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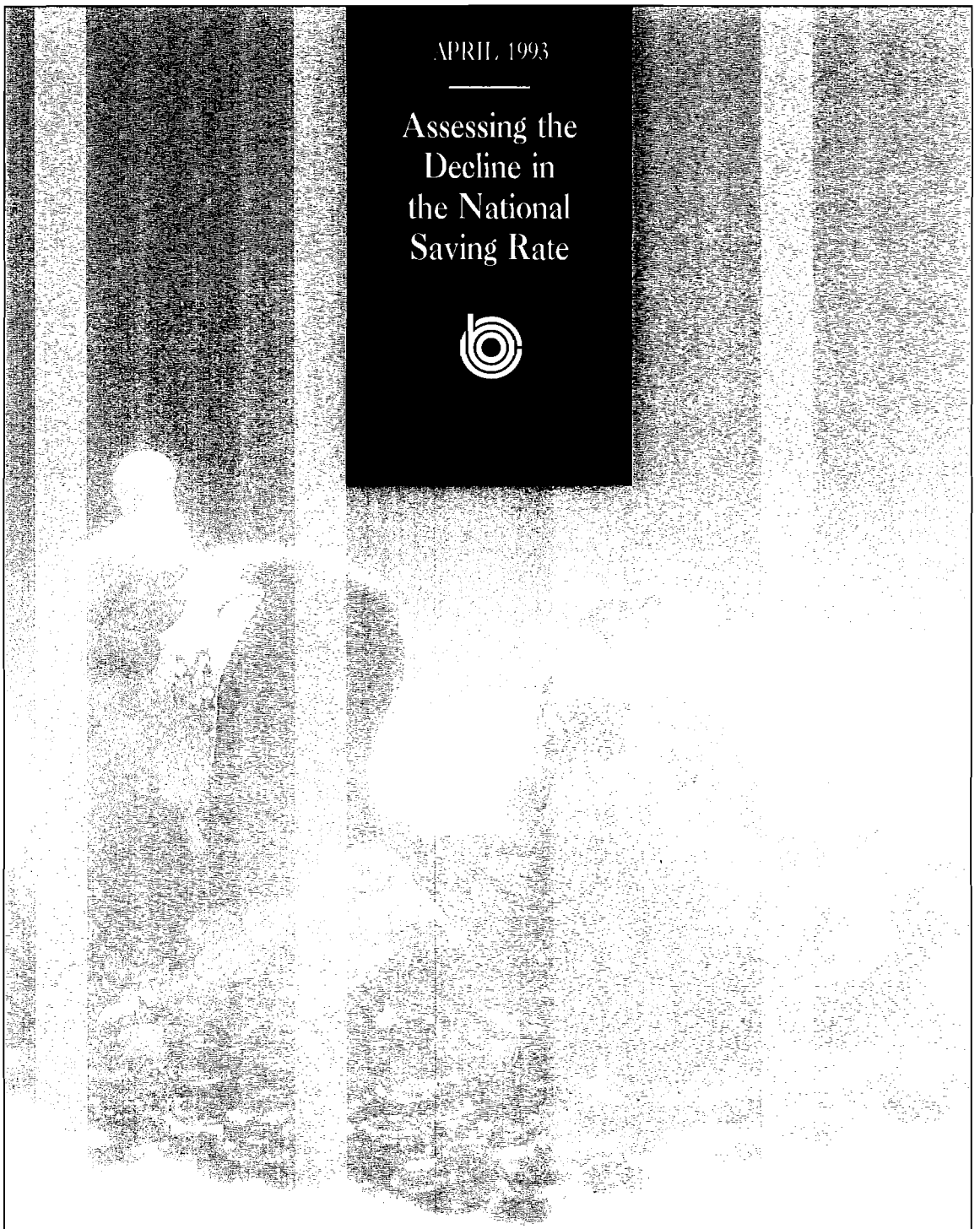
Assessing the Decline in the National Saving Rate



ASSESSING THE DECLINE IN THE NATIONAL SAVING RATE

The Congress of the United States
Congressional Budget Office

NOTES

Unless otherwise indicated, all years are calendar years.

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

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Preface

The nation's rate of saving declined in the 1980s and the trend has persisted into the 1990s. Large federal deficits and declining levels of private saving were the principle causes, and the result has raised serious questions about the outlook for the nation's future standard of living. In response to a request from the Senate Committee on the Budget, this study looks into the issue of national saving, clarifying how it should be measured and what sectors are most responsible for the decline.

Angelo Mascaro of the Congressional Budget Office's (CBO's) Macroeconomic Analysis Division wrote the study under the supervision of Robert Dennis. Larry Ozanne, John Peterson, Frederick Ribe, Frank Russek, John Sabelhaus, and Matthew Salomon of CBO offered insightful comments and criticisms. The study also benefited from suggestions and criticisms provided by Frank de Leeuw and Joe Cordes. Laurie Brown, Blake Mackey, Mark McMullen, and Mike Simpson provided research assistance.

Sherwood D. Kohn edited the manuscript. Chris Spoor provided editorial assistance. Verlinda Lewis, with the assistance of Rae Roy, produced numerous drafts of the study. Kathryn Quattrone prepared the study for publication.

Robert D. Reischauer
Director

April 1993

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Summary

The national saving rate--that is, the rate at which money is saved out of national income--declined substantially in the 1980s; it has dropped even more in the early 1990s, falling farther below the levels of other industrial countries and raising concerns among policymakers and analysts. National saving, along with the inflow of savings from other countries, is the main source of funds for machinery, buildings, and other investments that sustain economic growth. With less saving, investment, and economic growth, living standards (often measured by real per capita consumption) grow more slowly.

The reduced rate of national saving is also worrisome because new challenges lie ahead. The pending retirement of the baby-boom generation (people born between about 1946 and 1964) early in the 21st century is one such challenge. The retirement of the baby boomers will increase the ratio of dependent persons to working people and require that a given amount of national income be spread among more people.

A second challenge is posed by the unification of Germany and the conversion of the countries of Eastern Europe and the former Soviet Union from centrally planned to market economies under more democratic governments. By contrast with the 1980s, when inflows of foreign savings helped to offset some of the decline in U.S. saving, these developments abroad could raise the cost of foreign investment in the United States. Germany and the Eastern bloc countries are apt to demand more of the world's saving than they did in the 1980s to satisfy their own substantial needs for new investment.

Some economists have suggested that the apparent drop in saving may not be robust, that other measures of saving do not show the same weakness in recent years. But when alternative measures of national saving are used, they do not alter the impression that the national saving rate has declined in recent years (see Summary Table 1). They also suggest that government deficits contributed even more to the decline than conventional measures of national saving indicate.

Has National Saving Declined?

Net national saving, as officially measured in the national income and product accounts, has caused concerns about the deterioration of national saving during the 1980s. This measure attempts to estimate how much the nation is providing for future living standards by increasing its stocks of privately owned productive assets--plant, equipment, housing, and inventories. After averaging 7.1 percent of gross national product (GNP) during the 1970s, this measure declined to 3.8 percent in the 1980s and thus far in the 1990s is even below its 1980s average. But economists have focused on three aspects of the conventional measure

of net national saving that could indicate whether there had been a significant decline between earlier decades and the 1980s. Those aspects are measuring depreciation; classifying some investment-type expenditures as consumption instead of saving and investment; and excluding real capital gains from measured income and saving.

Has Estimated Depreciation Exaggerated the Decline?

More than half of the decline in the net national saving rate was caused by an increase in depreciation--the rate at which productive capital wears out and is retired from service--in relation to GNP, and some economists have suggested that official estimates of depreciation may be too large. Since net saving is gross saving less depreciation, overstating depreciation would exaggerate the decline in net saving. Perhaps depreciation has been measured incorrectly because it is not directly observable and must be estimated indirectly. In fact, official methods for estimating depreciation continue to evolve as better data and techniques become available.

Although alternative estimates of depreciation could affect the decline in the national saving rate, the available evidence points only

Summary Table 1.
The Effect of Adjustments on the Net National Saving Rate and on the Contributions of the Government and Private Sectors (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
Net National Saving Rate				
NIPA	8.0	7.1	3.8	1.8
Adjusted	11.7	9.9	6.0	4.0
Federal Government Saving				
NIPA	-0.2	-1.7	-3.6	-3.3
Adjusted	0.7	-0.3	-2.5	-2.2
State and Local Government Saving				
NIPA	0	0.8	1.0	0.4
Adjusted	1.7	1.5	1.1	0.8
Total Government Saving				
NIPA	-0.1	-0.9	-2.6	-2.9
Adjusted	2.5	1.2	-1.4	-1.4
Business Saving				
NIPA	3.5	2.6	1.6	1.3
Adjusted	4.2	4.0	2.9	2.1
Personal Saving				
NIPA	4.7	5.5	4.7	3.3
Adjusted	5.1	4.9	4.4	3.2
Total Private Saving				
NIPA	8.2	8.0	6.3	4.7
Adjusted	9.3	8.9	7.3	5.3

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Department of Labor, the Federal Reserve Board of Governors, and the Federal Reserve Bank of Dallas.

NOTES: Adjustments include those for consumer durables, government nonmilitary investment, the inflation component of interest flows, the market value of federal debt, and defined-benefit pension plans of the private sector (see Chapters 2 and 3).

NIPA = national income and product accounts.

to modest effects. Past studies using different methods than those used in the official estimates have found slower rates of depreciation for some components of the capital stock such as equipment (which accounts for the bulk of depreciation because of its relatively short life). However, these alternative estimates produced effects on the net national saving rate that were too small to affect the magnitude of the decline appreciably in the 1980s.

Would Changing the Treatment of Some Expenditures Lessen the Decline?

Alternative measures of national saving broaden the conventional measure by including other types of expenditures that are officially treated as consumption but could instead be regarded as investment. The major items treated this way are expenditures on durable goods by consumers; expenditures on investment-type goods by government; public and private expenditures on research, development, and educational services (such as teachers' salaries); and individual efforts to increase human capital, which can be measured by the earnings students forgo while attending school. All of these expenditures produce benefits well into the future, a distinguishing feature of investment and saving, as opposed to consumption.

Adjusting the net national rate of saving for consumer durables and government investment steepens the decline in the net rate of saving that occurred in the 1980s, from 3.3 percent for the conventional measure to 4 percent for the adjusted measure. In relation to GNP, expenditures on durable goods by consumers and on nonmilitary investment by government accounted about equally for the additional decline. The decline in spending by state and local governments caused most of the decline in government investment. That decline mostly reflected less spending on school construction when the baby boom lapsed, and less spending on such infrastructure as highways and bridges.

It is hard to assess the effect on the decline in net saving of spending on research and development, educational services, and human capital because estimating depreciation for these expenditures is difficult. As a result, only the gross saving measure, rather than the more inclusive net national saving measure, can be reliably adjusted. Nevertheless, spending on these items also eased in the 1980s, and including them caused the adjusted measure of gross saving to decline by about the same proportion as the conventional measure. If estimates of depreciation had been available, the resulting measure of net national saving presumably would have fallen significantly as well. Most of the added decline in the adjusted measure was the result of reduced investment in human capital as measured by earnings that students had given up. This trend in turn reflected the graduation of baby boomers during the 1980s from school to the work force.

Would the 1980s Look Better if Changes in the Value of Assets Were Included in Saving?

The conventional measure of saving omits changes in the value of assets that some economists would include. Including revaluations would emphasize changes in the economy's wealth as a measure of changed living standards. But the most important changes in wealth are those brought about by the current operations of the economy, which are reflected in saving and investment from current income and current production. The conventional measure, or one that has been adjusted for consumer durables and government investment, emphasizes this contribution to living standards.

Including revaluations would also produce a measure of saving that does not always reflect a change in living standards. Some revaluations, such as those on assets favored by regulations restricting competition, would improve living standards only selectively in the economy. Others, such as that induced by an oil-price increase, could increase the value of cer-

tain tangible assets but reduce wealth by lowering future real wages and salaries.

