, and education capital have increased through time, but the rates of increase are not accurately known. Estimates of costs in fiscal year 1996 prices were made through the application of price measures from the National Income and Product Accounts (NIPAs), but these should be considered only approximations of the costs of these assets in 1996 prices.

Depreciation.—The useful lives of physical, R&D, and education capital, as well as the pattern by which they depreciate, are very uncertain. This is compounded by using depreciation rates for broad classes of assets, which do not apply uniformly to all the components of each group. As a result, the depreciation estimates should also be considered approximations. This limitation is especially important in capital financed by grants, where the specific asset financed with the grant is often subject to the discretion of the recipient jurisdiction.

Research continues on the best methods to estimate these capital stocks. The estimates presented in the text could change as better information becomes available on the underlying investment data and as improved methods are developed for estimating the stocks based on those data.

Physical Capital Stocks

For many years, current and constant-cost data on the stock of most forms of public and private physical capital—e.g., roads, factories, and housing—have been estimated annually by the Bureau of Economic Analysis (BEA) in the Department of Commerce. With two recent comprehensive revisions of the NIPAs in January 1996 and October 1999, government investment has taken increased prominence. Government investment in physical capital is now reported separately from government consumption expenditures, and government consumption expenditures include depreciation as a measure of the services provided by the existing capital stock. In addition, as part of the most recent revisions, a new NIPA table explicitly links investment and capital stocks by reporting the net stock of government physical capital and decomposing the annual change in the stock into investment, depreciation, extraordinary changes such as disasters, and revaluation.[2]

The BEA data are not directly linked to the Federal budget, do not extend to the years covered by the budget, and do not separately identify the capital financed but not owned by the Federal Government. For these reasons, OMB prepares separate estimates for budgetary purposes, using techniques that roughly follow the BEA methods.

Method of estimation.—The estimates were developed from the OMB historical data base for physical capital outlays and grants to State and local governments for physical capital. These are the same major public physical capital outlays presented in Part I. This data base extends back to 1940 and was supplemented by rough estimates for 1915–1939.

The deflators used to convert historical outlays to constant 1996 dollars were based on chained NIPA price indexes for Federal, State, and local consumption of durables and gross investment. For 1915 through 1929, deflators were estimated from Census Bureau historical statistics on constant price public capital formation.

The resulting capital stocks were aggregated into nine categories and depreciated using geometric rates roughly following those used by BEA, which estimates depreciation using much more detailed categories.[3] The geometric rates were 1.9 percent for water and power projects; 2.4 percent for other direct nondefense construction and rehabilitation; 20.3 percent for nondefense equipment; 14.0 percent for defense equipment; 2.1 percent for defense structures; 2.0 percent for transportation grants; 1.7 percent for community and regional development grants; 1.5 percent for natural re-

[2] BEA most recently presented its capital stocks in "Fixed Assets and Consumer Durable Goods for 1925–2001," *Survey of Current Business,* September 2002, pp. 23–37.

[3] BEA presented its depreciation methods and rates in "Improved Estimates of Fixed Reproducible Tangible Wealth, 1929–95," *Survey of Current Business,* May 1997, pp. 69–76. Changes in depreciation methods introduced with BEA's October 1999 comprehensive revisions were detailed in "Fixed Assets and Consumer Durable Goods," *Survey of Current Business,* April 2000, pp. 17–30.

sources and environment grants; and 1.8 percent for other nondefense grants.

Research and Development Capital Stocks

Method of estimation.—The estimates were developed from a data base for the conduct of research and development largely consistent with the outlay data in Historical Tables. Although there is no consistent time series on basic and applied R&D for defense and nondefense outlays back to 1940, it was possible to estimate the data using obligations and budget authority. The data are for the conduct of R&D only and exclude outlays for physical capital for research and development, because those are included in the estimates of physical capital. Nominal outlays were deflated by the chained price index for gross domestic product (GDP) in fiscal year 1996 dollars to obtain estimates of constant dollar R&D spending.

The appropriate depreciation rate of intangible R&D capital is even more uncertain than that of physical capital. Empirical evidence is inconclusive. It was assumed that basic research capital does not depreciate and that applied research and development capital has a ten percent geometric depreciation rate. These are the same assumptions used in a study published by the Bureau of Labor Statistics estimating the R&D stock financed by private industry.[4] More recent experimental work at BEA, extending estimates of tangible capital stocks to R&D, used slightly different assumptions. This work assumed straight-line depreciation for all R&D over a useful life of 18 years, which is roughly equivalent to a geometric depreciation rate of 11 percent. The slightly higher depreciation rate and its extension to basic research would result in smaller stocks than the method used here.[5]

Education Capital Stocks

Method of estimation.—The estimates of the federally financed education capital stock in Table 7–7 were calculated by first estimating the Nation's total stock of education capital, based on the current replacement cost of the total years of education of the population, including opportunity costs. To derive the Federal share of this total stock, the Federal share of total educational expenditures was applied to the total amount. The percent in any year was estimated by averaging the prior years' share of Federal education outlays in total education costs. For more information, refer to the technical note in Chapter 3, "Stewardship."

The stock of capital estimated in Table 7–7 is based only on spending for education. Stocks created by other human capital investment outlays included in Table 7–1, such as job training and vocational rehabilitation, were not calculated because of the lack of historical data prior to 1962 and the absence of estimates of depreciation rates.

Part III: ALTERNATIVE CAPITAL BUDGET AND CAPITAL EXPENDITURE PRESENTATIONS

A capital budget would separate Federal expenditures into two categories: spending for investment and all other spending. In this sense, Part I of the present chapter provides a capital budget for the Federal Government, distinguishing outlays that yield long-term benefits from all others. But alternative capital budget presentations have also been suggested, and a capital budget process may take many different forms. This section is intended to show the implications of budgeting for capital separately or changing the basis for measuring capital investment in the budget. An Administration proposal being developed for capital acquisition funds is discussed in chapter 1 of this volume, "Budget and Performance Integration." It would neither budget for capital separately nor change the basis for measuring capital investment in the budget.

The Federal budget mainly finances investment for two quite different types of reasons. It invests in capital—such as office buildings, computers, and weapons systems—that primarily contributes to its ability to provide governmental services to the public in the future; some of these services, in turn, are designed to increase growth in the rest of the economy. And it invests in capital—such as highways, education, and research—that contributes more directly to the economic growth of the private sector. Most of the capital in the second category, unlike the first, is not owned or controlled by the Federal Government. In the discussion that follows, the first is called "Federal capital" and the second is called "national capital." Table 7–8 compares total Federal investment as defined in Part I of this chapter with investment in Federal capital and in national capital. Some Federal investment is not classified as either Federal or national capital, and a relatively small part is included in both categories.

