Economic Policy Institute

Briefing Paper

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THE PUBLIC INVESTMENT DEFICIT

Two decades of neglect threaten 21st century economy

by Dean Baker

Over the past two decades, federal support for virtually all categories of public investment has declined significantly. Since its peak in the late 1970s, federal spending on public investment, measured as a share of total economic output, has fallen by more than a third, and it will fall another 35% over the next 10 years on the current spending path. These projected spending declines—in education, infrastructure, research and development, and other areas—could significantly impede economic growth in the next century.

The primary factor behind these cuts has been pressure on the overall budget. The efforts to pare back the Reagan-era deficits has required significant constraints on spending, and investment expenditures, which often bear no return until far in the future, have been vulnerable targets. As a result, most categories of public investment have seen proportionately larger cutbacks than the rest of the federal budget.

In the last several years the budget situation has improved enormously. Spending has fallen below projected levels, tax collections have run ahead of projections, and, as a result, the deficit has virtually disappeared. This new situation creates the possibility of setting priorities under a budget that is in or near balance.

It is widely accepted among economists that public investment is important for productivity growth. Investments in education and training, physical infrastructure, and basic research have contibuted substantially to the economy's growth over the last half century. In fact, some studies have indicated that expenditures on public investment actually have more of an impact on productivity than do expenditures

on private investment (e.g., Holtz-Eakin and Schwartz 1994; Munnell 1994; and Aschauer 1990). But even if the impact of public and private investment on productivity is roughly comparable, the recent trends should provide grounds for concern, since we have seen a decline in public investment with no offsetting rise on the private side. This shortfall raises serious questions about whether future workers will have the education and training they need to be productive, whether the nation will have the appropriate infrastructure to support the technologies of the next century, and whether basic science is advancing at a pace needed to sustain innovations and technological advancements.

This paper sets out the case for a renewed commitment to public investment in this new budget context. It consists of four sections. The first examines the path of public investment over the recent past and projects it into the future. The second section examines the current economic and budget situation and the path of private investment in this business cycle. It looks particularly at whether the drive to reduce the deficit, which was primarily responsible for cuts in public investment, has had any compensating positive effects for the economy. The third section updates a 1991 estimate (Faux and Schafer 1991) of investment needs in a variety of categories of physical and human capital. Finally, the fourth section details three specific areas—Head Start, school repair and renovation, and environmental technologies—in which additional expenditures on public investment might be especially productive.

Public Investment Today: Too Low and Falling Further

This section examines the recent path and projected future path of public investment as a whole and for each of the three major categories of public investment: human capital, physical capital, and research and development. In each case, expenditures are measured as a share of gross domestic product, thereby controlling for the effects of both inflation and economic growth.[1] The definition of public investment used in this analysis is the one used by the Office of Management and Budget (OMB).[2]

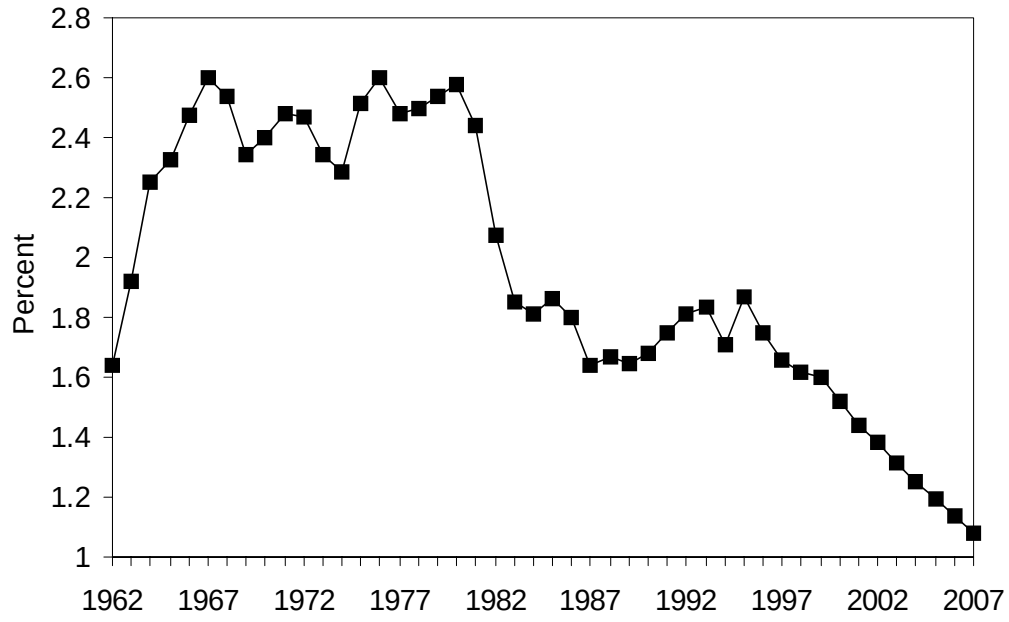
Most of the categories of government spending that are forms of public investment (e.g., education, roads and bridges, research and development funding) have seen significant cutbacks in recent years, and current projections indicate that public investment will be squeezed further in the future: these projections show public investment falling at the rate of roughly 2.0% a year in constant dollars (GAO 1997, 8). This decline is even larger when considered in the context of the needs of a growing economy. **Figure 1** shows levels of public investment, expressed as a share of GDP, in the recent past and projects them into the future. It illustrates that public investment has declined significantly from its peak levels of the 1960s and 1970s and is projected to sink further over the next 10 years if budget priorities do not change.

Human Capital: Education, Training, and Early Childhood Needs

Investment in human capital can be broken down into three broad areas: education, training, and early childhood needs. These categories of expenditure can be viewed as investment in the sense that they will increase the economy's productive capacity in the future. In the case of formal education and training, the effect is fairly straightforward: workers who are better educated and better trained will be more productive. Government expenditures on education and training, then, will increase the quality of present and

FIGURE 1

Public Investment as a Share of GDP, 1962-2007



Source: OMB and GAO (see Appendix A).

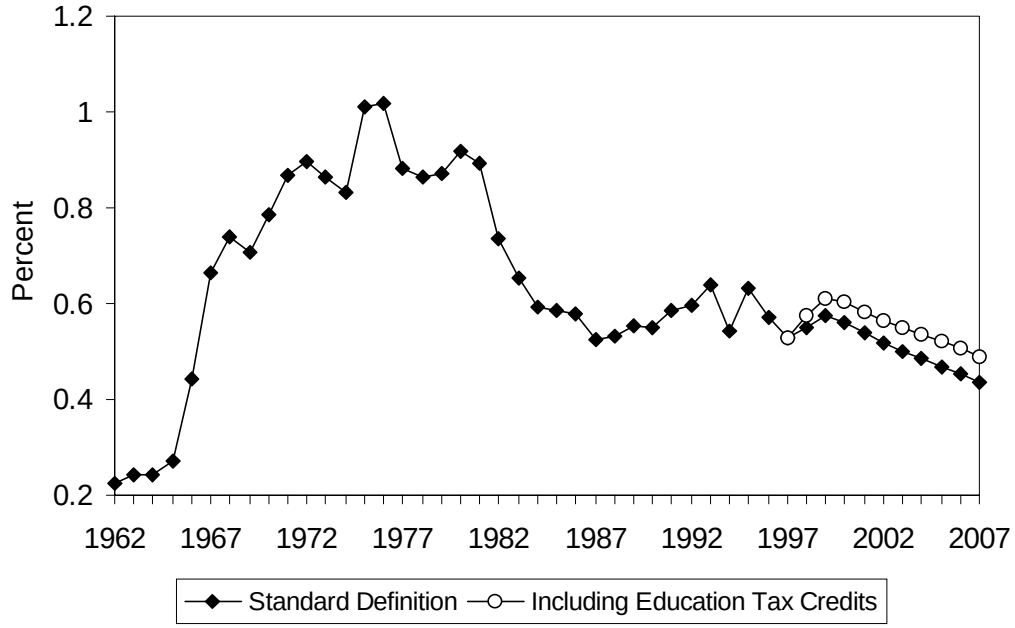
future workers. Similarly, pre-school education programs such as Head Start have been shown to affect learning patterns throughout a child's school years. Getting children on the right track early in life can have large paybacks for them and for society.