In any event, adjusting for revaluations does not affect the main conclusion about the national saving rate in the 1980s. Revaluations can be measured in two ways: the prices at which existing assets can be replaced by newly produced capital goods, or the prices of existing assets themselves, including the prices of shares traded in stock markets when the assets are held by corporations. The measure using the prices of replacement assets declined substantially during the 1980s, and resulted in the paradox that living standards were helped by the 1970s' boost in oil prices and hurt by the 1980s' fall in computer prices. The measure using the prices of existing assets, including equity claims on corporations holding the assets, has been low for the past two decades. This measure also showed enormous yearly fluctuations that all but obscured movements in the underlying saving rate.

Locating the Decline in National Saving

The conventional measure of national saving indicates that the public and private sectors shared equally in the decline of the national saving rate during the 1980s. Increased federal deficits accounted for all of the decline in public-sector saving, and business and personal saving shared equally in the decline in private saving. But proposed adjustments to national saving suggest that government might have played an even larger role in the decline, and that personal saving might have played a much smaller role than the conventional measure indicates.

The proposed adjustments are of two types. The first type affects the level of national saving--fixed nonmilitary investment by the federal government, fixed investment by state and local governments, and expenditures on durable goods by consumers. These are the adjustments for which measures of depreciation are readily available to compute net saving.

The second type of adjustment mostly affects the distribution of national saving among sectors and has figured prominently in analyzing federal deficits and personal and business saving. Three elements make up this adjustment:

- Adjusting interest flows among sectors for the effects of inflation. This adjustment reclassifies the inflation component of interest payments as a repayment of principal rather than as interest income. It reduces saving of sectors that are net savers (such as households) and increases saving of sectors that are net debtors (such as the federal government).

- Restating the outstanding amount of federal debt from book value to market value. This adjustment increases federal deficits when interest rates decline because lower interest rates translate into higher prices of outstanding government debt. Increases in interest rates have opposite effects.

- Adjusting private pensions of the defined-benefit variety. Instead of treating contributions and earnings for such plans as household saving, as in the conventional measure, this adjustment treats them as business saving, placing such plans on the same footing as Social Security. This adjustment only affects the distribution of private saving between businesses and households.

The combined adjustments suggest that government's share of the decline might have been larger, contributing to almost two-thirds of the decline in the adjusted rate of national saving, and that personal saving may have contributed least to the decline.

Although when taken together the adjustments leave the federal deficit's share of the decline mostly intact, they nevertheless increase government's share by reversing the contribution of state and local government--from slightly increased surpluses in relation to GNP to reduced surpluses between the 1970s and 1980s. The relatively small effect of the adjustments on the federal government's share of the decline reflects virtually offsetting effects among individual adjustments. By contrast, the adjustments for investment and inflation both lead to reduced surpluses for state and local governments. The adjustment for investment accounts for most of the less successful performance of state and local surpluses between the 1970s and 1980s.

The adjustments mostly preserve the contribution made by lower business saving to the decline in the national saving rate, but they cut the contribution of the household sector to the decline by one-half. As a consequence, the adjustments imply that household saving might have become an even more important source of national saving in the 1980s than before.

Assessing Personal Saving

Although lower personal saving had the least to do with the decline in the national saving rate during the 1980s, some economists were disappointed at the failure of personal saving to increase in response to lower saving by government and business and apparently increased incentives to save. The focus on the lackluster performance of personal saving was further heightened by its increased share of national saving, supplying $1.24 for each dollar of national saving in the 1980s compared with about 77 cents in the 1970s.

What Caused the Lackluster Performance of Personal Saving?

Both the conventional and adjusted measures of personal saving moved down after the mid-1980s, and standard theories of personal saving suggest that two factors--increased wealth and improved income prospects--may have held down the personal saving rate. Many individuals were prompted to increase their spending and reduce their saving during the stock market and real estate booms of the 1980s.

By itself, increased wealth could account for much of the reduced saving. Moreover, as the economy entered the expansion phase, the prospect of continued income growth probably encouraged individuals to finance additional expenditures, by borrowing not only against higher property values but against future income as well, further reducing saving out of current income.

Two other factors--increased real interest rates, and changes in the age distribution of the population--played a less certain role. Although real interest rates were higher in the 1980s than in the past, standard theories suggest they could have increased or lowered the personal saving rate. This ambiguity shows up in the absence of conclusive empirical evidence concerning their exact role. Similarly, demographic changes in the form of a declining percentage of those in their peak saving years and a rising percentage of those in their retirement years should have contributed to the poor performance of the personal saving rate. However, these changes began long before the 1980s and were too small, in the view of many economists, to have played a role in the 1980s. One possibility is that the demographic changes were having some effect on the lower saving rate in the 1980s, but that effect was obscured by the more powerful effects of wealth and income.

Will Personal Saving Improve Into the 1990s?

The bursting of the real estate bubble at the end of the 1980s, and the less optimistic view of income prospects that has so far characterized the 1990s, may combine to lift the personal saving rate over the balance of this decade. The weakness of consumption growth during recovery from the 1990-1991 recession suggests that individuals are already working to improve the personal saving rate. Of the two demographic factors mentioned above, the percentage of people in their peak saving years could reinforce this improvement if, as projected, it rises over the next two decades. But the other demographic factor--the percentage of people in retirement--could offset some of the improvement if, as expected, the percentage of retirees rises. As a result, the net effect of these two demographic influences will depend on which of these two segments of the population dominates the overall rate of personal saving in the decade ahead.

Chapter One

Introduction

Although the economy of the United States expanded for a longer period during the 1980s than it had during any other peacetime era, many economists became increasingly concerned as the decade unfolded because the expansion was accompanied by a significant decline in the nation's rate of saving. Saving finances the capital accumulation that, together with labor, creates employment, income, and production and supports individual living standards. But households, businesses, and government all saved at a lesser rate in the 1980s than they did in earlier decades. This decline in the national saving rate has persisted into the 1990s, and economists fear that if it continues, Americans will eventually face a substantial slowdown in the growth of their standard of living.

The decline in the national saving rate is of particular concern because two other factors work independently to diminish the growth of living standards: slow growth in productivity and in the ratio of the labor force to population. Much higher rates of productivity and growth in the labor force in past decades, together with higher rates of national saving, meant that people who were parents in the 1980s were able to achieve twice the living standard of their parents a generation earlier. But the Congressional Budget Office has estimated that the slowing of productivity and labor-force growth, when combined with the exceptionally low rate of national saving, would, if continued, mean that today's parents could hope for the same improvement only in the lives of their great-grandchildren.[1]

The decline in the national saving rate has also meant borrowing from abroad--using foreign saving to finance domestic investment--a contrast with past decades when national saving financed domestic investment as well as investment abroad. Although the United States could try to maintain its dependence on foreign saving, the unification of Germany and the economic rebuilding of Eastern Europe and the former Soviet Union generate other demands on world capital markets, raising the cost of such borrowing.

Most economists agree that inadequate national saving would adversely affect future living standards. But some are not convinced that saving is, in fact, as poor as the ordinary reports suggest. The reported decline in the national saving rate is based on a conventional measure that is only one of a number of possible gauges. The alternative measures attempt to approximate an ideal yardstick of saving, ideal in the sense that it is the measure most closely linked to growth in the standard of living.

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1. See Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1990-1994*, Chapter III, "Implications of Federal Deficits for Economic Growth" (January 1989), pp.79-99. Similar conclusions have been reached by Ethan Harris and Charles Steindel, "The Decline in U.S. National Saving and Its Implications for Economic Growth," *Quarterly Review*, Federal Reserve Bank of New York, vol. 15, no. 3-4 (Winter 1991).

The Decline in the National Saving Rate

Conventional measures compiled here and abroad agree that the decline of saving in the United States has been significant and greater than in most countries with which it is often compared. According to the national income and product accounts (NIPA) measure that is published by the Department of Commerce, the net national saving rate fell from 7.1 percent during the 1970s to 3.8 percent during the 1980s, and to 1.8 percent thus far in the 1990s (see Table 1). The NIPA measure is associated with net private domestic investment in housing and business plant and equipment, and with net investment abroad. Its precipitous decline has aroused fears that living standards may not improve as fast in the future as they have up to now.

Table 1.
NIPA Measure of National Saving as a Percentage of Gross National Product

	1960-1969	1970-1979	1980-1989	1990-1991
Gross National Saving	16.5	16.8	15.3	12.7
Capital Consumption	8.4	9.7	11.5	10.9
Net National Saving	8.0	7.1	3.8	1.8

SOURCE: Department of Commerce, Bureau of Economic Analysis.

NOTE: NIPA = national income and product accounts.

More than half the decline in the net national saving rate from the 1970s to the 1980s was caused by the rise in the consumption of fixed capital--productive assets that have depreciated and become less productive, or those that have been retired from service or destroyed by disasters. Although capital consumption has always been substantial, it has exceeded net national saving by increasing amounts over the last three decades.

How We Fared Against Other Countries

Although national saving rates declined in countries that are comparable in size and stage of industrialization to the United States, the declines were mostly smaller. They were also less troubling, however, because most saving rates abroad have been higher than in the United States (see Table 2).

According to a measure designed for international comparisons, the U.S. net national saving rate declined by 56 percent from its 1970s level, matched in significance only by the 49 percent decline in France. Declines in the other countries were much smaller. This measure of saving, compiled in Europe by the Organization for Economic Cooperation and Development, uses the United Nations System of National Accounts. It broadens the NIPA measure by including saving associated with government investment in nonmilitary equipment and structures. Although differences in measuring the consumption of fixed capital among countries have cast suspicion on comparing net national saving rates, both net and gross measures tell the same story.[2]

Why have most of these countries saved at higher rates than the United States? One contributing factor has been the gap in production per capita between the United States and other countries that opened up after World War II. The substantial loss of physical capital in Europe and Japan in the aftermath of the war triggered a growth process that entailed much higher rates of saving compared with the United States. Still possessing the skills, knowledge, and institutional arrangements conducive for growth, but lacking productive capital destroyed by war, the incen-

2. For further discussion of measurement problems in the international comparison of saving rates, see Derek W. Blades and Peter H. Sturm, "The Concept and Measurement of Savings: The United States and Other Industrialized Countries," in *Saving and Government Policy*, Conference Series No. 25 (Boston: The Federal Reserve Bank of Boston, October 1982), pp.1-30.

Table 2.
System of National Accounts Measure of National Saving Rates (National saving as a percentage of gross domestic product)

	Net National Saving Rate			Gross National Saving Rate		
	1960-1969	1970-1979	1980-1989	1960-1969	1970-1979	1980-1989
United States	9.8	8.2	3.6	19.8	19.7	16.5
Canada	9.8	11.4	8.4	21.5	22.4	20.1
United Kingdom	10.5	7.5	4.8	19.0	18.0	16.6
France	17.7	15.3	7.8	26.3	25.9	20.3
Germany	18.0	13.6	10.2	27.3	24.4	22.5
Japan	21.9	22.3	18.2	34.5	35.3	31.8

SOURCE: Congressional Budget Office calculations based on data from the Organization for Economic Cooperation and Development.

tive to invest became enormous. Individuals also had a strong desire to save and replace the wealth that the war destroyed.

By contrast, the United States emerged in better shape after the war and required far less saving. Businesses faced the less daunting task of converting existing capital from wartime to peacetime use instead of having to start from scratch. Individuals also emerged with substantial claims to wealth that were accumulated during the war years, and their desire to save probably was not nearly as strong as it was abroad.[3]

Although differences in production per capita could have influenced higher saving rates abroad in the 1960s and 1970s, when the gaps were wide, they should have become much less influential by the 1980s, when the gaps had narrowed. For example, using inflation-adjusted gross domestic product (GDP) per capita, Japan narrowed its gap by raising its production per capita from about 40 percent of that in the United States in the 1960-1969 period to more than 80 percent by 1990 (see Table 3). Nevertheless, except for Canada, where the wartime experience was more like the United States, gaps in GDP per capita have not been eliminated and may still be

Table 3.
Per Capita Gross Domestic Product in 1990 U.S. Dollars Adjusted for Purchasing Power Parity

	1960-1969	1970-1979	1980-1989	1990
United States	13,762	16,750	19,439	21,571
Canada	10,183	14,349	18,144	20,257
United Kingdom	8,904	11,176	13,220	15,064
France	8,002	11,641	14,059	15,895
Germany	8,572	11,572	14,249	16,079
Japan	5,572	10,308	14,055	17,406

SOURCE: Congressional Budget Office calculations based on data from the Organization for Economic Cooperation and Development (OECD).