Capital budgets and other changes in Federal budgeting have been suggested from time to time for the Government's investment in both Federal and national capital. The proposals differ widely in coverage, depending on the rationale for the suggestion. Some would include all the investment shown in Table 7–1, or more, whereas others would be narrower in various ways. These proposals also differ in other respects, such as whether the basis for measuring capital investment in the budget is altered, whether investment would be financed by borrowing, and whether the non-investment budget would necessarily be balanced. Some of these proposals are discussed below and illustrated by alternative capital budget and other capital expenditure presentations, although the discussion does not address matters of implementation such as the effect on the Budget Enforcement Act.

[4] See U.S. Department of Labor, Bureau of Labor Statistics, *The Impact of Research and Development on Productivity Growth, Bulletin 2331,* September 1989.

[5] See "A Satellite Account for Research and Development," *Survey of Current Business,* November 1994, pp. 37–71.

Some of the considerations in this section also apply to the budgetary treatment of leases and to providing appropriations for the full cost of useful segments of capital projects before they are begun. The planning process for capital assets, which is a different subject, is discussed in a separate publication, the *Capital Programming Guide.*[6]

Table 7–8. ALTERNATIVE DEFINITIONS OF INVESTMENT OUTLAYS, 2004

(In millions of dollars)

	Investment Outlays		
	All types of capital[1]	Federal capital	National capital
Construction and rehabilitation:			
Grants:			
Transportation	38,975	.....	38,975
Natural resources and environment	2,482	.....	2,482
Community and regional development	7,402	.....	1,066
Housing assistance	8,216	.....	.....
Other grants	367	.....	283
Direct Federal:			
National defense	7,012	7,012	.....
General science, space, and technology	2,411	2,399	2,411
Natural resources and environment	4,960	3,772	4,471
Energy	1,182	1,182	1,182
Transportation	353	299	353
Veterans and other health facilities	2,151	2,151	2,151
Postal Service	836	836	836
GSA real property activities	1,477	1,477	.....
Other construction	3,388	3,050	1,229
Total construction and rehabilitation	81,212	22,178	55,439
Acquisition of major equipment (direct):			
National defense	68,103	68,103	.....
Postal Service	642	642	642
Air transportation	3,465	3,465	3,465
Other	8,572	7,385	4,823
Total major equipment	80,782	79,595	8,930
Purchase or sale of land and structures	469	469	.....
Other physical assets (grants)	1,189	.....	67
Total physical investment	163,652	102,242	64,436
Research and development:			
Defense	62,898	.....	1,365
Nondefense	49,210	.....	48,722
Total research and development	112,108	.....	50,087
Education and training	79,700	.....	78,985
Total investment outlays	355,460	102,242	193,508

[1] Total outlays for "all types of capital" are equal to the total for "major Federal investment outlays" in Table 7-1. Some capital is not classified as either Federal or national capital, and a relatively small part is included in both categories.

Investment in Federal Capital

The goal of investment in Federal capital is to deliver the intended amount of Government services as efficiently and effectively as possible. The Congress allocates resources to Federal agencies to accomplish a wide variety of programmatic goals. Because these goals are diverse and most are not measured in dollars, they are difficult to compare with each other. Policy judgments must be made as to their relative importance.

Once amounts have been allocated for one of these goals, however, analysis may be able to assist in choosing the most efficient and effective means of delivering service. This is the context in which decisions are made on the amount of investment in Federal capital. For example, budget proposals for the Department of Justice must consider whether to increase the number of FBI agents, the amount of justice assistance grants to State and local governments, or the number of Federal prisons. The optimal amount of investment in Federal capital to meet a goal derives from these decisions; the optimal amount of total investment to meet all of the Government's goals derives from these decisions,

[6] Office of Management and Budget, Capital Programming Guide (July 1997).

goal by goal, and from the policy decisions about how much to allocate for each goal. There is no efficient target for total investment in Federal capital as such either for a single agency or for the Government as a whole.

The universe of Federal capital encompasses all federally owned capital assets. It excludes Federal grants to States for infrastructure, such as highways, and it excludes intangible investment, such as education and research. Investment in Federal capital in 2004 is estimated to be $102.2 billion, or 29 percent of the total Federal investment outlays shown in Table 7–1. Of the investment in Federal capital, 73 percent is for defense and 27 percent for nondefense purposes.

A Capital Budget for Capital Assets

Discussion of a capital budget has often centered on Federal capital—buildings, other construction, equipment, and software that support the delivery of Federal services. This includes capital commonly available from the commercial sector, such as office buildings, computers, military family housing, veterans hospitals, and associated equipment; it also includes special purpose capital such as weapons systems, military bases, the space station, and dams. This definition excludes capital that the Federal Government has financed but does not own.

Some capital budget proposals would partition the unified budget into a capital budget, an operating budget, and a total budget. Table 7–9 illustrates such a capital budget for capital assets as defined above. It is accompanied by an operating budget and a total budget. The operating budget consists of all expenditures except those included in the capital budget, plus depreciation on the stock of assets of the type purchased through the capital budget. The capital budget consists of expenditures for capital assets and, on the income side of the account, depreciation. The total budget is the present unified budget, largely based on cash for its measure of transactions, which records all outlays and receipts of the Federal Government. It consolidates the operating and capital budgets by adding them together and netting out depreciation as an intragovernmental transaction. The operating budget has a smaller deficit than the unified budget by a modest amount, $19 billion, because capital expenditures are larger than depreciation by $19 billion. This reflects both the small Federal investment in new capital assets relative to the budget as a whole ($102 billion out of $2,229 billion) and the largely offsetting effect of depreciation on the existing stock ($83 billion). The figures in Table 7–9 and the subsequent tables of this section are rough estimates, intended only to be illustrative and to provide a basis for broad generalizations.

Some proposals for a capital budget would exclude defense capital (other than military family housing). These exclusions—weapons systems, military bases, and so forth—would comprise three-fourths of the expenditures shown in the capital budget of Table 7–9. For 2004, this exclusion would make little difference to the operating budget surplus. If defense capital was excluded, the operating budget would have a deficit that was $11 billion less than the unified budget deficit instead of $19 billion less as shown above for the complete coverage of Federal capital. Capital expenditures for defense in 2004 are estimated to be $8 billion more than depreciation, whereas capital expenditures for nondefense purposes (plus military family housing) are estimated to be $11 billion more.

Table 7–9. CAPITAL, OPERATING, AND UNIFIED BUDGETS: FEDERAL CAPITAL, 2004 [1]

(In billions of dollars)

Operating Budget	
Receipts	1,922
Expenses:	
Depreciation	83
Other	2,127
Subtotal, expenses	2,210
Surplus or deficit (–)	–288
Capital Budget	
Income: depreciation	83
Capital expenditures	102
Surplus or deficit (–)	–19
Unified Budget	
Receipts	1,922
Outlays	2,229
Surplus or deficit (–)	–307

[1] Historical data to estimate the capital stocks and calculate depreciation are not readily available for Federal capital. Depreciation estimates were based on the assumption that outlays for Federal capital were a constant percentage of the larger categories in which such outlays were classified. They are also subject to the limitations explained in Part II of this chapter. Depreciation is measured in terms of current cost, not historical cost.