Figure 2 shows the past and projected future path for federal government expenditures in education and training. This category of investment rose rapidly through the 1960s into the 1970s, hitting a peak of just over 1.0% of GDP in 1976. Since then it has dropped by approximately 50%. Spending fell steeply in the early Reagan years, increased slightly under the Bush Administration, and then continued to decline under Clinton. This area of spending is projected to experience further cutbacks over the next 10 years.

One factor that somewhat complicates the measurement of investment expenditures on human capital is the treatment of tax credits. The education and training tax credits and deductions pushed through by the Clinton Administration in its 1998 budget are an indirect way for the federal government to support education and training, since a large portion of the credits are going to families who would have spent their money on education and training anyway.[3] These tax expenditures should be viewed as increasing public investment only insofar as they lead families to *increase* their spending on education and training. A high-end estimate would be that 50% of these tax expenditures actually supported new education and training spending (Gravelle and Zimmerman 1997), and the higher line in Figure 2 incorporates this assumption. As can be seen, even with this assumption, investment in human capital has still declined during the decade and is projected to continue falling over the next 10 years.

FIGURE 2

Education and Training Expenditures as a Share of GDP, 1962-2007



Source: OMB and GAO (see Appendix A).

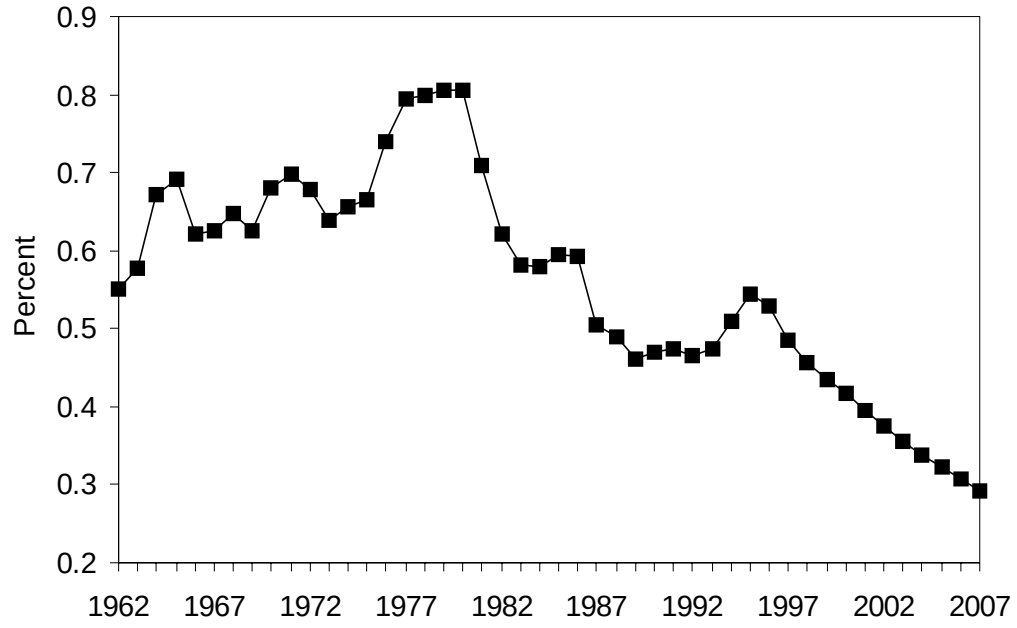
Physical Capital: Transportation and the Environment

Public expenditures on physical capital provide the basic infrastructure that the economy needs to sustain itself. It includes the road, bridges, highways, and airports that support the transportation of people and goods. It also includes facilities such as water purification systems, which provide clean drinking water to most cities, and sewage treatment facilities, which protect the nation's lakes and rivers. As we move into the next century and grapple with environmental problems such as global warming, the physical infrastructure set in place by the government will be enormously important. A well-planned system of infrastructure can lead to better use of existing urban areas and nearby suburbs, thereby reducing sprawl and the resulting pollution. Construction of efficient mass transit systems can also provide people with an attractive alternative to driving.

Figure 3 shows the recent path and projected future path of federal expenditures on physical capital. This category of investment peaked at just over 0.8% of GDP in 1980; it has since fallen back to approximately 0.5% and is projected to decline to less than 0.3% of GDP by 2007 if the budget constraints on discretionary spending are left in place. Among the areas that have seen the largest declines in federal support are urban mass transit and pollution control facilities, such as waste-water treatment plants. The cutbacks in these areas might be viewed as especially counterproductive in coming years if concern over environmental problems rises.

FIGURE 3

Infrastructure Expenditures as a Share of GDP, 1962-2007



Source: OMB and GAO (see Appendix A).

Research and Development: The Building Blocks of Innovation

The government has played an important role in supporting much of the basic scientific research that has subsequently led to pathbreaking innovations. In each of the major industries in which the United States is the recognized world leader — aerospace, computers, agriculture, and pharmaceuticals — federal expenditures on research and development were essential to growth. In the case of both aerospace and computers, research financed by the Defense Department or NASA led to major technological breakthroughs. The research supported by the Department of Agriculture and the system of land grant universities established to promote the spread of modern agricultural practices have been crucial to establishing the United States as the world's leading agricultural producer. The government's support for research conducted through the National Institutes of Health has provided enormous opportunities for the pharmaceutical industry. Until recently, more than half of the research and development in pharmaceuticals was paid for by the government.

The government's role in supporting basic research is crucial because the gains from these endeavors are often not felt until far in the future. There is a considerable time lag between scientific discovery and successful commercial applications, and the private sector is generally reluctant to support investments that require such a long payoff period. Furthermore, some discoveries may lead to enormous gains to society but might not provide much profit for an individual firm. For example, the discovery that a freely available drug like aspirin can be an effective treatment for a heart disease will provide little benefit to a pharmaceutical

company. This sort of research will only be carried through if supported by the public sector.

Figure 4 shows the path of federal support for research and development and projects it into the future. The big decline in R&D spending in the late 1960s was due to reduced support for the space program. The more recent decline in the 1980s was largely attributable to a fall in support for energy research. The projected path shows federal spending on R&D falling to less than 0.25% of GDP by 2007, down from a peak of nearly 1.0% in 1966.