NOTE: Gross domestic product in 1990 U.S. dollars uses OECD estimates of a purchasing power parity (PPP) rate of exchange between national currencies. PPP is an estimate of the exchange rate at which a dollar can buy the same basket of goods in each country.

3. For further discussion, see Robert E. Lipsey and Irving B. Kravis, *Saving and Economic Growth: Is the United States Really Falling Behind?* (New York: The Conference Board, 1987).

Table 4.
Contributions to Net National Saving Rate

	1960-1969	1970-1979	1980-1989	1980s Less 1970s
Personal	4.7	5.5	4.7	-0.8
Business	3.5	2.6	1.6	-1.0
State and Local	0	0.8	1.0	0.2
Federal	-0.2	-1.7	-3.6	-1.9
Net National Saving Rate	8.0	7.1	3.8	-3.3

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, national income and product accounts.

having some influence on saving rate differences between the United States and other countries.[4]

What Caused the Decline?

Federal deficits have contributed significantly to the decline in the national saving rate, and they also explain the much lower rate in the United States compared with other major industrial countries. According to the NIPA measure, federal deficits accounted for more than one-half of the decline in the net national saving rate between the 1970s and 1980s (see Table 4). By contrast, state and local governments provided a boost to the national saving rate, mostly because many had surpluses in pension funds operated for their employees. Business and personal saving each accounted for about one-fourth of the decline. In the case of businesses, lower profits stemmed from the rise in interest payments that was associated with increased debt financing during the 1980s.

Increasing deficits of the federal government also helped to keep the national saving rate lower here than abroad during the 1980s. By contrast with the United States, governments of most other major industrial countries maintained budget surpluses, adding to rather than dragging down their national saving (see Table 5). For example, the difference between government saving in Japan and the United States rose from 4 2 percentage points in the 1960s, to 4.4 points in the 1970s, and to 6.7 points in the 1980s. As a result, just when the narrowing of gaps in living standards might have brought national saving rates closer together, increased deficits in the United States helped to keep them apart.

Table 5.
Government Saving, Including Nonmilitary Investment, as a Percentage of Gross Domestic Product

	1960-1969	1970-1979	1980-1989
United States	2.0	0.4	-2.1
Canada	3.6	2.7	-1.6
United Kingdom	3.6	2.6	0.1
France	n.a.	3.6	1.3
Germany	6.2	3.9	2.0
Japan	6.2	4.8	4.6

SOURCE: Congressional Budget Office calculations based on data from the Organization for Economic Cooperation and Development.

NOTE: n.a. = not available.

Increased Importance of Personal Saving

Personal saving became an even more important source of national saving in the 1980s than it had been in previous decades, pro-

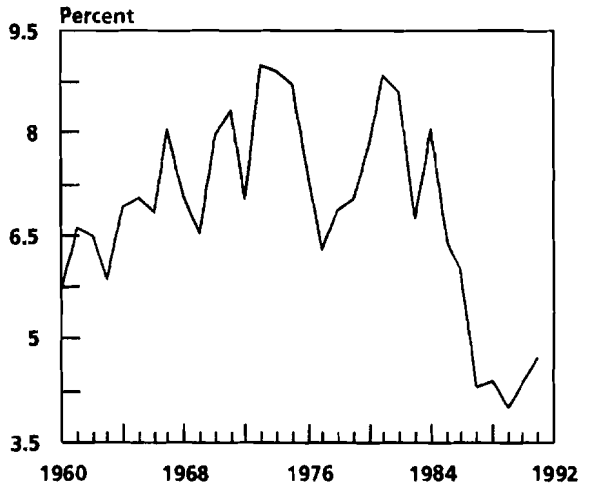
4. Although such effects should be less important now, very little is known about how long it takes for them to disappear. It could take as little as two or three decades, but some analysts suggest that it could take longer. For further discussion of this issue, using Japan as an example, see Lawrence Christiano, "Understanding Japan's Saving Rate: The Reconstruction Hypothesis," *Quarterly Review*, Federal Reserve Bank of Minneapolis (Spring 1989), pp. 10-25.

viding $1.24 for each dollar of national saving, compared with 59 cents in the 1960s and 77 cents in the 1970s. Given its increased relative importance, economists became concerned after the mid-1980s when saving out of disposable income--the personal saving rate--declined to levels well below those of earlier decades. With large government deficits already a fact, the further loss of national saving from reduced saving by consumers only added to the gloom about future living standards.

This concern was heightened when consumers financed some of their reduced rate of saving by taking on large mortgages and other debt. Some of the mortgage debt was used to finance residential investment. Debt used in other ways, however, reduced the pool of saving available for business investment. In fact, the record rise of nonmortgage debt seemed surprising because the ability to deduct the interest on such debt was being phased out by the Tax Reform Act of 1986. By the end of the 1980s, the personal saving rate was at an all-time low of about 4 percent and nonmortgage debt was at an all-time high of 33 percent of disposable income (see Figures 1 and 2).

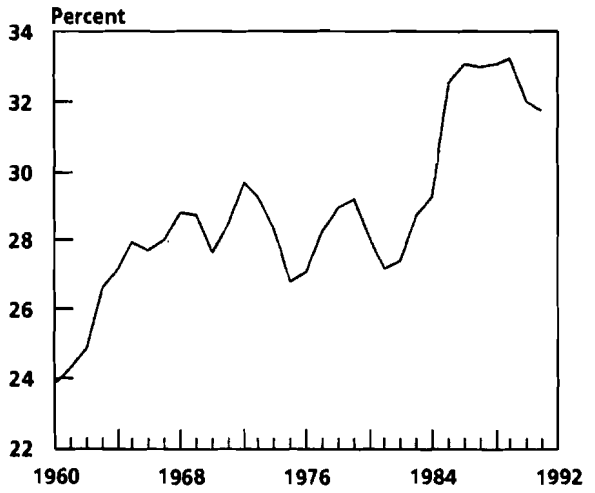
The record low rate of personal saving and record high rate of personal debt also generated fears that the economy might suffer in the short as well as in the long run. Economists feared that consumers would soon have to reduce their rate of spending to service the debt and thereby slow economic activity. The slower-than-normal growth of consumer spending that followed the recent recession has since justified that fear.

Figure 1.
Personal Saving as a Percentage of Personal Disposable Income, 1960-1991



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

Figure 2.
Personal Nonmortgage Debt as a Percentage of Personal Disposable Income, 1960-1991



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

Conclusion

The picture portrayed by the conventional measures of saving appears gloomy. The national saving rate is too low to provide more than negligible growth in living standards for the next generation of Americans. Gaps in living standards do not satisfactorily explain why the U.S. saving rate is lower than that of the nation's major competitors. Government deficits accounted for one-half of the decline of the 1980s and for the low rate of saving in relation to that of other countries. Personal saving, the most important source of national saving, also fell despite increased incentives to save rather than to borrow and spend.

Chapter Two

Adjusting the Conventional Measure of National Saving

The conventional measure of national saving shows a significant decline from 7.1 percent of gross national product in the 1970s to 3.8 percent in the 1980s (see Box 1 about the use of GNP as the base for the national saving rate). Some economists have proposed alternative measures of national saving that might better reveal how much the nation is saving to improve its future standard of living. These alternative measures sometimes differ substantially from the conventional measure of national saving. But the main proposed adjustments described in this chapter do not alter the general conclusions that national saving declined significantly during the 1980s, and that it is below even its 1980s average thus far in the 1990s.

Where the measurement of national saving is concerned, there are three broad issues: whether a better measure of saving, using alternative estimates of the consumption of fixed capital, might moderate the decline shown in the conventional measure of net national saving; whether the conventional measure draws the line between consumption and saving in the right place; and whether saving should include revaluations of existing assets. Each of these issues has arisen out of decades-long research that has sought to ex-

Box 1.
GDP, GNP, or NNP?

In analyzing national saving, economists have variously expressed it as a percentage of gross domestic product (GDP), gross national product (GNP), and net national product (NNP) when speaking of the national saving rate. Conclusions about movements in the national saving rate from one decade to another are qualitatively unaffected by the choice among these three measures. All three measures have grown at virtually identical rates.

As for the choice between GNP and GDP, the former was chosen for much of the analysis in this report because it is consistent with the emphasis on national saving. Both GNP and national saving exclude capital income earned in the United States by nonresidents and include capital income earned abroad by residents of the United States. The international comparisons, however, use GDP as the base simply because of its availability. Some countries do not report GNP.

Between GNP and NNP, the choice is less natural. The difference is the capital consumption allowance (CCA) that is removed from GNP in calculating NNP. Because one issue examined in this study concerns the potential problems with measuring CCA that some economists have noted, a matter taken up in this chapter, the selection of GNP as the base for the national saving rate seemed appropriate for this report.

plain the connection between the processes of saving, investment, accumulation of assets, and growth in living standards.

The Link Between Saving and Living Standards

When the residents of a nation save, they lay the foundation for increasing their standard of living by increasing their stock of productive assets. The increase in assets can take place either at home, through domestic investment, or through investment abroad. In either way, the larger stock of assets enables residents to attain a higher level of income, out of which they can achieve a higher standard of living.

In order to achieve a higher standard of living in the future, however, individuals must be willing to reduce their current consumption because both saving and investment compete with consumption in the use of current income and production. Saving and investment take place when a part of income and production is not devoted to goods and services that are immediately consumed. The portion of income not spent on consumption is saved, and the part of production not devoted to producing consumption goods can be devoted to producing investment or export goods. Thus, individuals must be willing to postpone consuming some of their current income if they want to increase their assets through domestic and foreign investment, and thereby increase future living standards.

Both tangible and intangible assets are financed from accumulated national saving. Tangible assets, in addition to inventories of goods in various stages of completion, include a vast array of capital goods such as mining, agricultural, and industrial machinery; factory, storage, and office buildings; transportation, communication, and computing equipment; road, water, and sewage systems; and developed natural resources such as oil and gas reserves, mines, and agricultural and timber lands. Intangible assets include the knowledge, skills, and techniques people obtain through education, training, and experience, and through other activities such as basic research and development.

Both types of assets contribute to living standards by enhancing the ability of the nation's workers to produce greater amounts of goods and services. Some tangible assets are used to produce goods and services for immediate consumption. Others are used to produce new investment goods for replacing and increasing stocks of productive assets. And intangible assets contribute to living standards by helping workers to develop entirely new products, materials, and manufacturing processes.

Because wear and tear consumes productive assets, net saving--as opposed to gross saving--is the commonly accepted measure of national saving. Net saving does not occur, productive assets do not increase, and future living standards are not improved when consumed assets are merely replaced.

Adjusting the Measure of Capital Consumption

The NIPA measure of net national saving differs from gross saving by the amount of new investment needed to replace the stocks of private fixed capital--plant, equipment, and housing--that have been consumed through obsolescence, physical deterioration, and accidents. Because new investment involves actual transactions between buyers and sellers in organized markets, estimates of investment can be obtained directly from these transactions.

Because the consumption of fixed capital does not involve actual transactions between buyers and sellers, however, estimates of capital consumption cannot be obtained in the same way. Instead, indirect methods of esti-

mating capital consumption must be used. These methods have evolved over the years, and official estimates of capital consumption are revised periodically as improved data and estimating techniques become available. Nevertheless, some research on capital consumption has suggested that official estimates might overstate the rate at which capital has been consumed. If so, the official estimate of national saving could overstate the decline in the net national saving rate. However, the amount of distortion appears to be modest.

Measuring Capital Consumption

All methods for determining the consumption of fixed capital require estimates of three elements: the division of the change in nominal investment expenditures into price changes and changes in quantities of real assets, the assets' useful lives, and their rates of depreciation during their lifetimes. In the first step of the methodology used in the NIPAs, changes in expenditures for investment are examined to determine what part of the change in purchase price of each type of asset reflects inflation and what part reflects quality improvements.[1] This step determines changes in prices and quantities of real investment adjusted for quality changes. For example, if all the price change from one year to another is judged to reflect improved quality, the entire increase in nominal expenditure on an asset is assumed to be an increase in quality-adjusted real investment.

In the second step, a distribution of useful lives is assigned to each type of asset based on past experience. For example, computers are assumed to last an average of seven years (about eight before 1991). However, not all computers purchased in a given year are assumed to last seven years. Instead, a few are assumed to last only three years, a few others as long as 11 years, and the lives of the remainder are assumed to be distributed in between these two extremes.