Budget Discipline and a Capital Budget

Many proposals for a capital budget, though not all, would effectively dispense with the unified budget and make expenditure decisions on capital asset acquisitions in terms of the operating budget instead. When an agency proposed to purchase a capital asset, the operating budget would include only the estimated depreciation.

For example, suppose that an agency proposed to buy a $50 million building at the beginning of the year that already existed; and suppose the building had an estimated life of 25 years with depreciation calculated by the straightline method. Operating expense in the budget year would increase by $2 million, or only 4 percent of the asset cost. The same amount of depreciation would be recorded as an increase in operating expense for each year of the asset's life.[7] In many cases, however, such as constructing an aircraft carrier or rebuilding a dam, an asset is constructed or manufac-

[7] The amount of depreciation typically recorded as an expense in the budget year for purchasing an asset that already exists is overstated by this illustration. Most assets are purchased after the beginning of the year, in which case less than a full year's depreciation would normally be recorded.

tured to order. In these cases, no depreciation would be recorded until the work was completed and the asset put into service. This could be several years after the initial expenditure, in which case the budget would record no expense at all in the budget year or several years thereafter.

Recording the annual depreciation in the operating budget each year would provide little control over the decision about whether to invest in the first place. Most Federal investments are sunk costs and as a practical matter cannot be recovered by selling or renting the asset. At the same time, there is a significant risk that the need for a capital asset may change over a period of years, because either the need is not permanent, it is initially misjudged, or other needs become more important. Since the cost is set, however, control cannot be exercised later on by comparing the annual benefit of the asset services with depreciation and interest and then selling the asset if its annual services are not worth this expense. Control can only be exercised up front when the Government commits itself to the full sunk cost. By spreading the real cost of the project over time, however, use of the operating budget for expenditure decisions would make the budgetary cost of the capital asset appear very cheap when decisions were being made that compared it to alternative expenditures—as noted above, it could even be zero if the asset was made to order. As a result, the Government would have an incentive to purchase capital assets with little regard for need, and also with little regard for the least-cost method of acquisition.

A budget is a financial plan for allocating resources—deciding how much the Federal Government should spend in total, program by program, and for the parts of each program. The budgetary system provides a process for proposing policies, making decisions, implementing them, and reporting the results. The budget needs to measure costs accurately so that decision makers can compare the cost of a program with its benefit, the cost of one program with another, and the cost of alternative methods of reaching a specified goal. These costs need to be fully included in the budget up front, when the spending decision is made, so that executive and congressional decision makers have the information and the incentive to take the total costs into account for setting priorities.

The present budget provides policymakers the necessary information regarding investment. It records investment on a cash basis, and it requires Congress to vote budget authority before an agency can obligate the Government to make a cash outlay. By these means, it causes the total cost to be compared up front in a rough and ready way with the total expected future net benefits. Since the budget measures only cost, the benefits with which these costs are compared, based on policy makers' judgment, must be presented in supplementary materials. Such a comparison of total costs with benefits is consistent with the formal method of cost-benefit analysis of capital projects in government, in which the full cost of a capital asset as the cash is paid out is compared with the full stream of future benefits (all in terms of present values).[8]

This comparison is also consistent with common business practice, in which most capital budgeting decisions are made by comparing cash flows. The cash outflow for the full purchase price is compared with expected future net cash inflows, either through a relatively sophisticated technique of discounted cash flows—such as net present value or internal rate of return—or through cruder methods such as payback periods.[9] Regardless of the specific technique adopted, it usually requires comparing future returns with the entire cost of the asset up front—not spread over time through annual depreciation.[10]

Practice Outside the Federal Government

The proponents of making investment decisions on the basis of an operating budget with depreciation have sometimes claimed that this is the common practice outside the Federal Government. However, while the practice of others may differ from the Federal budget and the terms "capital budget" and "capital budgeting" are often used, these terms do not normally mean that capital asset acquisitions are decided on the basis of annual depreciation cost. The use of these terms in business and State government also does not mean that businesses and States finance all their investment by borrowing. Nor does it mean that under a capital budget the extent of borrowing by the Federal Government to finance investment would be limited by the same forces that constrain business and State borrowing for investment.

Private business firms call their investment decision making process "capital budgeting," and they record the resulting planned expenditures in a "capital budget." However, decisions are normally based on up-front comparisons of the cash outflows needed to make the investment with the resulting net cash inflows expected in the future, as explained above, and the capital budget records the period-by-period cash outflows proposed for capital projects.[11] This supports the business's goal of deciding upon and controlling the use of its resources to earn income.

The cash-based focus of business budgeting for capital is in contrast to business financial statements—the in-

[8] For example, see Edward M. Gramlich, A Guide to Benefit-Cost Analysis (2nd ed.; Englewood Cliffs: Prentice Hall, 1990), chap. 6; or Joseph E. Stiglitz, Economics of the Public Sector (3rd ed.; New York: Norton, 1999), chap. 11. This theory is applied in formal OMB instructions to Federal agencies in OMB Circular No. A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs (October 29, 1992).

[9] For a full textbook analysis of capital budgeting techniques in business, see Harold Bierman, Jr., and Seymour Smidt, The Capital Budgeting Decision (8th ed.; Saddle River, N.J.: Prentice-Hall, 1993). Shorter analyses from the standpoints of corporate finance and cost accounting may be found, for example, in Richard A. Brealey and Stewart C. Myers, Principles of Corporate Finance (5th ed.; New York: McGraw-Hill, 1996), chap. 2, 5, and 6; Charles T. Horngren et al., Cost Accounting (9th ed.; Upper Saddle River, N.J.: Prentice-Hall, 1997), chap. 22 and 23; Jerold L. Zimmerman, Accounting for Decision Making and Control (Chicago: Irwin, 1995), chap. 3; and Surendra S. Singhvi, "Capital-Investment Budgeting Process" and "Capital-Expenditure Evaluation Methods," chap. 19 and 20 in Robert Rachlin, ed., Handbook of Budgeting (4th ed.; New York: Wiley, 1999).

[10] Two surveys of business practice conducted several years ago found that such techniques are predominant. See Thomas Klammer et al., "Capital Budgeting Practices—A Survey of Corporate Use," Journal of Management and Accounting Research, vol. 3 (Fall 1991), pp. 113–30; and Glenn H. Petry and James Sprow, "The Theory and Practice of Finance in the 1990s," The Quarterly Review of Economics and Finance, vol. 33 (Winter 1993), pp. 359–82. Petry and Sprow also found that discounted cash flow techniques are recommended by the most widely used textbooks in managerial finance.