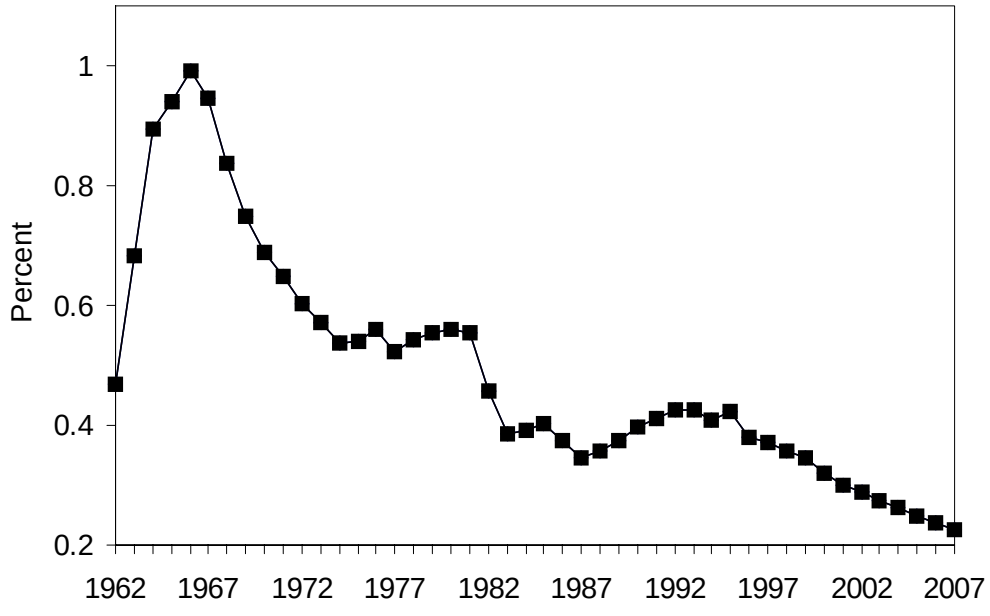
Little Change in Sight

In his 1999 budget, the President has included a series of proposals for increased support in various areas of public investment. Many of these initiatives are positive steps toward addressing unmet needs. For example, the President has proposed an additional $6.3 billion in research subsidies and tax credits over five years to promote energy conservation, and an additional $7.0 billion to reduce the average class size for young children. He has also has proposed a subsidy program that will provide $1 billion a year toward repairing and renovating the nation's schools. (This specific proposal and the level of actual need are discussed below.)

However worthwhile these proposals may be, the funding levels will generally not be sufficient to meet the stated goals. Furthermore, due to cuts in other areas, total expenditures on public investment are still projected to decline, even if the President's entire investment agenda is approved by Congress.

FIGURE 4

Research and Development as a Share of GDP, 1962-2007



Source: OMB and GAO (see Appendix A).

Including these new expenditures, OMB projects public investment to increase at the rate of 1.6% a year from 1998 to 2003, more than 0.5 percentage points less than the projected 2.2% rate of inflation (OMB 1998, 127). Since investment spending is falling in constant dollars, it will be falling even more rapidly when measured as a share of GDP. The President's investment agenda may redirect investment dollars to better uses, but it will not alter the general pattern of decline. Moreover, the President is not likely to get as much investment as he has requested. Congress will be pushing a different agenda, and some of the funding for the President's proposals will depend on uncertain events such as the tobacco settlement. In short, the general trend for public investment is downward, and the only question is how fast it will fall.

The Failure of Deficit Reduction to Deliver

In 1993, President Clinton narrowly pushed through a budget that made deficit reduction its top priority. While the President expressed a commitment to supporting public investment, and did increase expenditures in some areas, his budget plan actually provided for a decline in overall spending on public investment for the next five years. The costs of making deficit reduction the top priority were clearly recognized: abandoning most of the agenda in *Putting People First*—President Clinton's campaign platform—and allowing schools, transportation, and water quality to deteriorate. The argument was that deficit reduction would reduce interest rates and thereby allow for more private-sector investment. This in turn would increase productivity growth and allow for greater long-term growth.

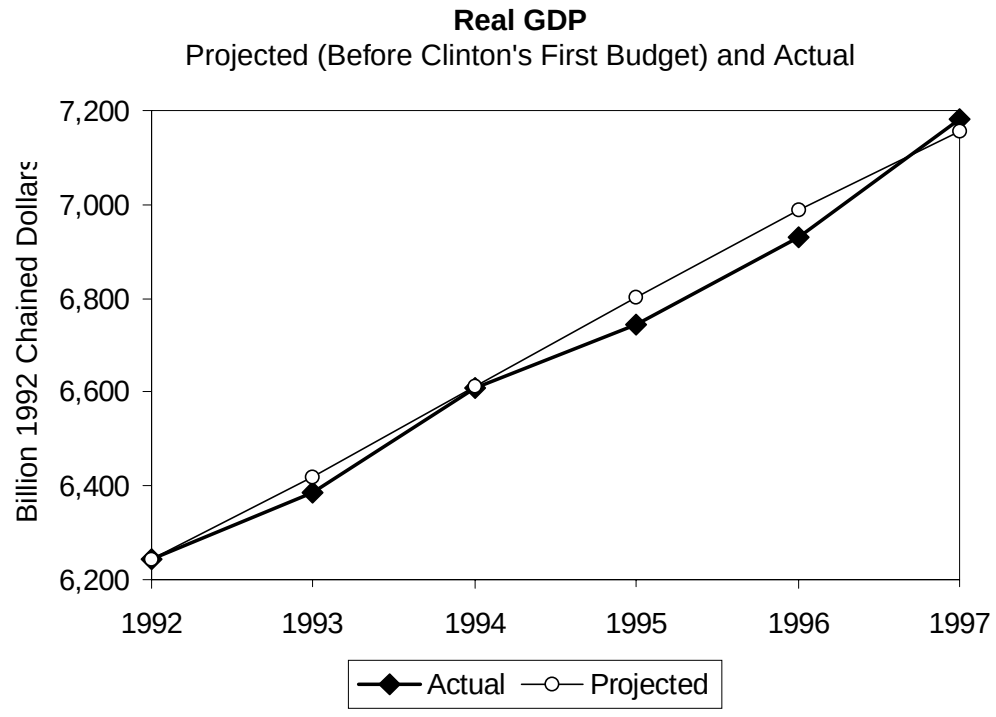
It is often claimed that the President's plans have been successful. Interest rates fell, investment has increased, and the economy has grown. While Clinton's target was to cut the deficit in half by fiscal year 1997, tax collections increased by so much that the budget was nearly in balance in FY 1997. Furthermore, the deficit is projected to be very small again in 1998, and the budget may even shift into surplus.

There are many reasons to be pleased about the current economic situation. The unemployment rate has fallen to its lowest level since the early 1970s, and real wages have begun to rise for most workers. However, while the economy's growth rate has been respectable, it is virtually identical to the path that had been projected before the President's deficit reduction plan. **Figure 5** shows the Congressional Budget Office's five-year projections for economic growth in January 1993, before the first Clinton budget was approved, and the actual growth path of the economy over this period.[4]

The budget deficit has fallen far more rapidly than anyone had anticipated. After the passage of the Clinton budget in 1993, CBO projected that the FY 1997 deficit would be $182 billion, or 2.3% of GDP. In fact, the deficit was just $23 billion, less than 0.3% of GDP. However, since the actual growth path of the economy and the projected growth path were virtually identical, the extent to which the actual decline in the deficit exceeded projections cannot be attributed to more rapid economic growth. The main factors have been a slowdown in the growth of health costs and higher-than-expected tax collections.

While the news on the deficit has been good, it turns out that the economy did not get any of the expected gains. The conventional "crowding out view" holds that government deficits will "crowd out" private investment by raising interest rates. Therefore, reducing the deficit should reduce interest rates and increase investment, because the dollars not borrowed by the government will be available for use by