In the third step, the NIPA methodology assumes that each asset will depreciate by equal amounts every year over its assigned lifetime. This assumption implies, for example, that a computer with an original useful life of three years is two-thirds as productive in its second year of service as it was in its first year of service.

When the NIPA methodology is applied to all private plant, equipment, and housing, the three steps yield the NIPA measure of real capital consumption. This measure is then converted to nominal capital consumption, using the estimates of quality-adjusted prices of newly produced investment goods, and the result is subtracted from gross saving and investment to obtain net saving and investment.

Alternative estimates of capital consumption have been produced in studies using different assumptions in the three steps outlined above.[2] But because these studies are either focused on particular categories of investment goods, or are applied to a given time span, they do not permit a straightforward comparison of total capital consumption between the 1980s and earlier decades.

Alternative Estimates of Capital Consumption

Most of the increase during the 1980s in the conventional measure of capital consumption as a percentage of GNP occurred in the nonresidential sector, and equipment accounted for the largest part of the increase (see Table 6). Although the stock of equipment is smaller than the stock of structures, equipment tends to dominate total capital consumption be-

1. For further discussion of the methodology used in the NIPAs, see John Musgrave, "Fixed Reproducible Tangible Wealth in the United States, Revised Estimates," *Survey of Current Business*, vol. 72, no. 1 (January 1992), pp. 106-107; Department of Commerce, *Fixed Reproducible Tangible Wealth in the United States, 1925-1985* (June 1987).

2. For a discussion of this literature, see Dan Usher, ed., *The Measurement of Capital: Studies in Income and Wealth*, vol. 45 (Chicago: University of Chicago Press, for the National Bureau of Economic Research, 1980).

Table 6.
Nonresidential and Residential Capital Consumption as a Percentage of Gross National Product and Capital Stocks

Type of Capital Consumption	1960-1969	1970-1979	1980-1989	1990-1991
	As a Percentage of GNP			
Nonresidential				
Equipment	4.4	5.0	6.2	5.9
Structures	2.0	2.5	2.9	2.6
Residential	2.0	2.2	2.5	2.4
Total Capital Consumption	8.4	9.7	11.5	10.9
	As a Percentage of Capital Stocks			
Nonresidential				
Equipment	12.3	11.9	13.3	13.3
Structures	4.7	4.8	5.1	5.0
Residential	2.5	2.6	2.7	2.7

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

NOTE: The capital stocks in 1991, valued in billions of 1987 dollars, were $2,229 for nonresidential equipment, $2,595 for nonresidential structures, and $4,433 for residential capital. The entries for capital consumption as a percentage of capital stocks are for each type of capital stock not total capital stocks. In each case, they are calculated as averages, over the decade, of consumption within a year as a percentage of capital at the start of the same year.

cause it is consumed at more than twice the rate at which nonresidential structures are consumed, and at almost five times the rate at which residential capital is consumed. In addition, the rate of capital consumption for equipment increased faster than that for structures in the 1980s, primarily because rapid advances in technology shortened the useful life of equipment by hastening its rate of obsolescence.

Based on depreciation as a percentage of capital stock, the average life of equipment fell from eight years in the 1960s and 1970s, to seven and one-half years in the 1980s, and to only seven years at the start of the 1990s. As the useful life of an asset shortens, capital consumption tends to rise.

Alternative estimates of capital consumption for business equipment could affect the decline in the net national saving rate, but the available evidence points to only modest effects. Past studies have reported different capital consumption patterns for business equipment than that found in the NIPA measure.[3] More recently, a study by economist Robert Gordon of Northwestern University developed an estimate of quality-adjusted prices of durable goods that used a different methodology than that used in the NIPA.[4] Using his alternative estimates, Gordon found a slower increase in the capital consumption of equipment between the 1970s and early 1980s, compared with that found in the NIPA measure. However, Gordon's estimates produced only modest changes in the net national saving rate, lessening the decline between the 1970s and the 1980-1983 period by 0.6 percentage points compared with the conventional measure. This amount is not enough to

3. For a discussion of these studies, see Charles Hulten and Frank Wykoff, "The Measurement of Economic Depreciation," in Charles Hulten, ed., *Depreciation, Inflation, and the Taxation of Income from Capital* (Washington, D.C.: The Urban Institute, 1981).

4. Robert Gordon, *The Measurement of Durable Goods Prices*, National Bureau of Economic Research Monograph (Chicago: University of Chicago Press, for the National Bureau of Economic Research, 1990).

Table 7.
Net National Saving as Measured by National Income and Product Accounts and Gross National Saving Less Discards (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
National Income and Product Accounts	8.0	7.1	3.8	1.8
Gross Less Discards	10.7	11.1	8.2	5.4

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

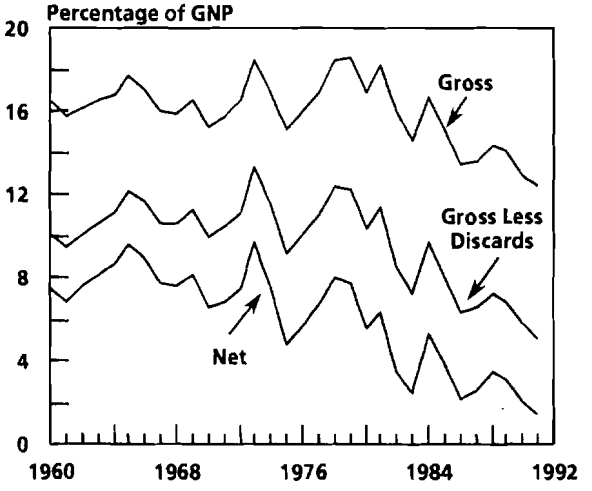
affect the significant decline of 2.7 percentage points that occurred in the conventional measure between those two periods.

Structures played a relatively minor role in the 1980s' increase in capital consumption as a percentage of GNP, and alternative estimates of their capital consumption probably would not be large enough to change the pattern of the national saving rate between the 1980s and earlier decades. The capital consumption estimates for structures are already low in relation to GNP, and alternative estimates would not likely be much lower. As a result, it is not evident that the measured decline in the national saving rate could be reversed by changes in this component of capital consumption.

Nevertheless, because the potential for mismeasuring capital consumption always exists, some analysts have suggested that the adequacy of saving might be evaluated by looking at gross saving, which does not reflect any subtraction for capital consumption.[5] In some cases, such as the international comparisons described in Chapter 1, this technique may be all that is feasible. But the approach does not seem appropriate for comparing the national saving rate over time within the United States because capital consumption, while not directly measurable, surely exists. A less extreme approach would be to examine gross saving minus assets that have been discarded.

Unlike the conventional measure of net national saving, that measure assumes that assets retain their full productivity until they are retired by assuming that annual depreciation is zero while the asset is in service. That measure also fell in the 1980s, though somewhat less precipitously, and is well below its 1980s average thus far into the 1990s (see Table 7 and Figure 3).

Figure 3.
National Saving Rate: Gross, Gross Less Discards, and Net, 1960-1991



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

Switching Investment-Type Goods from Consumption to Investment

Economists have long felt that conventional measures of saving and investment are incomplete because they omit important categories of spending that increase production and consumption possibilities. Measures of

5. For further discussion of this view, see *Economic Report of the President* (1990), p. 119.

saving and investment that include these categories improve the link between measured saving and the growth of living standards.

Some proposals would switch certain expenditures, now classified by the NIPAs as consumption, to saving and investment. Primary examples of those expenditures are consumer spending on durable goods; government spending on nonmilitary equipment and structures; and private and public spending on education, research, and development. Other proposals would broaden the measure of saving by expanding the measure of income for investment-type activities not included in the NIPAs. The major example is investment in human capital, such as when people give up current income to enter college or a trade school so that they may improve their future income and living standards.

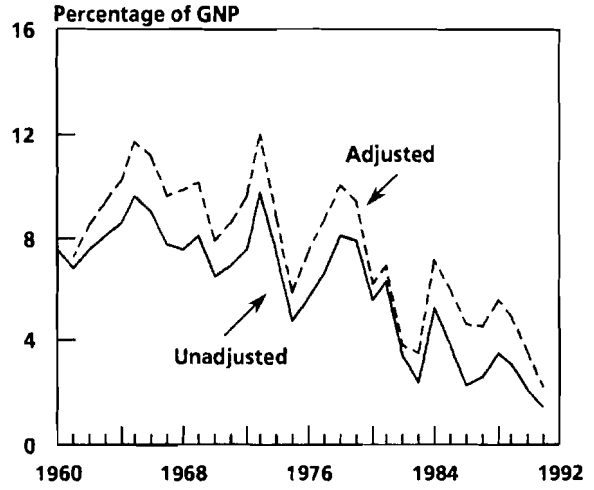
Three adjustments to the NIPAs are frequently proposed to alter the decline of the 1980s. The first two adjustments, for consumer durables and government capital expenditures, pose no new measurement problems and are relatively straightforward. The assets are tangible, they are purchased in organized markets, and data have been compiled back to 1925 for expenditures, prices, and capital consumption that allow net saving to be estimated. But the third adjustment, for human capital investment, poses measurement problems that can just as easily worsen as they can improve the quality of national saving measures. The assets associated with these expenditures are intangible, and measuring their stocks of capital, flows of services, and depreciation is imprecise and somewhat arbitrary.

Consumer Durable Goods

Durable goods purchased by consumers--automobiles, furniture, appliances, televisions, computers, books, and many others--provide services well beyond the time they are purchased. In some cases, such purchases may indirectly contribute to the growth of productivity by improving the quality of life. For these reasons many economists would include the purchases of these goods, net of depreciation, in saving and investment. By contrast, the NIPAs classify them as consumption.

Treating expenditures on durable goods by consumers as investment and saving, however, does not negate the decline in the net national saving rate in the 1980s. The adjusted net national saving rate declined by 3.6 percentage points between the 1970s and 1980s, slightly more than the 3.3 point decline in the conventionally measured national saving rate (see Figure 4). Consumer durables added 1.8 percentage points to the nation's saving rate in the 1970s and 1.5 points in the 1980s.

Figure 4.
NIPA Net National Saving Rate Adjusted for Consumer Durables



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

NOTE: NIPA = national income and product accounts.

Government Capital Expenditures

Government expenditures on equipment and structures--such as school buildings, bus and subway systems, highways and streets, sewers and water treatment facilities--also provide services that contribute to the nation's produc-

Table 8.
Net National Saving Rate Adjusted for Government Nonmilitary Investment (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
NIPA Net National Saving Rate	8.0	7.1	3.8	1.8
Adjustment for:				
Federal net investment	0.3	0.1	0.1	0.1
State and local net investment	1.7	1.0	0.5	0.7
Adjusted Net National Saving Rate	10.0	8.2	4.4	2.5

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

NOTE: NIPA = national income and product accounts.

tive potential over many years. The treatment of such expenditures will be changed from consumption to investment and saving if and when the United States adopts the United Nations System of National Accounts. Many other countries treat these expenditures as saving and investment.[6]

Adjusting national saving for government capital expenditures, however, does not alter the decline in the national saving rate during the 1980s. The adjusted net saving rate fell to about one-half the rate of saving in the 1970s, the same as the decline in the conventional measure (see Table 8).

A major reason for the similar drop in the adjusted saving rate was the decline--in relation to GNP--in expenditures on structures by state and local governments (although some of the expenditures were funded by federal revenues). Expenditures on structures have accounted for about 70 percent of all government spending for nonmilitary investment goods over the past four decades. The peak in such spending as a share of GNP was reached in 1969, with declines following in both the 1970s and 1980s.

The relative downturns of the past two decades were the result in part of slower growth of spending on such infrastructure as construction and repair of bridges and asphalt highways. Higher oil prices may have contributed to the slowdown of the 1970s by substantially increasing the cost of building roads. By the 1980s, however, real oil prices were back to 1973 levels, so that fluctuation would not account for reduced spending in the 1980s. Instead, the decline in the 1980s was partly influenced by the demographics of the baby boom, which reduced the need for new educational buildings.