[11] A business capital budget is depicted in Glenn A. Welsch et al., Budgeting: Profit Planning and Control (5th ed.; Englewood Cliffs: Prentice Hall, 1988), pp. 396–99.

come statement and balance sheet—which use accrual accounting for a different purpose, namely, to record how well the business is meeting its objective of earning profit and accumulating wealth for its owners. For this purpose, the income statement shows the profit in a year from earning revenue net of the expenses incurred. These expenses include depreciation, which is an allocation of the costs of capital assets over their estimated useful lives. With similar objectives in mind, the Federal Accounting Standards Advisory Board has adopted the use of depreciation on property, plant, and equipment owned by the Federal Government as a measure of expense in financial statements and cost accounting for Federal agencies.[12]

Businesses finance investment from net income, cash on hand, and other sources as well as borrowing. When they borrow to finance investment, they are constrained in ways the Federal government is not. The amount that a business borrows is limited by its own profit motive and the market's assessment of its capacity to repay. The greater a business's indebtedness, other things equal, the more risky is any additional borrowing and the higher is the cost of funds it must pay. Since the profit motive ensures that a business will not want to borrow unless the expected return is at least as high as the cost of funds, the amount of investment that a business will want to finance is limited; it will borrow only for projects where the expected return is as high or higher than the cost of funds. Furthermore, if the risk is great enough, a business may not be able to find a lender.

No such constraint limits the Federal Government—either in the total amount of its borrowing for investment, or in its choice of which assets to buy—because of its sovereign power to tax and the wide economic base that it taxes. It can tax to pay for investment; and, if it borrows, its power to tax ensures that the credit market will judge U.S. Treasury securities free from any risk of default even if it borrows "excessively" or for projects that do not seem worthwhile. The only constraint is policy decisions about the budget.

Most ***States*** also have a "capital budget," but the operating budget is not like the operating budget envisaged by proponents of making Federal investment decisions on the basis of depreciation. State capital budgets differ widely in many respects but generally relate some of the State's purchases of capital assets to borrowing and other earmarked means of financing. For the debt-financed portion of investment, the interest and repayment of principal are usually recorded as expenditures in the operating budget. For the portion of investment purchased in the capital budget but financed by Federal grants or State taxes, which may be substantial, State operating budgets do not record any amount. No State operating budget is charged for depreciation.[13]

States did not traditionally record depreciation expense in the financial accounting statements for governmental funds. They recorded depreciation expense only in their proprietary (commercial-type) funds and in those trust funds where net income, expense, or capital maintenance was measured.[14] Under new financial accounting standards, however, depreciation on most capital assets is recognized as an expense in government-wide financial statements. This requirement is now being phased-in and will be effective for all state governments for fiscal years beginning after June 2003.[15]

State borrowing to finance investment, like business borrowing, is subject to limitations that do not apply to Federal borrowing. Like business borrowing, it is constrained by the credit market's assessment of the State's capacity to repay, which is reflected in the credit ratings of its bonds. Rating agencies place significant weight on the amount of debt outstanding compared to the economic output generated by the State. Furthermore, borrowing is usually designated for specified investments, and it is almost always subject to constitutional limits or referendum requirements.

Other ***developed nations*** tend to show a more systematic breakdown between investment and operating expenditures within their budgets than does the United States, even while they record capital expenditures on a cash basis within the same budget totals. The French budget, for example, has traditionally been divided into separate titles of which some are for current expenditures and others for capital expenditures. A study of European countries several years ago found only four at that time which had a real difference between a current budget and a capital budget (Greece, Ireland, Luxembourg, and Portugal).[16]

In addition, three developed countries have recently adopted accrual budgets that include the use of depreciation in place of capital expenditures. These countries, however, require appropriations for the full cost or current cash disbursements as an additional control under some or all circumstances. New Zealand, the first country to shift to an accrual budget, requires the equivalent of appropriations for the full cost up front before a department can make net additions to its capital

[12] Statement of Federal Financial Accounting Standards (SFFAS) No. 6, Accounting for Property, Plant, and Equipment, pp. 5–14 and 34–35; and the proposed SFFAS No. 23, Eliminating the Category National Defense Property, Plant, and Equipment. (The Federal Accounting Standards Advisory Board was established by the Office of Management and Budget, Department of Treasury, and General Accounting Office to develop accounting standards and concepts for the Federal government. The American Institute of Certified Public Accountants has designated it as the body to establish generally accepted accounting principles (GAAP) for Federal government entities.) Depreciation is not used as a measure of expense for physical property financed by the Federal Government but owned by State and local governments, or for investment that the Federal Government finances in human capital and research and development.

[13] The characteristics of State capital budgets were examined in a survey of State budget officers for all 50 States in 1986. See Lawrence W. Hush and Kathleen Peroff, "The Variety of State Capital Budgets: A Survey," Public Budgeting and Finance (Summer 1988), pp. 67–79. More detailed results are available in an unpublished OMB document, "State Capital Budgets" (July 7, 1987). Two GAO reports examined State capital budgets and reached similar conclusions on the issues in question. See Budget Issues: Capital Budgeting Practices in the States, GAO/AFMD–86–63FS (July 1986), and Budget Issues: State Practices for Financing Capital Projects, GAO/AFMD–89–64 (July 1989). For further information about state capital budgeting, see National Association of State Budget Officers, Capital Budgeting in the States (November 1999).

[14] Governmental Accounting Standards Board (GASB), Codification of Governmental Accounting and Financial Reporting Standards as of June 30, 2000, sections 1100.107 and 1400.114–1400.118.

[15] Governmental Accounting Standards Board, Statement No. 34, Basic Financial Statements—and Management's Discussion and Analysis—for State and Local Governments (June 1999), paragraphs 18–29 and 44–45. For discussion of the basis for conclusions of these new standards, see paragraphs 330–43. Infrastructure assets must be reported on the balance sheet but do not have to be depreciated if they are part of a network and the State or locality can document that they are being preserved.

[16] M. Peter van der Hoek, "Fund Accounting and Capital Budgeting: European Experience," Public Budgeting and Financial Management, vol. 8 (Spring 1996), pp. 39–40.

assets or before the government can acquire certain capital assets such as state highways. It also requires Cabinet approval for purchases above a threshold amount. Australia, which adopted an accrual budget as of its 1999–2000 budget, requires an appropriation for departments that do not have adequate reserves to purchase assets. The United Kingdom budgeted on an accrual basis starting with its 2001–02 fiscal year. However, Parliamentary approval is needed for both the "resource budget," which includes depreciation, and the departmental cash requirement, which includes the cash payments made for capital assets.

Canada publishes its budget on a modified accrual basis and plans to shift to full accruals, including the depreciation of capital assets. However, it uses the term "budget" differently from the United States. The "budget" sets forth the overall fiscal framework, while the "estimates" comprise the detailed departmental appropriations. The estimates are prepared on a modified cash basis, which records many transactions differently from the budget. The estimates record investment on a cash basis and do not make use of depreciation. This is a major control over resource allocation that would remain when a full accrual budget is adopted.

A country with an accrual budget may calculate its measure of fiscal position on other bases as well. The Australian budget has several measures of fiscal position. The primary fiscal measure, the fiscal balance, is close to a cash basis and includes the purchase of property, plant, and equipment rather than depreciation.[17]

On the other hand, some countries—including Sweden, Denmark, Finland, and the Netherlands—formerly had separate capital budgets but abandoned them a number of years ago.[18] The Netherlands and Sweden, though, are either planning to adopt accruals for their budget generally or are actively considering whether to do so.