FIGURE 5



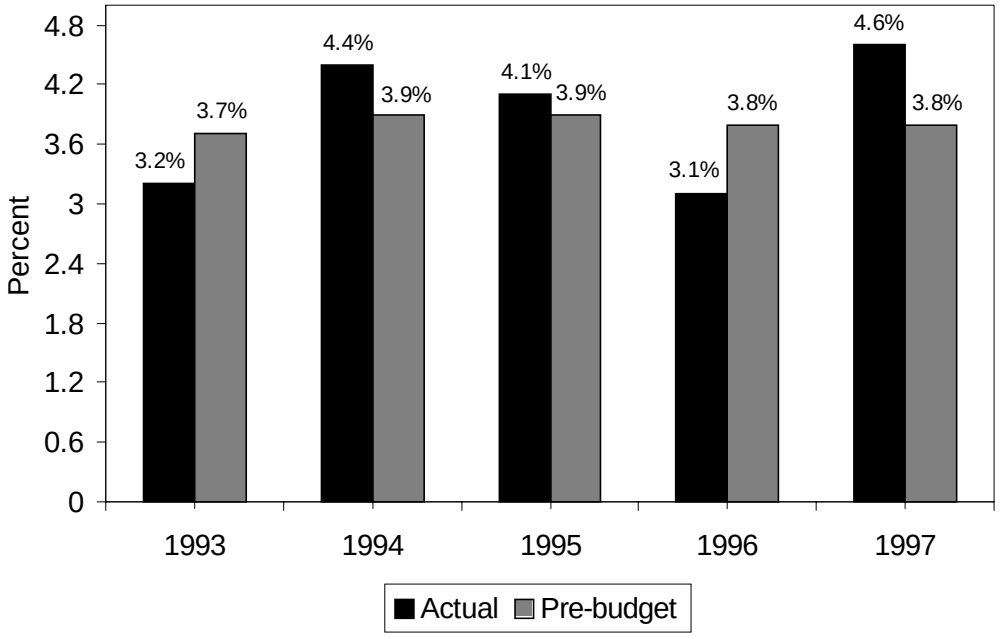
Source: Bureau of Economic Analysis (see Appendix A).

business. But the movement to a balanced budget had little effect on the course of interest rates over this period. **Figure 6** compares CBO's 1993 projections for the real interest rate (the nominal interest rate minus the inflation rate) on 10-year government bonds with the actual rate over the last five years. The average real rate over this period has been 3.9%, slightly higher than the 3.8% projected by CBO prior to the passage of the Clinton budget. This history indicates that the impact of the Clinton deficit reduction package on the path of interest rates was limited.

Since the impact of deficit reduction on interest rates was minimal, it should not be surprising that the impact on investment was limited as well. While it has been widely reported that investment has boomed in the current recovery, a more careful examination indicates otherwise. **Figure 7** shows the share of GDP that went to private investment in four previous business cycle peaks and in 1997. The investment share of GDP in 1997 was 10.4%, the same as in 1989—and far below its 1979 peak—and so it appears that the decline in the deficit did not lead to an increase in the investment share. The growth of investment appears much stronger when using real or "1992 chained dollars," but this outcome is due almost entirely to the way the Commerce Department prices computers. This method shows price declines averaging close to 30% annually, which leads to a corresponding increase in computer investment measured in 1992 chained dollars. The growth in productivity to date does not indicate that computer investment has had the sort of impact that would be indicated by the Commerce Department's pricing methods.[5]

FIGURE 6

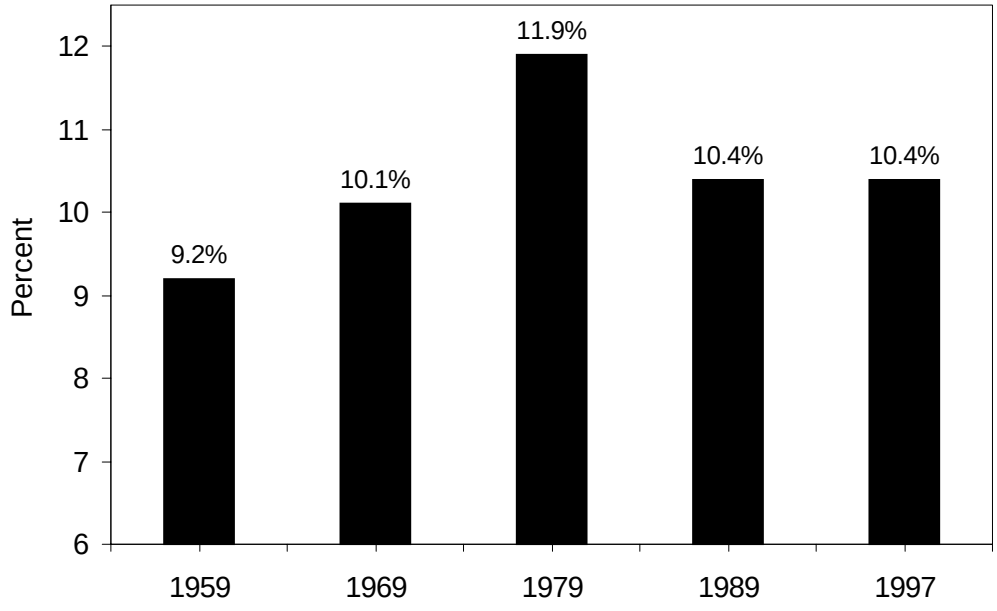
Real Interest Rate (10-Year Bonds)
Actual and Projected



Source: CBO and *Economic Report of the President* (see Appendix A).

FIGURE 7

Investment as a Share of GDP, 1959-97*



* Nonresidential fixed investment.

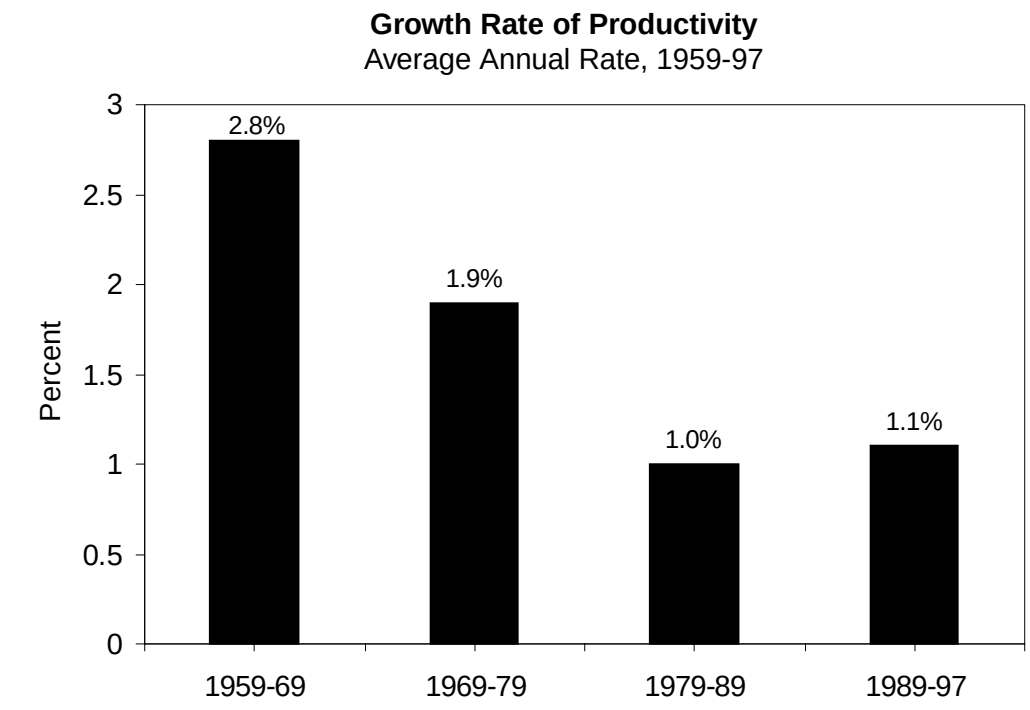
Source: Bureau of Economic Analysis (see Appendix A).

Thus, deficit reduction does not seem to have had much impact on the share of GDP going to private investment. Moreover, it does not seem to have had much impact on the trade deficit, as also would have been expected. The trade deficit in goods and services measured as a share of GDP was 1.3% in 1997, down only slightly from its 1.5% level at the last business cycle peak in 1989. It turns out that the category of GDP that grew most rapidly during the current business cycle was consumer spending, which went from 66.1% in 1989 to 67.9% in 1997. More specifically, consumption of services rose 4.0 percentage points, from 36.0% in 1989 to 40.0% in 1997. There is nothing wrong with people spending a larger share of GDP on health care and other types of services, but this was not supposed to be the goal of the deficit reduction package, and it will not have a positive impact on long-run growth.