The slowed growth of spending on infrastructure has been cited as one factor in the recent slowdown of productivity, and one that could also hold back a future increase in living standards. But how much of the low growth in productivity can be explained by the reduced growth of spending on infrastructure is a matter of dispute.[7]

Research and Development, Educational Services, and Human Capital

Private and public expenditures on research and development (R&D) and educational services such as teachers' salaries undoubtedly yield a stream of benefits long after the expenditures have been made.[8] Similarly, individuals' investments in education before en-

6. For a discussion of the System of National Accounts, see Carol Carson and Jeanette Honsa, "The United Nations System of National Accounts: An Introduction," *Survey of Current Business*, vol. 70, no. 6 (June 1990), pp. 20-30.

7. For further discussion of infrastructure spending, see Congressional Budget Office, *How Federal Spending for Infrastructure and Other Public Investments Affects the Economy* (July 1991).

8. For a recent discussion of the adjustments in this section, see Frank de Leeuw, "Interpreting Investment-to-Output Ratios: Nominal/Real, Net/Gross, Stock/Flow, Narrow/Broad," in Allan H. Meltzer, ed., *Unit Roots, Investment Measures and Other Essays*, Carnegie Rochester Conference Series on Public Policy, no. 32 (Amsterdam: North Holland Publishing Co., 1990), pp. 83-120.

Table 9.
Gross National Saving Rate Adjusted for Research and Development, Educational Services, and Students' Forgone Earnings (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	Change from 1980s to 1970s
Gross National Saving Rate	16.5	16.8	15.3	-1.5
Adjustment for:				
Research and development	2.7	2.3	2.6	0.3
Educational services	4.6	6.1	6.2	0.1
Students' forgone earnings	7.1	8.3	6.8	-1.5
Adjusted Gross National Saving Rate	30.9	33.5	30.9	-2.6

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Department of Education, and the National Science Foundation.

tering the work force also provide extra benefits in the future.[9] Economic research has found that such intangible investments are important in order to explain the growth in productivity that is not explained by tangible capital and measures of labor input such as hours worked.[10] But as noted earlier, constructing a measure of net saving that includes these expenditures requires estimates of capital consumption that cannot be easily defined or constructed. As a result, only measures of gross saving will be compared.

Adjusting the gross national saving rate for intangible investment expenditures has virtually no effect on the decline of saving in the 1980s. The adjusted measure fell to 92 percent of its level in the 1970s, compared with 91 percent for the conventional measure (see Table 9). Although spending on R&D and educational services rose slightly in the 1980s, increasing the adjusted measure, forgone earnings declined. Their decline reflected a drop in the student population during the 1980s as baby boomers graduated from school to the work force.

Adjusting Saving for Revaluations of Assets

The conventional measure of national saving and the adjusted measures that have been examined so far account for the change in assets from current saving and investment. But they leave out the change in assets attributable to changes in the prices of assets, or revaluations, that also might contribute to living standards. In order to bring the measure of saving into conformity with the change in assets, and presumably with the change in living standards, some economists have proposed adjusting national saving by including revaluations.[11] If the proposed adjustment is accepted, another issue arises about which

9. The use of students' forgone earnings to measure their investment in themselves is attributed to Theodore Schultz, "Capital Formation by Education," *Journal of Political Economy* (December 1960). For further discussion, see Gary Becker, *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education* (New York: National Bureau of Economic Research, 1964).

10. For a discussion of the role of intangible investment in economic growth, see Edward Denison, *Accounting for United States Economic Growth, 1948-1969* (Washington, D.C.: The Brookings Institution, 1974); John Kendrick and Elliot Grossman, *Productivity in the United States* (Baltimore, Md.: The Johns Hopkins University Press, 1980).

11. For further discussion, see Robert Eisner, "Capital Gains and Income: Real Changes in the Value of Capital in the United States, 1947-1977," in Dan Usher, ed., *The Measurement of Capital* (Chicago: The University of Chicago Press, 1980); David F. Bradford, "Market Value vs. Financial Accounting Measures of National Saving," NBER Working Paper no. 2906, (Cambridge, Mass.: National Bureau of Economic Research, March 1989).

method of measuring revaluations should be used, the prices of newly produced assets or the prices of the assets themselves.

Measured the first way, the adjusted saving rate fell substantially more than the conventional measure between the 1970s and 1980s. Measured the second way, the saving rate was virtually unchanged between the two decades, but showed enormous yearly variations that obscured underlying movements in the national saving rate.

Should Revaluations Be Included in Saving?

Because changes in national wealth come about through revaluations as well as through net saving from production, a measure of saving that includes revaluations would emphasize changes in national wealth as a gauge for future living standards. Revaluations affect the tangible part of wealth and the expected living standards of those who hold the assets.

Revaluations do not, however, always reflect a change in living standards, and including them could result in a measure of saving that sends confusing signals about future living standards.[12] Some types of revaluations, such as transitory swings in the stock market, may have little or no net effect on overall living standards. Other types--for example, revaluations of assets favored by new regulations restricting competition--would not necessarily improve future living standards throughout the economy. Still others, such as those produced by an increase in oil prices, could increase the value of some tangible assets but simultaneously reduce wealth by lowering future real wages and salaries.

The conventional measure, or one including consumer durables and government investment, lacks these disadvantages. It emphasizes changes in the economy's productive capital as the gauge for future living standards. The amount of such capital provides a clear measure of potential employment and income. Although revaluations can also affect future capital stocks by signaling a shift in production away from consumption goods and toward investment goods, they do not finance actual investment. Saving out of current production--the conventional measure--does finance investment. Revaluations can be used, however, to help explain what has happened to consumption and saving out of current production. For example, part of the decline in personal saving in the 1980s has been attributed to rises in stock market and real estate prices.

How Should Revaluations Be Measured?

Revaluations can be measured in one of two ways: by the prices at which existing assets can be replaced with newly produced capital goods, or by the prices of existing assets themselves, including the prices of shares traded in stock markets when the assets are held by corporations. Although these two types of prices should be closely related in the long run, they can exhibit very different behavior in the short term.[13]

In the short term, economic shocks can cause the two adjusted measures to move in opposite directions. For example, a supply shock such as an increase in oil prices could increase the measure based on the replacement price but reduce the measure based on existing asset prices; higher oil prices increase the price of newly produced investment goods but reduce the market value of firms hurt by higher oil prices. By contrast, technological advances that increase the efficiency of exist-

12. See Charles L. Schultze, "Of Wolves, Termites, and Pussycats or, Why We Should Worry About the Budget Deficit," *The Brookings Review* (Summer 1989), pp. 26-33.

13. For a discussion of the relationship between the two types of prices, see James Tobin and William Brainard, "Asset Markets and The Cost of Capital," in James Tobin, *The Papers of James Tobin*, vol. 3, *Essays in Economics: Theory and Policy* (Cambridge, Mass.: MIT Press, 1982).

ing capital could increase the measure using existing asset prices but reduce the replacement-price measure. Thus, the circumstances causing revaluations would determine whether an increase in either measure of saving has contributed to increased living standards.

Using replacement prices produces a measure of saving that is more variable than the conventional measure but considerably less volatile than the measure that uses prices of existing assets. The reason is that prices of goods continuously produced tend to be less variable than prices of existing assets, especially the prices of equity that represent shareholders' ownership of the assets. Although variability alone need not be an issue when choosing between saving measures adjusted for revaluations, the interpretation of such measures is nevertheless made difficult when increased variability is a permanent feature of the adjusted measure of saving.

What the Adjustment for Revaluations Shows

Adjusting the conventional measure of saving for each measure of revaluation produces adjusted saving measures that behaved very differently from each other and from the conventional measure of saving between the 1970s and 1980s (see Table 10 and Figure 5).

Table 10.
Net National Saving Rate Adjusted for Revaluations at Replacement Prices and at Prices of Existing Assets (As a percentage of gross national product)

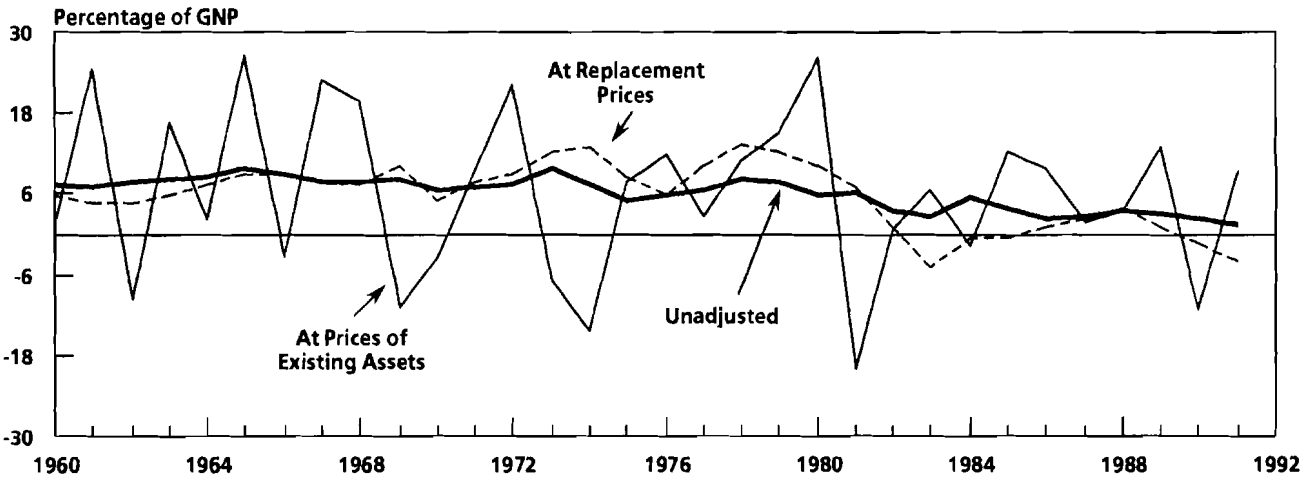
	1960-1969	1970-1979	1980-1989	1990-1991
NIPA Net National Saving Rate	8.0	7.1	3.8	1.8
Adjusted for Revaluations at:				
Replacement prices	7.1	9.6	2.0	-2.8
Prices of existing assets	8.9	5.5	5.1	-0.9

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

The measure using replacement prices fell substantially more than the conventional measure between the 1970s and 1980s, while that using the prices of existing assets was unchanged, but much lower than in the 1960s. Thus far in the 1990s, the two alternative

Figure 5.
NIPA Net National Saving Rate After Inflation-Adjusted Revaluations at Replacement Prices and at Prices of Existing Assets



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

Table 11.
Net National Saving Rate Adjusted for Consumer Durables, Government Investment, and Inflation-Adjusted Revaluations (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
NIPA Net National Saving Rate	8.0	7.1	3.8	1.8
Adjusted for:				
Consumer durables and government investment	11.5	9.9	5.9	3.6
Revaluations at:				
Replacement prices	10.7	12.9	3.5	-2.2
Prices of existing assets	12.3	9.6	6.0	-1.0

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

measures also have been negative. The revaluations included in each adjusted measure apply to investment goods in the conventional measure of saving with the effects of inflation removed.

The behavior of the measure using replacement prices during the 1970s and 1980s reveals the pitfalls of using measures that adjust for real revaluations. Its sharp decline in the 1980s reflected the greater impact of the slower inflation rate of the 1980s on the prices of residential and commercial structures, producers' durable equipment, and business inventories than on the overall level of prices. Prices of structures softened as the real estate boom ebbed and falling computer prices helped slow prices of durable equipment. Declines in many primary commodity prices added to the negative influence on prices of business inventories. This measure of the national saving rate rose substantially in the 1970s when rising prices of oil and other primary commodities boosted prices of new investment goods (including inventories). It would be paradoxical to conclude that living standards were helped by the boost in oil prices in the 1970s and hurt by the fall in computer prices in the 1980s.