Many ***developing countries*** operate a dual budget system comprising a regular or recurrent budget and a capital or development budget. The World Bank staff has concluded that:

> "The dual budget may well be the single most important culprit in the failure to link planning, policy and budgeting, and poor budgetary outcomes. The dual budget is misconceived because it is based on a false premise that capital expenditure by government is more productive than current expenditure. Separating development and recurrent budgets usually leads to the development budget having a lower hurdle for entry. The result is that everyone seeks to redefine their expenditure as capital so it can be included in the development budget. Budget realities are left to the recurrent budget to deal with, and there is no pretension that expenditure proposals relate to policy priorities."[19]

Conclusions

The General Accounting Office issued a report in 1993 that criticized budgeting for capital in terms of depreciation. This report affirmed the concerns regarding capital budgeting expressed here. Although the GAO's criticisms were in the context of what is termed "national capital" in this chapter, they apply equally to "Federal capital."

> "Depreciation is not a practical alternative for the Congress and the administration to use in making decisions on the appropriate level of spending intended to enhance the nation's long-term economic growth for several reasons. Currently, the law requires agencies to have budget authority before they can obligate or spend funds. Unless the full amount of budget authority is appropriated up front, the ability to control decisions when total resources are committed to a particular use is reduced. Appropriating only annual depreciation, which is only a fraction of the total cost of an investment, raises this control issue."[20]

After further study of the role of depreciation in budgeting for national capital, GAO reiterated that conclusion in another study in 1995.[21] "The greatest disadvantage . . . was that depreciation would result in a loss of budgetary control under an obligation-based budgeting system."[22] Although that study also focused primarily on what is termed "national capital" in this chapter, its analysis applies equally to "Federal capital." In 1996 GAO expressly extended its conclusions to Federal capital as well. "If depreciation were recorded in the federal budget in place of cash requirements for capital spending, this would undermine Congress' ability to control expenditures because only a small fraction of an asset's cost would be included in the year when a decision was made to acquire it."[23]

Investment in National Capital

A Target for National Investment

The Federal Government's investment in national capital has a much broader and more varied form than its investment in Federal capital. The Government's

[17] The practices and plans of New Zealand, Australia, United Kingdom, and Canada are discussed in GAO, Accrual Budgeting: Experiences of Other Nations and Implications for the United States, GAO/AIMD–00–57 (February 2000).

[18] *Denmark* had accrual budgets generally, not just for capital assets, but abandoned that practice a number of years ago. *Sweden* had separate capital and operating budgets from 1937 to 1981, together with a total consolidated budget from 1956 onwards. One reason for abandoning the capital budget was that borrowing was no longer based on the distinction between current and capital budgets. See GAO, Budget Issues: Budgeting Practices in West Germany, France, Sweden, and Great Britain, GAO/AFMD–87–8FS (November 1986); and, for a more extensive discussion of the reasons to abandon a capital budget, see Sweden, Ministry of Finance, Proposal for a Reform of the Swedish Budget System: A Summary of the Report of the Budget Commission Published by the Ministry of Finance (Stockholm, 1974), chapter 10. The *Netherlands* distinguished between a current account and a capital budget between 1927 and 1976. See Aad Bac, "Government Budgeting and Accounting Reform in the Netherlands," in OECD Journal on Budgeting, vol. 2, Supplement 1, page 278.

[19] The World Bank, Public Expenditure Management Handbook (Washington, D.C.: The World Bank, 1998), Box 3.11, page 53.

[20] GAO, Budget Issues: *Incorporating an Investment Component in the Federal Budget,* GAO/AIMD–94–40 (November 1993), p. 11. GAO had made the same recommendation in earlier reports but with less extensive analysis.

[21] GAO, Budget Issues: The Role of Depreciation in Budgeting for Certain Federal Investments, GAO/AIMD–95–34 (February 1995), pp. 1 and 19–20.

[22] Ibid., p. 17. Also see pp. 1–2 and 16–19.

[23] GAO, Budget Issues: Budgeting for Federal Capital, GAO/AIMD–97–5 (November 1996), p. 28. Also see p. 4.

goal is to support and accelerate sustainable economic growth for the private sector and in some instances for specific regions or groups of people. The Government's investment concerns for the Nation are two-fold:

- *The effect of its own investment in national capital on the output and income that the economy can produce.*
- *The effect of Federal taxation, borrowing, and other policies on private investment.*

In its 1993 report, *Incorporating an Investment Component in the Federal Budget,* the General Accounting Office (GAO) recommended establishing an investment component within the unified budget—but not a separate capital budget or the use of depreciation—for this type of investment.[24] GAO defined this investment as "federal spending, either direct or through grants, that is directly intended to enhance the private sector's long-term productivity."[25] To increase investment—both public and private—GAO recommended establishing targets for the level of Federal investment.[26] Such a target for investment in national capital would focus attention on policies for growth, encourage a conscious decision about the overall level of growth-enhancing investment, and make it easier to set spending priorities in terms of policy goals for aggregate formation of national capital. GAO reiterated its recommendation in another report in 1995.[27]

Table 7–10. UNIFIED BUDGET WITH NATIONAL INVESTMENT COMPONENT, 2004 [1]

(In billions of dollars)

Receipts	1,922
Outlays:	
National investment	194
Other	2,036
Subtotal, outlays	2,229
Surplus or deficit (–)	–307

[1] The details of this table do not add to the totals in every case due to rounding.

Table 7–10 illustrates the unified budget reorganized as GAO recommended to have a separate component for investment in national capital. This component is roughly estimated to be $194 billion in 2004. It includes infrastructure outlays financed by Federal grants to State and local governments, such as highways and sewer projects, as well as direct Federal purchases of infrastructure, such as electric power generation equipment. It also includes intangible investment for nondefense research and development, for basic research financed through defense, and for education and training. Much of this expenditure consists of grants and credit assistance to State and local governments, nonprofit organizations, or individuals. Only 11 percent of national investment consists of assets to be owned by the Federal Government. Military investment and some other capital assets as defined previously are excluded, because that investment does not primarily enhance the economic growth of the private sector.