Since deficit reduction seems to have had little impact on investment, it should not be surprising that there does not appear to have been any positive effect on productivity either. **Figure 8** shows the average rates of productivity growth over the previous three decades and the current business cycle. As can be seen, the rate of productivity growth over the current cycle is nearly the same as the rate of the 1980s and considerably lower than the rates in both the 1960s and 1970s. While there was strong productivity growth in the first three quarters of 1997, this more rapid growth will have to continue for a considerable time to offset the slow growth earlier in the decade. At this point, there is no evidence in the data of an upturn in the long-term trend of productivity growth in the 1990s.

Thus, the evidence indicates that deficit reduction has not met expectations in terms of spurring overall growth, private sector investment, or productivity growth.

FIGURE 8



Source: Bureau of Economic Analysis (see Appendix A).

Calculating the Unmet Needs

There is no simple way to determine the need for public investment expenditures. Faux and Schafer (1991) uses two methods to derive estimates of the size of the unmet needs. The first method might be called a "top-down" approach. It compares current spending in the various categories of public investment, measured as a share of GDP, with the spending levels in 1976. The difference is treated as an estimate of the current shortfall in public investment. The year 1976 was selected because it was a typical year in a period in which more resources were being devoted to public investment than they are today. The second method is a "bottom-up" approach, which uses estimates from government agencies and experts in the relevant areas to place bounds on the size of unmet needs in specific areas.

We do not mean to imply that the year 1976 provides a definitive baseline for the appropriate amount of public investment spending. The needs for public investment may have been greater or less in the 1970s than at present. Also, it is possible the government was spending more than was necessary in the 1970s. Therefore, by itself, the fact that the government is currently spending less on public investment does not prove there is a shortfall. Similarly, the bottom-up needs assessments are presented here without a careful consideration of alternative uses of these resources. It is always possible to find a productive way to spend an additional dollar of government money, but it does not follow that it is always desirable to have more government spending.

While it is important to keep these qualifications in mind, it seems unlikely that the country's needs for public investment could have simultaneously declined, *in all areas*, from the 1970s to the present. It is also unlikely that the government was consistently wasting large amounts of this spending, since recent research has indicated that public investment on average has been at least as productive as private investment (e.g., Holtz-Eakin and Schwartz 1994; Munnell 1994; and Aschauer 1990).

Top-Down Assessment

Table 1 compares the percentages of GDP going to each category of public investment in 1998 with the average for the 1970s. It also includes projections for spending in the year 2007, derived from a study by the General Accounting Office (GAO 1997). The gap between the two (expressed in dollar terms in the bottom half of the table) is considered the shortfall for each period.

By this approach, the shortfall for 1998 is $68.2 billion. The largest gap, $26.1 billion, occurs in the area of education and training. This number includes half of the value of the recently passed education tax credit as investment. (The gap in this category and overall would rise by $2.5 billion if the OMB method of calculating public investment were used and the education tax credit were not included at all.) The shortfall in spending on physical capital is $21.9 billion, and $18.5 billion in R&D.[6]

The shortfall will rise to $173.1 billion in 2007 under the projected spending path. At that point, the shortfall in physical capital and education and training will be approximately the same, $55.9 billion and $52.0 billion. (The shortfall in education and training and public investment overall will be $6.5 billion higher if the OMB accounting method is used and the education tax credit is excluded from the calculation.) The shortfall in R&D spending will have grown to $45.5 billion by 2007. Expressed as a share of GDP, the shortfall will be approximately 1.3%.

TABLE 1
"Top-Down" Estimate of Public Investment Shortfall

	Shares of GDP		
	1970-79	**1998**	**2007**
Education and Training	0.89	0.55	0.44
Physical Capital	0.72	0.46	0.29
Research and Development	0.58	0.36	0.23
Total Public Investment	2.46	1.62	1.08

	Billions of Dollars	
Implied Shortfall	**1998**	**2007**
Education and Training	26.1	52.0
Physical Capital	21.9	55.9
Research and Development	18.5	45.5
Total Public Investment	68.2	173.1

Note: The numbers do not sum because some children's health expenditures, which the Office of Management and Budget counts as public investment, do not appear in any of the three categories listed.

Source: See Appendix A.

Bottom-Up Assessment

The bottom-up estimate of the unmet need for public investment spending compiles estimates from government agencies and experts in various fields of the additional public expenditures that would be needed to meet certain goals, such as maintaining bridges at acceptable standards or providing adequate school facilities for children. This set of estimates follows as closely as possible the estimates in Faux and Schafer (1991).[7] This list of needs is far from comprehensive. For example, it excludes the estimate of an additional $11 billion in annual federal spending that will be needed to improve the physical condition of the nation's schools (see the discussion in the following section). There are many other areas for which well-documented needs exist but that were not included in this estimate.

Table 2 presents the bottom-up estimate of unmet needs for public investment. The total unmet needs calculated through this method are similar to those calculated through the top-down approach. The bottom-up approach indicates somewhat greater needs in the area of education and training than does the top-down approach, but this is partially offset by slightly lower reported needs for expenditures on physical capital and research and development. Since there was a large random element in the choice of sources and areas to examine, these numbers should be seen primarily as giving rough orders of magnitude rather than precise measures of need.

The bottom-up assessment of the needs for spending on human capital relied on a variety of

TABLE 2
"Bottom-Up" Estimate of Public Investment Shortfall
($Billions)

Human Capital	
Higher Education	$10.1
Training	22.8 – 32.5
Education	2.9
Head Start	8.6
Total	**$44.4 – 54.1**
Physical Capital	
Highways and Bridges	$7.8–11.4
Mass Transit	2.4–7.3
Rail	1.0–3.4
Water/Sewage	1.7
Other	3.1
Total	**$16.0 – 26.9**
Research and Development	**$6.0 – 14.0**
Total	**$66.4 – 95.0**

Source: See Appendix A.

sources for its estimates. The unmet need for higher education is the estimated cost of extending the Pell Grant program to all eligible students (NEA 1994). This program provides grants to low-income students while they attend college. The program is not fully funded, and only about half the students that qualify based on income are able to receive grants. The estimates for needed spending on training represents the difference between the level of expenditures by the U.S. government measured as a share of GDP and the average share of GDP spent by OECD (Organization for Economic Cooperation and Development) nations on training (low estimate) and the share spent by Germany (high estimate). The shortfall listed for education is the estimated cost of extending the Chapter I Compensatory Education for Disadvantaged Students program to all eligible students (NEA 1994).

The other component of needed human capital expenditures is additional spending to provide for the health and educational needs of young children. The Clinton Administration has pushed through some small increases for programs in this area, but enormous unmet needs remain. The one clear need listed in the table, and a 1992 campaign promise by both Presidents Clinton and Bush, is the cost of fully funding Head Start. Currently only one-third of the low-income children who qualify for Head Start are actually enrolled in the program (Children's Defense Fund 1997, 34). There are many other ways in which the federal government could be playing an important role in promoting the health and education of young children, but Head Start is a program that is a recognized success and enjoys enormous support.

The largest estimated needs in the area of physical capital are for expenditures to maintain and improve the nation's highways and bridges and the mass transit capital stock. In both cases the lower number is an estimate of the additional expenditures needed to maintain services at existing levels; it

includes routine items such as filling potholes and re-paving highways, but also essential safety measures like ensuring the structural integrity of the nation's bridges. The higher number is an estimate of the economically justifiable spending that will be needed in these areas to support projected levels of economic growth.[8]

In transportation, well-directed public expenditures will be especially important in coming decades. In the past, poor transportation planning encouraged suburban sprawl. The construction of new and expensive highways encouraged an outflow of population from the nation's cities and inner suburbs to new and more distant developments. This development pattern often had devastating consequences for established communities, and it has had harmful environmental side effects. As the United States works to reduce its emissions of greenhouse gases, it will be important to develop a transportation infrastructure that supports greater degrees of energy efficiency. This plan would include greater support for mass transit, but also an increased drive to repair and improve roads that support more concentrated patterns of development. The government could also take steps to establish an infrastructure to support the use of alternative fuels in cars; it could, for example, set up battery recharging stations to facilitate the use of electric cars.