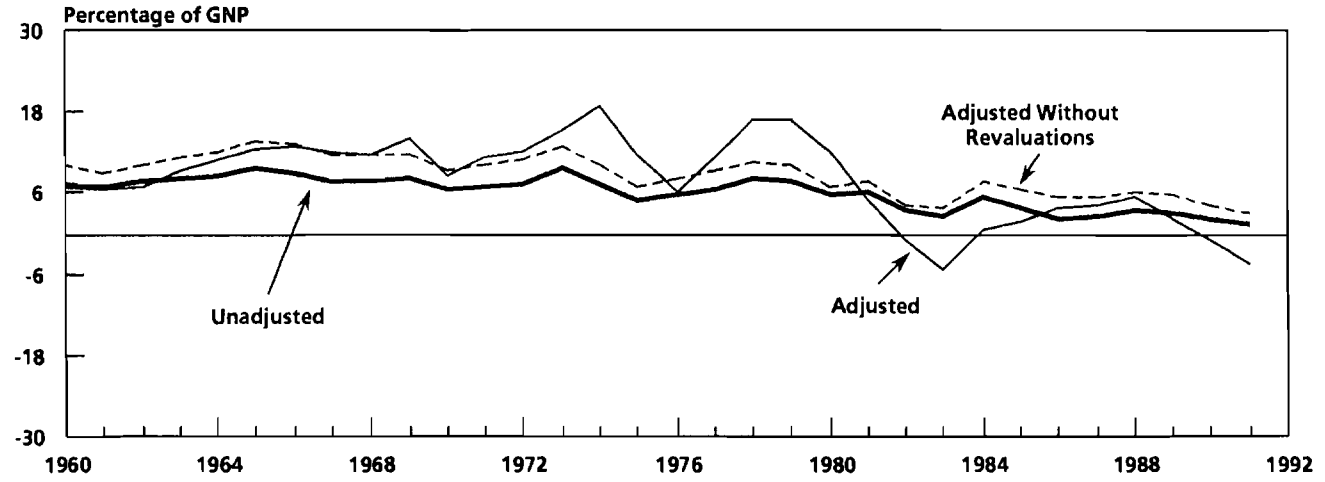
Revaluations based on the prices of existing assets, also adjusted for inflation, reduced national saving substantially in the 1970s and somewhat less in the 1980s, resulting in an unchanged adjusted measure for the two decades. Inflation, oil-price shocks, stock market declines, and the end of the real estate boom alternated in holding this measure down during the two decades. These real devaluations occasionally produced large, negative saving rates in the 1970s and 1980s that dominated decade averages.

This measure also showed considerable variability from year to year (see Figure 5). By contrast, the measure of saving using replacement prices was much less variable, since, as noted earlier, prices of newly produced goods tend to be less variable than prices of existing assets.

Combined Measures of the National Saving Rate

Combining the adjustments that have been examined separately would be relatively straightforward except for the absence of estimates on capital consumption for intangible investments in research and development, educational services, and human capital. As a result, the combined measures reported here

Figure 6.
NIPA Net National Saving Rate Adjusted for Consumer Durables, Government Investment, and Inflation-Adjusted Revaluations at Replacement Prices



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

omit these investments. However, studies that have constructed very broad measures of saving and included estimates of net saving from intangible investment in human capital suggest that even if intangible investment (net of capital consumption) were included, the decline in the saving rate would probably remain.[14]

Not suprisingly, combining adjustments that have been examined separately produces an adjusted measure of the national saving rate that also declined significantly during the 1980s (see Table 11 on page 17 and Figure 6). Adding consumer durables and government investment in nonmilitary structures and equipment produces a larger decline in the 1980s, compared with the conventional measure. Including real revaluations, constructed in either of the two ways previously described, also yields a relatively large decline in the 1980s. The revaluations are for wealth in the form of producers' equipment and structures, inventories, housing, durable goods owned by consumers, and all government nonmilitary equipment and structures. Although the measures adjusted for real revaluations omit wealth in the form of privately owned land, including those revaluations would not have altered the conclusions found here.

Conclusion

It seems clear that the national saving rate has declined significantly. The decline remains after adjusting the conventional measure for expenditures that it treats as consumption instead of investment and saving. These adjustments consisted of expenditures on durable goods by consumers; expenditures on nonmilitary investment-type goods by government; public and private expenditures on research, development, and educational services; and private investment in human capital.

14. For further discussion of this measure of saving, see Dale Jorgenson and Barbara Fraumeni, "The Accumulation of Human and Nonhuman Capital, 1948-84," in Robert E. Lipsey and Helen Stone Tice, eds., *The Measurement of Saving, Investment, and Wealth* (Chicago: University of Chicago Press, for the National Bureau of Economic Research, 1989), pp. 227-285.

Alternatives to the conventional measure of consumption of fixed capital are also unlikely to change the decline in the net national saving rate significantly. Problems in measuring capital consumption do exist, and they introduce errors in measuring net saving. Available evidence indicates, however, that alternative measures of capital consumption probably would only modestly affect the decline between earlier decades and the 1980s. Moreover, even if one assumes that capital retains its full efficiency until it is retired, the supposition does not alter the significance of the decline in the national saving rate during the 1980s and its even further decline thus far in the 1990s.

Including real revaluations in saving raises unresolved issues. In some respects, it might produce a measure of saving that more accurately reflects the change in wealth and the potential increase in living standards, although it can also give misleading signals. The existence of two different ways of measuring revaluations raises further doubts. One measure declined much more than the conventional measure and yielded paradoxical results about living standards and revaluations. The other measure declined somewhat less than the conventional measure between the 1970s and 1980s, but it showed enormous volatility that increased the difficulty of interpreting movements in the saving rate from one year to another, or even from one decade to another.

Chapter Three

Locating the Decline in the National Saving Rate

Although large federal deficits during the 1980s have been blamed for much of the decline in the national saving rate, the conventional measure examined in Chapter 1 showed that federal deficits and private saving contributed about equally to that decline. Even though the adjustments examined in Chapter 2 did not alter the significance of the overall decline, they could change its location because the adjustments affected national saving through its government, business, and household components.

Expenditures on investment goods by government and on durable goods by consumers are those for which depreciation measures are available to compute adjustments of net national saving. How are the relative contributions of government and private saving affected by those expenditures? And how are the relative contributions affected by adjustments that redistribute national saving without changing its level? One adjustment of this sort that has figured prominently in discussions of federal deficits affects measured flows of interest income and outlays. This adjustment strives to restate such flows from their nominal, contractual values to their current market values adjusted for inflation. It was not examined in Chapter 2 because it largely affects the distribution of national saving without noticeably affecting the overall national saving rate.

Alternative saving measures can also affect the way in which private saving is distributed between businesses and households. That distribution is important because business saving is a major source of funds for financing business investment, and household saving has accounted for more than one-half of net national saving over the past 30 years. Besides the adjustments already mentioned, an additional adjustment has been proposed that affects that distribution. It attempts to correct corporate contributions to defined-benefit pension plans for the possibility that such plans operate less like a retirement system and more like a system of transfer payments.

Other adjustments have been proposed that affect the distribution of a given amount of national saving among its government, personal, and business components, but they will not be examined here. An important one is changing the net contributions for Social Security and civil service pensions from government to household saving. Given the government's obligation to finance these programs, and the recognition that they have the formal characteristics of a system of transfer payments rather than those of a true retirement system, proposals to change their treatment from government to private saving have been rejected.[1] Although the programs probably affect individual saving motives, and should not

1. For further discussion of this issue, see Congressional Budget Office: *The Federal Deficit: Does It Measure the Government's Effect on National Saving?* (March 1990).

be ignored when diagnosing movements in personal saving, changing their treatment would seem to require changing their characteristics to those of a true retirement system.[2]

Reassessing Government and Private-Sector Contributions to the Decline in the National Saving Rate

The conventional measure of national saving showed that government and the private sector shared equally in the decline of the national saving rate during the 1980s. But the adjustments described in Chapter 2 and elsewhere suggest that government's share of the decline was even greater, amounting to about two-thirds of the decline in the adjusted measure of national saving. Consequently, the adjustments lessen the contribution of private saving to the decline in the national saving rate, from about one-half for the conventional measure, to about one-third for the adjusted measure.

Within the government sector, the federal government's share of the decline in the adjusted measure of national saving is virtually the same as its share in the decline of the conventional measure. By contrast, the contribution of state and local government is reversed, from providing a boost to the conventional measure, to sharing in the decline of the adjusted measure.

2. The federal government's Thrift Savings Plan is counted as part of private saving.

The Effect of Adjustments That Change National Saving

The adjustments for expenditures on investment goods by government and on durable goods by consumers do not change the distribution of the decline in the national saving rate between the government and private sectors from the 1970s to the 1980s. The adjusted rate of national saving declined by a larger amount than the conventional measure, and declines in government investment and consumer durables relative to gross national product each contributed about equally to the additional decline of the adjusted measure (see Table 12). Reduced spending on investment-type goods by state and local government in relation to GNP accounted for all of the additional decline in the rate of saving by government.

The Effect of Adjustments That Mostly Redistribute National Saving Between the Government and Private Sectors

Two types of adjustments have figured prominently in discussions of government and private saving. The first attempts to restate the flows of interest income and outlays from nominal to inflation-adjusted values. The second attempts to include capital gains and losses on interest-bearing assets. Taken together, the two types are really separate parts of an adjustment that attempts to measure the real economic value of interest flows rather than their nominal book value. Because the interest income received by one sector is paid by other sectors, the adjustment tends to leave national saving unchanged while altering its distribution among the personal, business, and government sectors. Interest flows taking place between the United States and the rest of the world are an exception. To the extent that they are a factor, the adjustment can change the national saving rate as well.

Table 12.
Contributions of Government and Private Sectors to the Decline in Adjusted National Saving (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
Federal Government Saving				
NIPA	-0.2	-1.7	-3.6	-3.3
Adjustment for:				
Nonmilitary investment	0.3	0.1	0.1	0.1
Inflation	0.6	1.4	1.3	1.8
Market value of federal debt	0	0	-0.3	-0.8
Adjusted federal saving	0.7	-0.3	-2.5	-2.2
State and Local Government Saving				
NIPA	0	0.8	1.0	0.4
Adjustment for:				
Nonmilitary investment	1.7	1.0	0.5	0.7
Inflation	0	-0.3	-0.4	-0.5
Market value of federal debt	0	0	0	0.2
Adjusted state and local saving	1.7	1.5	1.1	0.8
Total Government Saving				
NIPA	-0.1	-0.9	-2.6	-2.9
Adjustment for:				
Nonmilitary investment	2.0	1.0	0.6	0.8
Inflation and market value	0.6	1.1	0.6	0.7
Adjusted government saving	2.5	1.2	-1.4	-1.4
Total Private Saving				
NIPA	8.2	8.0	6.3	4.7
Adjustment for:				
Consumer durables	1.7	1.8	1.5	1.0
Inflation	-0.6	-1.0	-0.7	-0.8
Market value of federal debt	0	0	0.2	0.5
Adjusted private saving	9.3	8.9	7.3	5.3
Net National Saving				
NIPA	8.0	7.1	3.8	1.8
Adjustment for:				
Government nonmilitary investment and consumer durables	3.7	2.8	2.1	1.8
Inflation and market value (Equals adjustment to net foreign investment)	0	0	0.1	0.4
Adjusted national saving	11.7	9.9	6.0	4.0

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

Adjusting Interest Flows for Inflation. This adjustment views interest payments as consisting of an inflation premium plus a real premium that would be paid for the use of money even if inflation was zero. The inflation premium, however, is viewed as repayment of principal to compensate for the loss of purchasing power. Thus, the inflation premium should be added to saving of the sector making interest payments because debt repayment is saving. For the same reason, it should be subtracted from saving of the sector receiving interest payments because it represents recapture of principal rather than receipt of income. The adjustment tends to reduce the saving of sectors that are net recipients of interest flows, such as individuals and state and local governments, and increase the saving of net payers of interest such as the federal government. As a result, the adjustment does not change the combined saving of those paying and those receiving interest, but does redistribute saving between them.

Adjusting Federal Debt for Capital Gains and Losses. This adjustment has figured prominently in discussions about properly measuring the federal deficit.[3] It views contractual payments of interest by the federal government, and receipts of such interest by sectors holding the debt, as an incomplete measure of interest flows, because the total return or cost would also include capital gains and losses on the debt.

For example, the interest payment stipulated in a Treasury bond is set when the bond is issued. The government reports this contractual payment as interest expense throughout the life of the bond. After the bond is issued, however, subsequent changes in market rates of interest will cause the price of the bond to fluctuate. The bond will rise in price if interest rates fall, adding to the total return; it will fall in price if interest rates rise, reducing total return. When interest rates are rising, the adjustment tends to reduce the saving attributed to sectors holding federal debt and to increase saving attributed to the federal government. The adjustment is made by subtracting from federal government saving (or adding to the deficit) the product of the change in the market price of debt and the par value of debt held by the public. The offsetting adjustment is distributed among the other sectors according to the share of federal debt they held in each year.