A Capital Budget for National Investment

Table 7–11 roughly illustrates what a capital budget and operating budget would look like under this definition of investment—although it must be emphasized that this was ***not*** GAO's recommendation. Some proponents of a capital budget would make spending decisions within the framework of such a capital budget and operating budget. But the limitations that apply to the use of depreciation in deciding on investment decisions for Federal capital apply even more strongly in deciding on investment decisions for national capital. Most national capital is neither owned nor controlled by the Federal Government. Such investments are sunk costs completely and can be controlled only by decisions made up front when the Government commits itself to the expenditure.[28]

Table 7–11. CAPITAL, OPERATING, AND UNIFIED BUDGETS: NATIONAL CAPITAL, 2004 [1] [2]

(In billions of dollars)

Operating Budget	
Receipts	1,884
Expenses:	
Depreciation [3]	84
Other	2,036
Subtotal, expenses	2,120
Surplus or deficit (–)	–235
Capital Budget	
Income:	
Depreciation [3]	84
Earmarked tax receipts [4]	38
Subtotal, income	121
Capital expenditures	194
Surplus or deficit (–)	–72
Unified Budget	
Receipts	1,922
Outlays	2,229
Surplus or deficit (–)	–307

[1] For the purpose of this illustrative table only, education and training outlays are arbitrarily depreciated over 30 years by the straight-line method. This differs from the treatment of education and training elsewhere in this chapter and in Chapter 3. All depreciation estimates are subject to the limitations explained in Part II of this chapter. Depreciation is measured in terms of current cost, not historical cost.
[2] The details of this table do not add to the totals in every case due to rounding.
[3] Excludes depreciation on capital financed by earmarked tax receipts allocated to the capital budget.
[4] Consists of tax receipts of the highway and airport and airways trust funds, less trust fund outlays for operating expenditures. These are user charges earmarked for financing capital expenditures.

In addition to these basic limitations, the definition of investment is more malleable for national capital than Federal capital. Many programs promise long-term intangible benefits to the Nation, and depreciation rates are much more difficult to determine for intangible investment such as research and education than they are for physical investment such as highways and office buildings. These and other definitional questions are

[24] Incorporating an Investment Component in the Federal Budget, pp. 1–2, 9–10, and 15.
[25] Ibid., pp. 1 and 5.
[26] Ibid., pp. 2 and 13–16.
[27] The Role of Depreciation in Budgeting for Certain Federal Investments, pp. 2 and 19–20.
[28] GAO's conclusions about the loss of budgetary control that were quoted at the end of the section on Federal capital came from studies that predominantly considered "national capital."

hard to resolve. The answers could significantly affect budget decisions, because they would determine whether the budget would record all or only a small part of the cost of a decision when policy makers were comparing the budgetary cost of a project with their judgment of its benefits. The process of reaching an answer with a capital budget would open the door to manipulation, because there would be an incentive to make the operating expenses and deficit look smaller by classifying outlays as investment and using low depreciation rates. This would "justify" more spending by the program or the Government overall.[29]

A Capital Budget and the Analysis of Saving and Investment

Data from the Federal budget may be classified in many different ways, including analyses of the Government's direct effects on saving and investment. As Parts I and II of this chapter have shown, the unified budget provides data that can be used to calculate Federal investment outlays and federally financed capital stocks. However, the budget totals themselves do not make this distinction. In particular, the budget surplus or deficit does not measure the Government's contribution to the nation's net saving (i.e., saving net of depreciation). A capital budget, it is sometimes contended, is needed for this purpose.

This purpose, however, is fulfilled by the Federal subsector of the national income and product accounts (NIPA) for Government purchases of structures, equipment, and software. The NIPA Federal subsector measures the impact of Federal current receipts, current expenditures, and the current surplus or deficit on the national economy. It is part of an integrated set of measures of aggregate U.S. economic activity that is prepared by the Bureau of Economic Analysis in the Department of Commerce to measure gross domestic product (GDP), the income generated in its production, and many other variables used in macroeconomic analysis. The NIPA Federal subsector for recent periods is published monthly in the *Survey of Current Business* with separate releases for historical data. Estimates for the President's proposed budget through the budget year are normally published in a chapter of the budget documents. The NIPA translation of the budget, rather than the budget itself, is ordinarily used by economists to analyze the effect of Government fiscal policy on the aggregate economy.[30]

The NIPA Federal subsector distinguishes between government purchases of goods and services for consumption and investment.[31] It is a current account or an operating account for the Federal Government and accordingly shows current receipts and current expenditures. The account excludes expenditures for structures, equipment, and software owned by the Federal Government; it includes depreciation on the federally owned stock of structures, equipment, and software as a proxy for the services of capital assets consumed in production and thus as part of the Federal Government's current expenditures. It applies this treatment to a comprehensive definition of federally owned structures, equipment, and software, both defense and nondefense, similar to the definition of Federal capital in this chapter.[32]

The NIPA "current surplus or deficit" of the Federal Government thus measures the Government's direct contribution to the Nation's net saving (given the definition of investment that is employed). The Federal Government current account surplus was reduced by small amounts several years in the past decade by including depreciation rather than gross investment, because depreciation of federally owned structures, equipment, and software was more than gross investment. During 2002–04, however, gross investment is more than depreciation by growing amounts. The 2004 Federal current account surplus is estimated to be increased $9.5 billion by using depreciation.[33] A capital budget is not needed to capture this effect.

Borrowing to Finance a Capital Budget

A further issue traditionally raised by a capital budget is the financing of capital expenditures. Some have argued that the Government ought to balance the operating budget and borrow to finance the capital budget—capital expenditures less depreciation. The rationale is that if the Government borrows for net investment and the rate of return exceeds the interest rate, the additional debt does not add a burden onto future generations. Instead, the burden of paying interest on the debt and repaying its principal is spread over the generations that will benefit from the investment. The additional debt is "justified" by the additional assets.[34]

[29] These problems are also pointed out in GAO, Incorporating an Investment Component in the Federal Budget, pp. 11–12. They are discussed more extensively with respect to highway grants, research and development, and human capital in GAO, The Role of Depreciation in Budgeting for Certain Federal Investments, pp. 11–14. GAO found no government that budgets for the depreciation of human capital or research and development (except that New Zealand budgets for the depreciation of research and development if it results in a product that is intended to be used or marketed).

[30] See chapter 17 of this volume, "National Income and Product Accounts," for the NIPA current account of the Federal Government based on the budget actuals and estimates for 2002–04, and for a discussion of the NIPA Federal subsector and its relationship to the budget. The Federal subsector is part of the NIPA government sector, the other subsector being all state and local governments treated as a consolidated entity.

[31] This distinction is also made in the national accounts of most other countries and in the System of National Accounts (SNA), which is guidance prepared by the United Nations and other international organizations. Definitions of investment vary. For example, the SNA does not include the purchase of military equipment as investment.

[32] The treatment of investment (except for the recent recognition of software) in the NIPA Federal subsector is explained in Survey of Current Business, "Preview of the Comprehensive Revision of the National Income and Product Accounts: Recognition of Government Investment and Incorporation of a New Methodology for Calculating Depreciation" (September 1995), pp. 33–39. As is the case of private sector investment, government investment does not include expenditures on research and development or on education and training. Government purchases of structures, equipment, and software remain a part of gross domestic product (GDP) as a separate component. The NIPA State and local government account is defined in the same way and includes depreciation on structures, equipment, and software owned by State and local governments that were financed by Federal grants as well as by their own resources. Depreciation is not displayed as a separate line item in the summary tables of the government account: depreciation on general government capital assets is included as part of government "consumption expenditures"; and depreciation on the capital assets of government enterprises is subtracted in calculating the "current surplus of government enterprises."