Maintaining and improving the nation's rail system should also have a high priority from an environmental perspective. Railroads offer a far more energy-efficient mode of transportation than do planes or cars, and new technologies allow for high-speed rail transportation that in many cases compares favorably with plane travel. Well-planned expenditures in this area can therefore be expected to pay big dividends. The low estimate for rail expenditures uses an estimate of the additional capital expenditures needed to maintain Amtrak's capital stock in working order. The higher estimate includes the estimated cost of building five high-speed rail corridors ($11-12 billion), paid for over five years (American Association of State Highway and Transportation Officials 1996).

The estimate need for public investment in the water/sewage category is based on the estimate of needed expenditures for sewage and drinking water treatment facilities (Environmental Protection Agency 1996). This need was assumed to be met over a 10-year period with a federal contribution of 50%. The estimate for "other" is the amount of money that would be needed to restore the funding for community development block grants back to their 1980 level, a measure recommended by the Center for Community Change (1990). These federal grants provide money for local communities to support capital expenditures that could not be easily financed otherwise. The current level of funding is approximately 60% of the 1980 level.

The estimated need for additional support for research and development was obtained by calculating how much additional spending would be needed to raise the share of GDP in the U.S. that is spent on civilian R&D to Germany's level (low estimate) or Japan's level (high estimate). The present level of U.S. spending on R&D, measured as a share of GDP, is somewhat below the average for the G-7 nations.[9]

Both the top-down and bottom-up estimates presented here are crude means of determining the nation's unmet needs for public investment. However, they provide a strong basis for believing that substantial needs exist. As a result of pressures to reduce the deficit, the federal government has been cutting back support for public investment for the last 15 years, leaving a backlog of needs and an inadequate current level of spending. Failure to address these needs will slow economic growth and jeopardize the health and safety of the population.

A Public Investment Portfolio: Three Examples

There is a long list of specific projects that could be initiated as part of a public investment agenda. This section lays out three, one in each category of public investment. These projects were selected not because they necessarily present the best use of additional public expenditures, but because they are illustrative of the sorts of programs that could be supported with a greater commitment to public investment.

Fully Funding Head Start

Head Start, an anti-poverty program created in the 1960s, is almost universally viewed as a success. Its purpose is to provide a healthy pre-school learning environment for children from low- and moderate-income families. Over the last three decades, the program (which consumes less than 0.3% of the total budget) has benefited tens of millions of pre-school-age children in financially pressed families. Numerous studies have shown the positive effect that this experience has had for the subsequent performance of these children in school and in their working lives.

In spite of the success and widespread political support of Head Start, access to the program has been restricted as part of the drive to reduce the budget deficit. At present, only one in three eligible children is enrolled in the program. As important as this program has been in the past, it is likely to be even more important in the future. The recently passed welfare reform bill will be pushing many mothers of young children into the workforce, and these women will need some type of child care during their working hours. At present, however, there is a tremendous lack of adequate child care facilities for low-income families. Although even an expanded Head Start program will not come close to fully alleviating this shortage, it can provide a quality learning environment to millions of underprivileged children who would otherwise face uncertain prospects.

Serious investment in the country's children is long overdue. Nearly a quarter of the nation's children under age 6 – nearly half of black children under age 6 – live in poverty. Research has shown that the health care children receive during their first years of life will affect their health throughout their lifetime. Similarly, exposing children to a stimulating educational environment in their first years will have an impact on their success throughout their school years. Therefore, public support for providing health care and education in early childhood years has an extremely high payback. It will also allow millions of children to enjoy happier and healthier lives than they would otherwise.

Repairing and Renovating Public Schools

There is a significant public consensus that it is necessary to improve the quality of education for young children. While schools are primarily directed and funded at the state and local level, the federal government can play an important role in providing funds for safe and modern buildings. A recent study by the General Accounting Office (1996) found that one-third of the nation's schools, with 14 million students, have at least one entire building in need of substantial repair or replacement. The problem of inadequate school facilities is widespread, however. It is most concentrated in inner cities, where over 38% of schools had at least one building in need of substantial repair or replacement.

There is a growing body of evidence that links the conditions of schools to student performance (e.g., Earthman, Cash, and Berkum 1995). Moreover, in many cases, the physical conditions of schools

actually pose safety hazards to children. In some areas schools are not structurally sound, have inadequate sanitation facilities, and may even expose students to hazardous substances.

Physical improvements to the nations' schools should go beyond just making them safe: they should allow for a better learning environment. One of the areas that will be important in this regard is the upgrade of wiring to ensure that all schools can have access to the Internet. Another is the redesign of interior space to allow for smaller class size. In many schools, classrooms were designed to hold 35 to 40 students. Using these rooms for smaller classes both wastes space and creates a less conducive environment for learning. A third possibility might be the provision of facilities for pre-school education. There is a shortage of pre-school providers in most areas of the nation, and this demand can be partly met by allowing public schools to offer pre-school care.

There are many other ways in which physical improvements to schools can improve educational outcomes. However, most of these are not likely to take place unless the federal government takes the lead in providing the funding. The areas where repairs and renovations are most badly needed tend to be inner-city areas that are already straining to meet operating costs for schools and other social services. Tending to capital needs generally gets put off. The General Accounting Office (1996) estimated that it would take $112 billion to repair and upgrade the nation's public schools. Doing this over a five-year period, with a 50% federal share, would imply additional federal spending of approximately $11 billion per year. The evidence indicates that this additional spending would offer substantial returns.

In his 1999 budget, the President has proposed a set of interest subsidies that should go part of the way toward meeting the need for increased investment in the nation's public school structures. His budget provides for approximately $1 billion a year for this purpose. While this money will provide an additional incentive for communities to renovate or rebuild their public schools, it will require that the vast majority of the money come from state and local governments. But if these governments already had the resources and inclination to support their school facilities, they would not have deteriorated to the extent that GAO reports. Therefore, it seems unlikely that the needed repairs and improvements will be carried through as a result of the proposed tax credit.[10]

Promoting Clean Technologies

A third area where public investment expenditures can be expected to offer large dividends is in the research and development of clean technologies. There is a strong consensus among climatologists that global warming will present a serious threat to the environment in the next century. This will make it incumbent on the United States and other nations to reduce their emissions of the greenhouse gases that are the cause of rising temperatures. Price increases for energy can force conservation and reduce emissions, but they can also have significant economic costs and lead to job loss.

The economic costs associated with reduced emissions can be drastically reduced if innovations in technology allow for cleaner energy sources or for the more efficient use of energy. While the private sector has been researching these possibilities, it is widely accepted among economists that the private sector will tend to under-invest in research and development, since a corporation that discovers a new product or process usually cannot garner all the benefits that result. Other companies may be able to build on a new discovery and improve upon it, thereby capturing much of the profits, even though they did not

pay for the initial research. For this reason, corporations tend to be cautious in their research and development spending, usually only funding work that they expect will have an immediate and certain payback. The government is not subject to the same constraints. Since the purpose of government-funded research is to improve living standards for the country as a whole, not to garner profits, it is appropriate for the federal government to take the lead in researching clean technologies.