The Effect of the Two Adjustments. Taken together, these two adjustments increase the government's contribution to the decline in the national saving rate between the 1970s and 1980s, adding an additional decline of one-half of one percentage point (see Table 12).

The inflation adjustment increased government's contribution to the decline in the national saving rate. It had little effect on the federal government's contribution because lower inflation in the 1980s was all but offset by the much larger interest payments associated with the increased federal debt. The adjustment slightly increased the contribution of state and local governments to the decline in national saving. Although inflation was lower in the 1980s than it was in the 1970s, the adjustment had an adverse effect because it was applied to higher interest income from the much larger assets in state and local pensions in the 1980s than in the 1970s. The overall increase in government's contribution as a result of the adjustment was more than offset by the adjustment to private saving, implying that adjusted national saving was improved through an upward adjustment to net foreign investment.

The adjustment for capital gains and losses increased the share of the decline in national saving attributed to the federal government during the 1980s. Interest rates were lower in the 1980s than in the 1970s, thus raising the price of debt instruments that had been issued in the past, and producing capital losses for the federal government. These losses were only partially offset by corresponding capital gains in the private sector. Some of the

3. See Robert Eisner, *How Real Is the Federal Deficit?* (New York: The Free Press, 1986).

federal debt is held abroad. Therefore, foreigners reaped some of the capital gains from lower interest rates.

Effects on the Location of the Decline in the National Saving Rate

The adjustments outlined in Chapter 2, and those introduced in this chapter, could increase the share of the decline in the national saving rate between the 1970s and 1980s that can be attributed to government from about one-half to two-thirds. The change reflects two factors: the decline in government investment, particularly by state and local governments, and the reduction in the inflation tax on interest flows caused by lower inflation in the 1980s. Since the conventional deficit has remained large thus far into the 1990s, and the outlook is for lower inflation than in the past, government's contribution to low rates of national saving will persist throughout this decade, unless public policies toward the deficit are changed.

Business and Personal Contributions to the Decline in the National Saving Rate

According to the conventional measure of saving, businesses and individuals shared about equally in the decline of national saving between the 1970s and 1980s. The adjustments already described, plus an additional adjustment described here, suggest that while business' share of the decline is about the same, the personal sector's share might have been even smaller than that found in the conventional measure--about only 13 percent instead of almost 25 percent. The additional adjustment that has been proposed does not change private saving but does change its distribution between businesses and households. The focus of this adjustment is on the treatment of defined-benefit pension plans that companies offer their employees.[4]

The Effect of Adjusting for Consumer Durables, Inflation, and the Market Value of Federal Debt

These adjustments do not change the decline in personal saving. Instead, they lessen the decline in business saving relative to GNP. For households, the additional decline from reduced spending on consumer durables between the 1970s and 1980s is virtually offset by the inflation adjustment (see Table 13). Household saving benefited from the inflation component of the adjustment, mainly because lower inflation in the 1980s meant less of a loss of real interest income from inflation. By contrast, business saving benefited mostly from the market-value adjustment because businesses hold a substantial amount of federal debt.

Adjusting for Defined-Benefit Retirement Plans

In the conventional measure of saving, corporate contributions to pension plans are treated as an outlay by business that reduces business saving, and as income of households that adds to personal saving.[5] But about two-thirds of business pension assets are in defined-benefit plans. Benefits from these plans

4. Another adjustment has been proposed. It attempts to correct dividend payments by businesses for the effects of equity retirements. Such retirements are often seen as a way to pay dividends without incurring the double taxation commonly attributed to the payment of ordinary dividends. However, this adjustment is omitted because it requires detailed information that is not available. Moreover, conceptual problems raise measurement issues analogous to those for making adjustments for capital gains on real assets.

5. For further discussion of this adjustment, see James Poterba, "Tax Policy and Corporate Saving," *Brookings Papers on Economic Activity*, no. 2 (1987), pp. 455-503.

Table 13.
Contributions of Business and Personal Saving to the Decline in Adjusted Private Saving (As a percentage of gross national product)

	1960-1969	1970-1979	1980-1989	1990-1991
Business Saving				
NIPA	3.5	2.6	1.6	1.3
Adjustment for:				
Defined-benefit pensions	0.7	1.1	0.9	0.5
Inflation	0	0.3	0.2	-0.1
Market value of federal debt	0	0	0.2	0.4
Adjusted business saving	4.2	4.0	2.9	2.1
Personal Saving				
NIPA	4.7	5.5	4.7	3.3
Adjustment for:				
Defined-benefit pensions	-0.7	-1.1	-0.9	-0.5
Inflation	-0.6	-1.3	-0.9	-0.7
Market value of federal debt	0	0	0	0.1
Durable consumer goods	1.7	1.8	1.5	1.0
Adjusted personal saving	5.1	4.9	4.4	3.2
Total Private Saving				
NIPA	8.2	8.0	6.3	4.7
Adjusted	9.3	8.9	7.3	5.3

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Department of Labor, the Federal Reserve Board of Governors, and the Federal Reserve Bank of Dallas.

NOTE: NIPA = national income and product accounts.

typically depend on a worker's length of service and pay, rather than on the plan's accumulated assets. Because these benefits are independent of a plan's assets, the assets can be viewed as belonging to the business, and net contributions and earnings of such plans could be treated as business saving.[6] At the same time, however, it would be an oversimplification to treat all defined-benefit accumulations in this way because employers frequently substitute pension plans and accruals in their plans for higher wages.[7] Therefore, the plans could reflect personal saving by corporations on individuals' behalf. In this respect, the adjustment introduces measurement errors that may worsen as well as improve the measurement of business and household saving.

The adjustment for defined-benefit retirement plans worsens the decline in business saving in relation to GNP during the 1980s, with an equal and offsetting improvement to the decline in household saving (see Table 13). The adjustment produces a decline in business saving for two reasons: first, business contributions to such plans were increased during the 1970s by more stringent funding standards applied by the Employee Retirement Income Security Act of 1974, as well as by the poor performance of the stock market; second, the plans required fewer contributions during the 1980s because the bull market in stocks built up the plans' value of assets. Many plans could cover accruing liabilities to retirees without adding funds. (In this instance, capital gains had an indirect effect on conventional measures of saving.)

6. For more discussion of this point, see Douglas Bernheim and John Shoven, "Pension Funding and Saving," in Zvi Bodie, John Shoven, and David Wise, eds., *Pensions in the U.S. Economy* (Chicago: University of Chicago Press, 1988), pp.85-114

7. For additional discussion on this point, see Jeremy Bulow and Myron Scholes, "Who Owns the Assets in a Defined-Benefit Pension Plan?" in Zvi Bodie and John Shoven, eds., *Financial Aspects of the United States Pension System* (Chicago: University of Chicago Press, 1983), pp. 17-36.

The Combined Effects on Business and Household Saving

Combining these adjustments, business saving accounted for about the same share of the decline in the national saving rate during the 1980s, although it did account for a much larger share of the decline in the private saving rate. The adjustments for defined-benefit pensions, inflation, and market value produce a change in the adjusted measure of business saving that is virtually the same as the change in the conventional measure. But the adjustments lessen the decline in household saving by almost one-half. As a result, the business share of the decline in the private saving rate rose from slightly over one-half of the decline in the conventional measure of private saving to just under three-fourths of the decline in the adjusted measure. This shift also meant that personal saving became even more important for net national saving during the 1980s, and thus far in the 1990s, than it was during the 1970s.

Conclusion

The adjustments for government investment and purchases of durable goods by consumers that were introduced in Chapter 2, together with other adjustments explained in this chapter, suggest that government deficits accounted for much more of the decline in the national saving rate between the 1970s and 1980s than is found in the conventional measure of saving. The adjustments raise the government's contribution to the decline from about one-half for the conventional measure to about two-thirds for the adjusted measure. Apart from the adjustments (see Chapter 2) that raise national saving through its government and private components, the other adjustments outlined in this chapter redistribute saving from government to the private sector.

Of the two other adjustments, one restates interest flows in terms adjusted for inflation and current market value of federal debt. It lessened the contribution of private saving to the decline of national saving in the 1980s at the expense of increasing the contribution of government saving to the decline. The other adjustment redistributes private saving from businesses to households, increasing the business sector's and reducing the household sector's contribution to the decline. As a result, after government, businesses were the next largest contributor to the decline in the national saving rate. Consequently, household saving emerged--even more than in the past two decades--as the major source of national saving.

Chapter Four

Assessing the Behavior of Personal Saving

With the onset of larger federal deficits and a lower rate of business saving, personal saving by households has become an even more important source of national saving than it was before the 1980s. Although personal saving contributed least to the decline in the national saving rate, why did it not increase and offset larger deficits and lower business saving? According to one widely accepted theory, personal saving should have increased to offset some and perhaps all of the decline in corporate saving. This theory, which has been called "Denison's Law," assumes for example that if a corporation saves an extra dollar of retained earnings, households will factor this into an increase in the value of their equity claims on the corporation and increase their consumption by a fraction of their increased wealth.[1]

According to another, but less widely accepted, theory, personal saving also should have increased by enough to offset the large increase in government deficits. This theory, which has been called "Ricardian Equivalence," assumes that the private sector takes future government policies into account, and its theoretical and empirical status have been hotly debated.[2] But, as shown in Chapter 3, both the conventional and adjusted measures of personal saving also declined as percentages of gross national product, apparently failing to satisfy the expectations of either theory. When analyzing personal saving, however, economists typically focus on it as a percentage of personal disposable income--the personal saving rate.

Even so, the conventional measure of the personal saving rate also declined significantly during the 1980s, and the adjustments to personal saving described in Chapter 3 do not eliminate the decline (see Table 14 and Figure 7). The adjustments are for consumer durables, inflation, the market value of federal debt held by individuals, and the contributions of corporate business to defined-benefit pension plans.

As discussed in Chapter 3, the first adjustment changes both personal and national saving, while the remaining adjustments change personal saving mostly through offsetting changes to those government and business sectors that leave national saving unaffected. Therefore, like the conventional measure, the adjusted measure of the personal saving rate also declined in the 1980s. Its movement did not suggest that the household sector offset either increased government deficits or reduced business saving.

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1. See Edward F. Denison, "A Note on Private Saving," *Review of Economics and Statistics*, vol. 15 (August 1958), pp. 261-67; and Paul David and John Scadding, "Ultrarationality, Aggregation, and 'Denison's Law'," *Journal of Political Economy*, vol. 82, no. 2, part I (March/April 1974), pp. 225-250. For a recent discussion, see Patrick Hendershott and Joe Peek, "Aggregate U.S. Private Saving: Conceptual Measures," in Robert E. Lipsey and Helen Stone Tice, eds., *The Measurement of Saving, Investment, and Wealth* (Chicago: University of Chicago Press, for the National Bureau of Economic Research, 1989), pp.185-226.

2. For further discussion, see Robert J. Barro, "The Public Debt," in *Macroeconomics* (New York: John Wiley & Sons, Inc., 1987). For a critical survey, see B. Douglas Bernheim, "Ricardian Equivalence: An Evaluation of Theory and Evidence," in Stanley Fischer, ed., *Macroeconomics Annual 1987* (Cambridge, Mass.: MIT Press, 1987), pp. 263-315.

Table 14.
NIPA and Adjusted Measures of Personal Saving as a Percentage of Personal Disposable Income

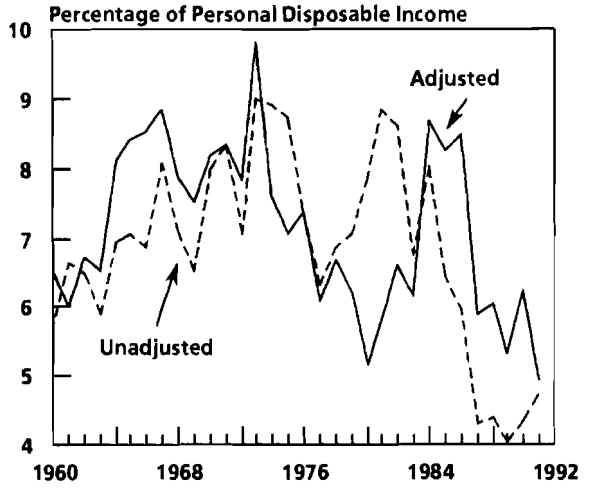
	1960-1969	1970-1979	1980-1989	1990-1991
NIPA Personal Saving Rate	6.7	7.7	6.5	4.5
Adjustment for:				
Consumer durables	2.2	2.4	2.1	1.4
Inflation	-0.8	-1.9	-1.2	-1.0
Market value of federal debt	0.0	0.0	0.0	-0.1
Defined-benefit pension plans	-1.0	-1.5	-1.3	-0.7
Adjusted Personal Saving Rate	7.1	6.7	6.1	4.2

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Department of Labor, the Federal Reserve Board of Governors, and the Federal Reserve Bank of Dallas.