[33] See actuals and estimates for 2002–04 in Table 17–2 of chapter 17 of this volume, "National Income and Product Accounts."

[34] As this argument has traditionally been framed, it might appear as though it did not apply when the Government has a surplus. When the Government has a surplus, as in 1998–2001, additional expenditure is generally financed by repaying less debt rather than borrowing more. However, the argument about borrowing for investment is fundamentally about the proper target for Federal debt and whether that target should be higher if the Government has net investment. If the Government has deficits financed by selling debt, should it borrow more than otherwise because of its net investment? Or if the Government has surpluses used to repay debt, should it repay less than otherwise because of

This argument about financing capital expenditures is at best a justification to borrow to finance net investment, after depreciation is subtracted from gross outlays, not to borrow to finance gross investment. To the extent that capital is used up during the year, there are no additional assets to justify additional debt. If the Government borrows to finance gross investment, the additional debt exceeds the additional capital assets. The Government is thus adding onto the amount of future debt service without providing the additional capital that would produce the additional income needed to service that debt.

This justification, furthermore, requires that depreciation be measured in terms of the current replacement cost, not the historical cost. Current cost depreciation is needed in order to measure all activities in the budget on a consistent basis, since other outlays and receipts are automatically measured in the prices of the current year. Current cost depreciation is also needed to obtain a valid measure of net investment. Net investment is the change in the capital stock. To measure it correctly, the addition to the capital stock from new purchases and the subtraction from depreciation on existing assets must both be measured in the prices of the same year. When prices change, historical cost depreciation does not measure the extent to which the capital stock is used up each year.

As a broad generalization, Tables 7–9 and 7–11 suggest that this rationale would currently justify some borrowing under the two capital budgets roughly illustrated in this chapter, but for Federal capital the borrowing justified in this way would not be great. For Federal capital, Table 7–9 indicates that gross investment is more than current cost depreciation—the capital budget deficit is $19 billion. The rationale of borrowing to finance net investment would justify the Federal Government borrowing this amount ($19 billion) and no more to finance its investment in Federal capital. For national capital, Table 7–11 indicates that gross investment is more than current cost depreciation (plus the excise taxes earmarked to finance capital expenditures for highways and airports and airways[35])—the capital budget deficit is $72 billion. The rationale of borrowing to finance net investment would justify the Federal Government borrowing this amount ($72 billion) and no more to finance its investment in national capital.[36]

Even with depreciation calculated at current cost, the rationale for borrowing to finance net investment is not persuasive. The Federal Government, unlike a business or household, is responsible not only for its own affairs but also for the general welfare of the Nation. To maintain and accelerate national economic growth and development, the Government needs to encourage private investment as well as its own investment. A high level of net national saving is needed to meet the demographic and other challenges expected in the decades ahead.[37]

Part IV: SUPPLEMENTAL PHYSICAL CAPITAL INFORMATION

The Federal Capital Investment Program Information Act of 1984 (Title II of Public Law 98–501; hereafter referred to as the Act) requires that the budget include projections of Federal physical capital spending and information regarding recent assessments of public civilian physical capital needs. This section is submitted to fulfill that requirement.

This part is organized in two major sections. The first section projects Federal outlays for public physical capital and the second section presents information regarding public civilian physical capital needs.

Projections of Federal Outlays For Public Physical Capital

Federal public physical capital spending is defined here to be the same as the "major public physical capital investment" category in Part I of this chapter. It covers spending for construction and rehabilitation, acquisition of major equipment, and other physical assets. This section excludes outlays for human capital, such as the conduct of education and training, and outlays for the conduct of research and development.

The projections are done generally on a current services basis, which means they are generally based on 2003 enacted appropriations and adjusted for inflation in later years. The current services concept is discussed in Chapter 15, "Current Services Estimates."

Federal public physical capital spending was $156.5 billion in 2002 and is projected to increase to $191.5 billion by 2012 on a current services basis. The largest components are for national defense and for roadways and bridges, which together accounted for more than three-fifths of Federal public physical capital spending in 2002.

its net investment? For the present analysis, "borrowing more" is equivalent to "repaying less debt."

[35] The capital budget deficit would be about $23 billion larger if current cost depreciation were used instead of earmarked excise taxes for investment in highways and airports and airways.

[36] This discussion abstracts from non-budgetary transactions that affect Federal borrowing requirements, such as changes in the Treasury operating cash balance and the net financing disbursements of the direct loan and guaranteed loan financing accounts. See chapter 13 of this volume, "Federal Borrowing and Debt," and the explanation of Table 13–2.

[37] GAO considered deficit financing of investment but did not recommend it. See Incorporating an Investment Component in the Federal Budget, pp. 12–13.

Table 7–12 shows projected current services outlays for Federal physical capital by the major categories specified in the Act. Total Federal outlays for transportation-related physical capital were $44.1 billion in 2002, and current services outlays are estimated to increase to $51.7 billion by 2012. Outlays for nondefense housing and buildings were $16.5 billion in 2002 and are estimated to be $20.7 billion in 2012. Physical capital outlays for other nondefense categories were $27.6 billion in 2002 and are projected to be $32.0 billion by 2012. For national defense, this spending was $68.3 billion in 2002 and is estimated on a current services basis to be $87.1 billion in 2012.

Table 7–13 shows current services projections on a constant dollar basis, using fiscal year 1996 as the base year.

Table 7–12. CURRENT SERVICES OUTLAY PROJECTIONS FOR FEDERAL PHYSICAL CAPITAL SPENDING

(In billions of dollars)

	2002 Actual	Estimate									
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nondefense:											
Transportation-related categories:											
Roadways and bridges	30.1	28.5	28.6	29.7	30.4	31.3	32.1	32.8	33.0	33.3	34.2
Airports and airway facilities	5.5	7.6	7.6	7.3	7.3	7.7	7.8	7.9	8.1	8.2	8.4
Mass transportation systems	7.3	6.9	7.1	6.9	6.8	6.8	7.4	7.6	7.6	7.7	7.9
Railroads	1.1	0.6	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2
Subtotal, transportation	44.1	43.6	44.4	45.0	45.6	46.9	48.5	49.5	49.8	50.5	51.7
Housing and buildings categories:											
Federally assisted housing	9.1	9.3	8.7	8.6	9.1	9.1	8.4	8.6	8.8	9.0	8.7
Hospitals	2.4	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.0
Public buildings [1]	5.0	6.4	6.2	6.3	7.6	7.8	8.6	8.7	8.8	8.8	8.9
Subtotal, housing and buildings	16.5	18.0	17.4	17.4	19.2	19.5	19.6	20.0	20.3	20.7	20.7
Other nondefense categories:											
Wastewater treatment and related facilities	3.0	3.3	3.3	3.4	3.4	3.6	3.6	3.7	3.7	3.7	3.8
Water resources projects	3.8	3.6	4.0	3.8	4.1	4.1	4.2	4.3	4.5	4.6	4.7
Space and communications facilities	4.8	4.5	4.9	5.1	5.1	5.3	5.5	5.7	5.9	5.9	5.9
Energy programs	1.6	1.3	1.3	1.2	1.3	1.3	1.0	0.9	0.9	0.9	1.0
Community development programs	6.1	7.5	7.1	6.4	5.8	5.9	6.1	6.2	6.2	6.3	6.4
Other nondefense	8.3	9.0	8.7	8.0	8.9	9.1	9.3	9.5	9.7	10.0	10.2
Subtotal, other nondefense	27.6	29.0	29.2	27.9	28.7	29.3	29.8	30.4	31.0	31.4	32.0
Subtotal, nondefense	88.2	90.6	91.0	90.3	93.5	95.7	97.9	99.8	101.1	102.6	104.4
National defense	68.3	70.0	74.3	77.6	78.8	80.9	82.6	82.3	84.0	85.5	87.1
Total	156.5	160.6	165.3	167.9	172.2	176.6	180.5	182.1	185.1	188.1	191.5

[1] Excludes outlays for public buildings that are included in other categories in this table.