There are many promising areas in which research funding can be directed under the broad agenda of promoting clean technologies. Two specific areas are the development of "fuel cell" engines to power automobiles and the development of photovoltaic electricity generation. Fuel cells are an alternative to internal combustion engines that break down hydrocarbons, the source of the energy in fossil fuels, to generate electricity. Current prototypes can run on standard gasoline or alternative fuels such as methane, and they capture 84% of the energy in gasoline (compared to 20% for standard internal combustion engines), reduce pollution by 90%, and generate enough power to run a mid-sized car. Additional government support for research can help develop these engines more quickly. Also, using these engines in government vehicles should help create a large enough market to bring down costs.

Photovoltaic electricity generation offers similar promise. Presently, the technology is cost efficient only in areas that are not connected to power grids and have favorable weather. However, the Electric Power Research Institute (EPRI 1997) projects that costs will decline sufficiently in the next 20 years so that the technology can become competitive for a wide range of uses throughout the country. Here also, government-funded research and development can help speed this cost decline, and government purchasing policy can help the industry achieve economies of scale in production.

There are many other important technologies in which government support can move forward the date that they become marketable. Federal support has an impressive record of producing results in the past in areas such as medical, computer, and aerospace technology. Future investments in these and other areas should also have large paybacks.

The Best Option for Long-Term Growth

For most of the last two decades, the elimination of the deficit has been the central focus of budget policy. This is unfortunate, since there is no particular economic gain from running balanced budgets. While it is important that deficits be kept in check so that debt does not rise to dangerous levels, this goal can be achieved with a much looser standard than a balanced budget. As long as deficits are not so large as to increase the debt-to-GDP ratio, the government can run deficits indefinitely without creating a greater interest burden for future generations. At present, this rule would allow an annual deficit of approximately $200 billion. The European nations, in the Maastricht Treaty, have chosen a similar rule for fiscal stringencyby requiring that deficits be held under 3.0% of GDP; the same rule in this country would allow deficits of approximately $240 billion a year. However, the politics favoring a balanced budget seem to have won out on this point.

Now that the government deficit has been eliminated, the central budget question is what should be done with the surplus. Four possibilities have been suggested: cutting taxes, paying down the debt, shoring up Social Security or Medicare, and increasing public investment. Only the last route is likely to

add to the long-run strength of the economy. Tax reductions will provide benefits to their recipients and may in some cases be appropriate, but they will be used primarily for consumption and will not increase the economy's productive capacities. Paying down the debt continues the deficit reduction path followed for the last five years. While this has been a period of respectable economic growth and relatively low unemployment, deficit reduction did not yield the promised dividends in terms of higher investment. Instead, it facilitated an increase in private consumption, and the economy's productive capacities have not been enhanced.

The long-term issues involving Social Security and Medicare cannot be addressed with the modest surpluses projected for the next decade. In the case of Social Security, the problem is a gradual increase in life expectancies that will increase the ratio of retirees to workers throughout the next century. This shift will eventually require an increase in taxes, a reduction in benefits, an increase in the retirement age, or some combination of the three, but the problem will not require any changes for more than 30 years into the future. Furthermore, the surpluses that are currently projected will not go very far toward addressing the long-term arithmetic of a population that spends an increasing portion of its life in retirement.

The surplus will be of even less use in dealing with Medicare. The problem that confronts Medicare is that health care costs, in both the public *and private* sector, are projected to rise at rapid rate for the foreseeable future. If these projections prove accurate, Medicare will soon be an enormous strain on the federal budget. Of course, if the health care cost projections prove accurate, then health care expenditures will also impose an impossible strain on family budgets as well. Tens of millions of people will either lose access to decent health care or impoverish themselves in their efforts to cover the costs. The only real answer to the long-term problem of Medicare is a comprehensive reform of the nation's health care system. Since this is apparently not politically feasible at present, there is nothing that the President and Congress can do with the surplus to fix Medicare's real problem.

Government investment in education and training, infrastructure, and research and development has a proven track record. Well-directed spending in these areas can increase the economy's productive capacities. Furthermore, many of these expenditures will have additional benefits that are not even picked up in standard economic accounts. For example, an individual's gains from education extend beyond just getting a higher wage on the job. And the benefits from a well-planned infrastructure will include a cleaner environment and more livable cities.

The nation is fortunate to be enjoying a long period of growth since the last recession and to be experiencing the lowest unemployment rates in a quarter century. In the last two years workers at all levels of the income distribution have even seen gains in real wages. While the present economic situation provides much to be thankful for, it is important that the country plan for its future. A renewed commitment to public investment must be a central part of this planning.

February 1998

Eileen Appelbaum, Jeff Faux, Max Sawicky, and Ruy Teixeira provided helpful comments on an earlier draft of this paper.

Appendix A

The historical data for **Table 1** were taken from the *Budget of the United States Government, Fiscal Year 1998: Analytic Perspectives* and *Budget of the United States Government, Fiscal Year 1998: Historical Tables* (Office of Management and Budget 1997). The spending levels for 1997 and beyond were obtained by taking projected growth rates from *Budget Trends: Federal Investment Outlays, Fiscal Years 1981-2002* (General Accounting Office 1997). The GDP growth projections are taken from *The Economic and Budget Outlook: Fiscal Years 1998-2002* (CBO 1997). It was assumed that in years after 2002 spending in each category grows at the same rate as it did from 2001 to 2002. The totals from the three categories do not sum to the total GDP share for public investment because this number also includes some expenditures on children's health care that do not appear in any of the three categories.

In **Table 2**, the higher education number comes from taking the estimate for full funding of the Pell Grant program in 1995 from NEA (1994) ($16.7 billion), adjusted upward for inflation to 1998, and subtracting the 1998 appropriation ($7.8 billion [OMB 1997b, 428]).

The numbers for training are based on the shares of GDP used to support training in OECD countries given in the July 1997 *Economic Outlook*. The low number represents the difference between the share of GDP in the U.S. devoted to training (0.04%) and the OECD average (0.31%). The high estimate is the difference between the share of GDP devoted to training in the U.S. and Germany (0.45%).

The shortfall for elementary education is obtained by taking the estimate for full funding of the Chapter I Compensatory Education for Disadvantaged Students program in 1995 from NEA (1994) ($10.2 billion), adjusted upward for inflation to 1998, and subtracting the 1998 appropriation ($8.1 billion [OMB 1997b *Appendix to the Budget,* 416]).

The shortfall for Head Start was calculated based on the cost of making the program available to all eligible children. The Children's Defense Fund estimates that only one-third of eligible children are currently enrolled in Head Start (CDF 1997, 34). Therefore, the need was estimated at twice the current cost ($4.3 billion [OMB,1997, *Appendix to the Budget,* 519]).

The estimate for highways is from the *American Association of State Highway and Transportation Officials* (1996). The lower number is an estimate of the additional spending needed to maintain the current quality of roads and bridges. The higher number is an estimate of the additional spending needed to improve the system to accommodate the needs of a growing economy. Both numbers were multiplied by the federal share of current highway spending (43.0%) and adjusted for inflation.

The estimate for mass transit is from the *American Association of State Highway and Transportation Officials* (1996).The lower number is an estimate of the additional spending needed to maintain the current quality of the capital stock of the nation's mass transit system. The higher number is an estimate of the additional spending needed to improve the mass transit system to the extent that is economically justifiable. Both numbers were multiplied by the current federal share of capital expenditures for mass transit (67.0%).

The estimate for water/sewage is based on the estimate of needed expenditures for sewage and drinking water treatment facilities (Environmental Protection Agency 1996). This need was assumed to be met over a 10-year period, with a federal contribution of 50%.

The estimate for rail expenditures uses an estimate of the additional capital expenditures needed to maintain Amtrak's capital stock in working order. The higher estimate includes the estimated cost of building five high-speed rail corridors ($11-12 billion) paid over five years (*American Association of State Highway and Transportation Officials* 1996).