Table 7–13. CURRENT SERVICES OUTLAY PROJECTIONS FOR FEDERAL PHYSICAL CAPITAL SPENDING

(In billions of constant 1996 dollars)

	2002 Actual	Estimate				
		2003	2004	2005	2006	2007
Nondefense:						
Transportation-related categories:						
Roadways and bridges	27.1	25.1	24.6	25.0	25.0	25.2
Airports and airway facilities	5.2	7.1	7.0	6.6	6.4	6.6
Mass transportation systems	6.6	6.0	6.1	5.8	5.6	5.4
Railroads	1.1	0.6	1.1	1.1	1.0	1.0
Subtotal, transportation	40.0	38.9	38.8	38.5	38.1	38.3
Housing and buildings categories:						
Federally assisted housing	8.3	8.3	7.6	7.3	7.5	7.4
Hospitals	2.4	2.3	2.3	2.4	2.4	2.4
Public buildings[1]	4.9	6.2	5.9	5.9	7.0	7.1
Subtotal, housing and buildings	15.6	16.8	15.8	15.6	16.9	16.9
Other nondefense categories:						
Wastewater treatment and related facilities	2.7	2.9	2.8	2.8	2.8	2.9
Water resources projects	3.8	3.5	3.8	3.6	3.9	3.8
Space and communications facilities	4.7	4.4	4.7	4.8	4.8	4.9
Energy programs	1.6	1.3	1.2	1.1	1.2	1.2
Community development programs	5.5	6.6	6.1	5.4	4.8	4.8
Other nondefense	8.1	8.6	8.2	7.4	8.1	8.2
Subtotal, other nondefense	26.4	27.2	27.0	25.3	25.6	25.7
Subtotal, nondefense	82.0	82.9	81.5	79.3	80.6	80.8
National defense	70.7	71.5	74.8	77.0	76.9	77.7
Total	152.7	154.4	156.4	156.3	157.5	158.5

[1] Excludes outlays for public buildings that are included in other categories in this table.

Public Civilian Capital Needs Assessments

The Act requires information regarding the state of major Federal infrastructure programs, including highways and bridges, airports and airway facilities, mass transit, railroads, federally assisted housing, hospitals, water resources projects, and space and communications investments. Funding levels, long-term projections, policy issues, needs assessments, and critiques, are required for each category.

Capital needs assessments change little from year to year, in part due to the long-term nature of the facilities themselves, and in part due to the consistency of the analytical techniques used to develop the assessments and the comparatively steady but slow changes in underlying demographics. As a result, the practice has arisen in reports in previous years to refer to earlier discussions, where the relevant information had been carefully presented and changes had been minimal.

The needs assessment material in reports of earlier years is incorporated this year largely by reference to earlier editions and by reference to other needs assessments. The needs analyses, their major components, and their critical evaluations have been fully covered in past Supplements, such as the 1990 Supplement to Special Analysis D.

It should be noted that the needs assessment data referenced here have not been determined on the basis of cost-benefit analysis. Rather, the data reflect the level of investment necessary to meet a predefined standard (such as maintenance of existing highway conditions). The estimates do not address whether the benefits of each investment would actually be greater than its cost or whether there are more cost-effective alternatives to capital investment, such as initiatives to reduce demand or use existing assets more efficiently. Before investing in physical capital, it is necessary to compare the cost of each project with its estimated benefits, within the overall constraints on Federal spending.

Significant Factors Affecting Infrastructure Needs Assessments

Highways

1. Projected annual average growth in travel to the year 2020	2.08 percent
2. Annual Federal, state, and local cost to maintain 2000 conditions and performance on highways	$68.6 billion (2000 dollars)
3. Annual Federal, state, and local cost to maintain 2000 conditions and performance on bridges	$7.3 billion (2000 dollars)

Airports and Airway Facilities

1. Airports in the National Plan of Integrated Airport Systems with scheduled passenger traffic	546
2. Air traffic control towers	659
3. Airport development eligible under airport improvement program for period 2001–2005	$46.2 billion (2001 dollars)

Mass Transportation Systems

1. Yearly cost to maintain condition and performance of rail facilities over a period of 20 years	$9.7 billion (2000 dollars)
2. Yearly cost to replace and maintain the urban, rural, and special services bus fleet and facilities	$5.2 billion (2000 dollars)

Wastewater Treatment

1. Total remaining needs of sewage treatment facilities	$128 billion (1996 dollars)
2. Estimated level of remaining need not covered by State and local receipts and spending for clean water infrastructure assuming 3 percent annual growth	$21 billion (2001 dollars)
3. Total Federal expenditures under the Clean Water Act of 1972 through 2001	$80 billion
4. The population served by centralized treatment facilities: percentage that benefits from at least secondary sewage treatment systems	99 percent
5. States and territories served by State Revolving Funds	51

Housing

1. Total unsubsidized very low income renter households with worst case needs (4.9 million*)	
A. In severely substandard units	0.5 million
B. With a rent burden greater than 50 percent	4.6 million

*The total is less than the sum because some renter families have both problems.

Indian Health Service (IHS) Health Care Facilities

1. IHS hospital occupancy rates (2002)	37.3 percent
2. Average length of stay, IHS hospitals (days) (2002)	3.9
3. Hospital admissions (2002)	60,311
4. Outpatient visits (2002)	8,159,116
5. Eligible population (2002)	1,568,510

Department of Veterans Affairs (VA) Hospitals (2003)

1. Medical Centers	163
2. Outpatient clinics	848
3. Domiciliaries	43
4. Vet centers	206
5. Nursing homes	137

Water Resources

Water resources projects include navigation (deepwater ports and inland waterways); flood and storm damage protection; irrigation; hydropower; municipal and industrial water supply; recreation; fish and wildlife mitigation, enhancement, and restoration; and soil conservation.

Potential water resources investment needs typically consist of the set of projects that pass both a benefit-cost test for economic feasibility and a test for environmental acceptability. In the case of fish and wildlife mitigation or restoration projects, the set of eligible projects includes those that pass a cost-effectiveness test.

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