The estimate for "other" is the amount of money that would be needed to restore the funding for community development block grants back to their 1980 level, a measure recommended by the Center for Community Change (1990).

The estimate for research and development needs was obtained by calculating how much additional spending would be needed to raise the share of GDP in the U.S. that is spent on civilian R&D to Germany's level (low estimate) or Japan's level (high estimate). The share information appears in National Science Foundation (1996).

Figure 1 presents the past and projected future shares of public investment in GDP. The data for historical spending are taken from the FY98 *Analytic Perspectives* and *Historical Tables* (Office of Management and Budget 1997). The spending levels for 1997 and beyond were obtained by taking projected growth rates from *Budget Trends: Federal Investment Outlays, Fiscal Years 1981-2002* (General Accounting Office 1997). It was assumed that in years after 2002 investment in each category grows at the same rate as from 2001 to 2002.

Figure 2 shows the past and projected future shares of federal education and training expenditures in GDP. The data for historical spending are taken from the FY98 *Analytic Perspectives* and *Historical Tables* (Office of

Management and Budget 1997). The spending levels for 1997 and beyond were obtained by taking projected growth rates from *Budget Trends: Federal Investment Outlays, Fiscal Years 1981-2002* (General Accounting Office 1997). It was assumed that in years after 2002 investment in education and training grows at the same rate as from 2001 to 2002. The higher line is based on the assumption that half of the education tax credit is a net addition to education spending. The nominal value of the education tax credit is assumed to rise at the rate 10.0% annually for the years after 2002, the same as the rate projected in the 1998 budget for the increase from 2001 to 2002.

Figure 3 shows the past and projected future shares of public infrastructure expenditures in GDP. The data for historical spending are taken from the FY98 *Analytic Perspectives* and *Historical Tables* (Office of Management and Budget 1997). The spending levels for 1997 and beyond were obtained by taking projected growth rates from *Budget Trends: Federal Investment Outlays, Fiscal Years 1981-2002* (General Accounting Office 1997). It was assumed that in years after 2002 infrastructure investment grows at the same rate as from 2001 to 2002.

Figure 4 shows the past and projected future shares of research and development expenditures in GDP. The data for historical spending are taken from the FY98 *Analytic Perspectives* and *Historical Tables* (Office of Management and Budget 1997). The spending levels for 1997 and beyond were obtained by taking projected growth rates from *Budget Trends: Federal Investment Outlays, Fiscal Years 1981-2002* (General Accounting Office 1997). It was assumed that in years after 2002 research and development spending grows at the same rate as from 2001 to 2002.

OMB and GAO use slightly different definitions of public investment, but these only have a minimal effect on the totals. The only important distinction between the two measures is that GAO counts defense R&D expenditures in its nondefense public investment measure, whereas OMB provides a separate breakout of defense and nondefense R&D expenditures. The differences between the two measures are only relevant for this analysis insofar as the growth path differs. This would be of some consequence in the projected growth path for civilian R&D spending, since defense R&D may fall somewhat further relative to nondefense R&D in the next 10 years. However, any possible differences in these growth paths could not be large enough to significantly affect the overall projections for public investment.

Figure 5 applies the last projections of real GDP growth that CBO made prior to the passage of the first Clinton budget (CBO 1993) to 1992 real GDP. It compares this to actual annual GDP in the latest National Income and Product Accounts. The figure for 1997 assumes a growth rate of 3.0% for the fourth quarter.

Figure 6 shows the real interest rate on 10-year bonds defined as the average nominal yield minus the December-to-December change in the CPI. The projections use the last CBO interest rate projections made prior to the passage of the first Clinton budget (CBO 1993) and the set of projections that CBO made the following January (CBO 1994).

Figure 7 shows the percentage of nominal share of GDP that consists of nonresidential fixed investment. The numbers are taken from the latest National Income and Product Accounts. The figure for 1997 is the average share for the first three quarters of the year.

Figure 8 shows the average annual growth rate of productivity in the nonfarm business sector. The data come from the Bureau of Labor Statistics productivity and costs series. It includes data through the third quarter of 1997.

Appendix B

The Measurement of "Real" Investment

The growth rate of investment over this business cycle appears considerably stronger when measured in 1992 chained dollars than as a share of GDP. The main reason is that the Commerce Department's current system of measurement attributes a 30% annual rate of price decline to computers. This means that investment in computers will show a 30% rate of increase, in 1992 chained dollars, even if computer investment stays the same in nominal dollars. While computer prices are clearly declining rapidly, some economists believe the current method overcounts the true value of computing power (e.g., "Some Experts Say Inflation Is Understated," *New York Times*, November 6, 1997, page D1).

Measuring investment as a share of nominal GDP (current dollar expenditures on investment divided by current dollar GDP) presents one way of getting around this measurement problem. This is the method suggested by E.F. Denison (1989), one of the foremost experts on productivity and measurement issues. A rapid increase in the true value of the dollars devoted to investment goods relative to the value of money spent on consumption should be reflected in a rapid rate of productivity growth. (Investment only has value insofar as it increases productivity.) In fact, as noted in the first section, productivity growth has been virtually unchanged between the business cycles of

the 1980s and the 1990s. Since computers are a component of the real output that is used to calculate productivity growth, a lower rate of price decline (e.g., 10% annually) attributed to computers would mean that productivity growth actually has fallen somewhat from its rate in the 1980s. This productivity performance is not consistent with a view of rapid growth in investment.

Endnotes

1. Controlling for inflation is necessary so that it can be determined whether higher expenditures in, say, 1998 than in 1991 are the result of the government paying higher prices for the same goods or actually buying more goods. Controlling for economic growth is necessary to allow a determination of the extent to which spending has changed in proportion to the size of the economy. For example, if the economy is 50% larger in 1998 than in 1980, one could assume that approximately 50% more public investment is needed in 1998 than in 1980. This doesn't mean that all types of public investment should necessarily grow at the same rate as the economy – a doubling in the size of the economy would not necessarily require twice as many highways, but it may require more than twice as much spending on education or on research into the technologies of the future. Focusing on GDP shares simply means that on average we should expect the need for public investment to be roughly proportional to the size of the economy.

2. OMB's definition is a narrow notion that excludes many categories that can reasonably be considered investment. One such category, for example, is spending on early childhood health care. There is now a considerable body of evidence to show that attending to the health needs of young children will have a lifelong impact. Immunization against and treatment of early childhood diseases can prevent children from being afflicted with lifelong handicaps or continuing health problems. For this reason, spending on early childhood health care can reasonably be viewed as an investment. Similar programs that could be viewed as investment include drug prevention and rehabilitation programs, many types of health care spending that facilitate work, and housing assistance that sustains inner-city neighborhoods. However, this analysis follows OMB's definition of investment and therefore excludes these types of government programs.

3. It is worth noting that this problem can also exist on the spending side. If the federal government provides money to the states with few restrictions, the states may simply substitute the new revenue for money they would have spent otherwise, thereby leading to little or no net increase in investment expenditures.

4. Over the last two decades, CBO has developed a reputation for its careful nonpartisan analysis of the budget and the economy. For this reason, its projections have come to be the standard benchmark for policy analysis.

5. Appendix B includes a discussion of the appropriateness of measuring investment in 1992 chained dollars.

6. These three numbers do not sum to the total shortfall because they exclude some areas of health spending that OMB counts as investment. Since OMB does not provide a consistent historical series for this measure, it is not broken out separately here.

7. In some cases, it was necessary to use an alternative means to update the early estimate, since an update cannot be obtained from the original source.

8. These estimates were derived from assessments from the Department of Transportation and the American Association of State Highway and Transportation Officials.

9. The data on shares was obtained from the National Science Foundation's *National Patterns of R&D Resources, 1996.*

10. The President had included a similar proposal in his 1998 budget, but it was eliminated by Congress.

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