NOTES: NIPA = national income and product accounts.

Why did the personal saving rate decline in defiance of the two theories mentioned above and remain even below its 1980s average thus far into the 1990s? To address this question, economists typically look at several key factors that may help to explain the behavior of personal saving such as wealth, income, inflation, real interest rates, and demographics. Perhaps these factors caused the personal saving rate to decline in the 1980s and enter the 1990s at a level even below its average in the 1980s. These same factors might also help to answer another question: will the personal saving rate improve as this decade unfolds?

Figure 7.
NIPA Personal Saving Rate Adjusted for Consumer Durables, Inflation, Defined-Benefit Pension Plans, and Market Value of Federal Debt



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Federal Reserve Board of Governors, the Department of Labor, and the Federal Reserve Bank of Dallas.

What Factors Reduced the Personal Saving Rate?

Both measures of the personal saving rate declined in the 1980s, and most of the decline came after the middle of the decade. The conventional measure started in 1985, and the adjusted measure started in 1987 (see Figure 7). Standard theories of personal saving should indicate why the personal saving rate declined and why the household sector has continued to save at such low rates (see Box 2). Based on these theories, three factors could account for the magnitude and timing of the decline in the personal saving rate--namely, wealth, income, and inflation.

Two additional factors that have received much attention--real interest rates and changes in the age distribution of the

Box 2.
Factors Determining Personal Saving

Standard theories of personal saving behavior suggest three primary, related motives.[1]

First is the *life-cycle motive*. This theory suggests that individuals will strive for a stable consumption path during working and retirement years. It implies that saving should depend on such factors as existing wealth, expected earnings from employment and real returns to wealth, inflation, taxes and transfers, age, expected life span, and planned retirement age. The theory also suggests that individuals will save little during their first years in the labor force, instead borrowing against the incomes they expect from their peak earning years. Similarly, individuals will save little in retirement, instead drawing down their accumulated saving.

Second is the *precautionary motive* of saving to hedge against unpredictable events such as worse-than-expected inflation, unemployment, or the possibility of large medical expenditures. It implies that saving will depend on the degree of uncertainty individuals perceive and their attitude toward risk. This motive is also related to the first since increased inflation uncertainty, the possibility of unemployment, or large medical expenditures may disrupt planned consumption, and saving is one way to protect in advance against such events.

Third is the *bequest motive* of providing for one's heirs. It implies that saving will extend beyond the working and into the retirement years as well. This motive is related to the first and second because bequests may be planned so that one's heirs may also achieve a stable consumption path, or bequests may be unplanned as a consequence of the uncertainty of a person's life span.

Government policies can influence personal saving through each of the three saving motives. The life-cycle motive can be affected by government retirement and transfer programs and by tax and macroeconomic stabilization policies. Retirement and transfer programs reduce other forms of personal saving by an amount depending in part on perceived benefits and how the programs are funded. Tax and macroeconomic stabilization policies influence such factors as expected earnings and after-tax returns from wealth. The precautionary motive can be affected by government insurance and retirement programs as well as by many other government policies. For example, social insurance programs reduce the need to save in advance for unpredictable events such as unemployment, major medical expenses, or natural disasters. Government retirement programs such as Social Security eliminate the need for maintaining enough personally accumulated wealth for hedging against uncertain life spans. Tax and stabilization policies influence uncertainty about future income and returns on assets. The bequest motive can be affected by tax policies such as estate and gift taxes, which directly influence saving for bequests.

Although the theoretical factors determining saving suggest that personal saving behavior is well understood, empirical research suggests that much of that behavior remains one of the most unsettled areas of empirical economics. For example, economists disagree about how far into the future consumers plan, the responsiveness of saving to rates of return on wealth, and how much private saving is reduced by the Social Security retirement program.

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1. The life-cycle theory is attributed to Franco Modigliani and Richard Brumberg, "Utility Analysis and the Consumption Function," in Kenneth K. Kurihara, ed., *Post-Keynesian Economics* (New Brunswick, N.J.: Rutgers University Press, 1954). Closely associated with the life-cycle theory is the permanent-income theory attributed to Milton Friedman, *A Theory of the Consumption Function* (Princeton, N.J.: Princeton University Press, 1957). An extensive treatment of the theory and empirical research on saving is provided in Laurence J. Kotlikoff, *What Determines Saving?* (Cambridge, Mass: MIT Press, 1989).

Table 15.
Personal Saving Rate, Wealth-to-Income Ratio, and Debt-to-Wealth Ratio (Percent)

	1960-1969	1970-1979	1980-1989	1980-1984	1985-1989
NIPA Personal Saving Rate	6.7	7.7	6.5	8.0	5.0
Wealth-to-Income Ratio	502	460	483	479	488
Debt-to-Wealth Ratio	13.4	14.9	16.8	15.4	18.2

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce and the Federal Reserve Board of Governors.

NOTE: NIPA = national income and product accounts.

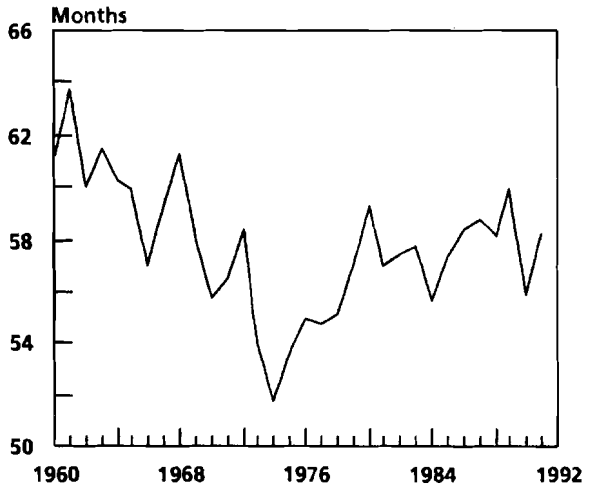
population--played a less certain role in the decline. Other factors might also have affected the decline, but their role is even less certain.

The Roles of Wealth and Income

According to standard theories of saving, individuals tend to reduce their rate of saving when their level of wealth rises in relation to income. That kind of behavior may have been responsible for a substantial part of the decline in the personal saving rate between the 1970s and 1980s. Revaluations of assets accounted for about three-fifths of the growth of wealth in the 1980s, primarily as a result of the real estate and stock market booms. Consequently, individuals could leverage their financial position by borrowing against higher wealth and use the proceeds of loans to finance expenditures on consumption as well as on housing and durable goods. This would have induced many individuals to increase the ratio of debt to wealth and to reduce their rate of saving out of personal disposable income in the 1980s.

Changes in the wealth-to-income ratio appear to explain a large part of the decline of the 1980s, but they may not explain the timing of the decline. Between the 1970s and 1980s, the ratio of wealth to personal disposable income rose from 460 percent to 483 percent (see Table 15). This represents an increase in wealth from 55 months to 58 months of income, or one-fourth of one year's income. The historical evidence suggests that an increase of this magnitude should lower the conventional measure of the personal saving rate by 1 percentage point. Since the conventional measure declined by 1.1 percentage points between the 1970s and 1980s, the wealth-to-income effect apparently accounted for about nine-tenths of the decline in the personal saving rate during the 1980s. At the same time however, the change in the wealth-to-income ratio explains only one-sixth of the decline between 1984 and 1989, the years when the most of the decline in the personal saving rate took place (see Figure 8).

Figure 8.
Personal Wealth in Months of Disposable Income, 1960-1991



SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce; Federal Reserve Board of Governors.

NOTE: Months of disposable income is calculated as the ratio of wealth at the beginning of a year to average monthly income during that year.

Table 16.
Personal Saving and Personal Saving Adjusted for Inflation
(As a percentage of personal disposable income)

	1960-1969	1970-1979	1980-1989	1980-1984	1985-1989
Personal Saving Rate					
NIPA	6.7	7.7	6.5	8.0	5.0
Adjusted for inflation	5.9	5.8	5.3	6.4	4.2
Memorandum:					
Inflation	2.3	7.1	5.5	7.5	3.6

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

NOTES: NIPA = national income and product accounts.

Inflation is measured by the annual percentage change in the consumer price index.

Although the wealth-to-income ratio is less revealing about the timing of the decline in the personal saving rate, the surge in the debt-to-wealth ratio that accompanied the decline in the 1985-1989 period may indicate an explanation (see Table 15). The relative increase in debt suggests that consumers were confident enough about their future income prospects to leverage their wealth in this way. Because of the surge in personal income during the relatively strong recovery from the 1981-1982 recession, consumers may have become more confident that personal income would continue growing. They could then have felt comfortable in reducing their rate of saving by spending a greater percentage of current income and adding to their debt. Surveys of consumer confidence showed a surge in 1984 and 1985, and expectations continued at a high level through the end of the decade. In the past, the personal saving rate has tended to decline when consumer confidence rose, and that pattern was repeated once again during the last half of the 1980s. In 1990 and 1991, as the economy struggled with recession and slow recovery, the pattern continued; falling consumer confidence was linked to a rise in the personal saving rate.

The Role of Inflation

Standard theories of saving suggest that inflation should affect the conventional measure of the personal saving rate.[3] As discussed in Chapter 3, the conventional measure records the inflation component of interest payments as income, but it is more consistent with standard economic theories to regard it as a return of principal to compensate for inflation's effect on the purchasing power of funds loaned out. The conventional measure therefore tends to move in the same direction as inflation, especially when rates of inflation are high. By contrast, the adjusted measure that removes the effects of inflation has not always moved in the same direction as the inflation rate. It fell slightly between the 1960s and 1970s when inflation rose significantly, and it fell between the first and second half of the 1980s when inflation fell (see Table 16).

The Role of Real Rates of Return on Saving

Real rates of return on wealth were much higher in the 1980s than in the 1970s, but both the theory of saving and empirical evidence are ambiguous about how increased returns would have affected the personal saving rate. As a result, the role played by real rates

3. For further discussion, see Gregory Jump, "Interest Rates, Inflation Expectations, and Spurious Elements in Measured Real Income and Saving," *American Economic Review*, vol. 70, no. 5 (December 1980), pp. 990-1,004.

Table 17.
Real Personal Saving Rate, Real Interest Rate, and Stock Market Returns (Percent)

	1960-1969	1970-1979	1980-1989	1980-1984	1985-1989
Real NIPA Personal Saving Rate	5.9	5.8	5.3	6.4	4.2
Real Three-Month Treasury Bill Rate	1.7	-0.5	3.8	4.6	3.1
Standard and Poor's 500 Stocks					
Dividend yield	3.2	4.1	4.3	5.1	3.1
Real appreciation	2.6	-5.4	6.8	2.1	11.4

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce, the Federal Reserve Board, and Standard and Poor's.

NOTE: NIPA = national income and product accounts.

of return in the decline in the personal rate remains uncertain.

Standard theories of saving indicate an ambiguous response of saving to an increase in real rates of return. In the simplest case, this ambiguity arises from what economists call the negative-wealth effect and the positive-substitution effect on saving from increased real rates of return. Higher real returns allow increased consumption and lower saving without eating into one's wealth--the negative-wealth effect between saving and real rates of return. But increased real returns also mean that each dollar not consumed in the present enables even greater consumption in the future--the positive-substitution effect of real rates of return on saving. In order for higher real returns to increase the rate of personal saving, the substitution effect must dominate the wealth effect, but standard theories suggest that either can dominate individuals' behavior. This suggests that the connection between the personal saving rate and real rates of return on saving can sometimes be positive, other times negative, and at still other times seemingly unrelated.[4]

The empirical evidence reflects the ambiguity about saving's response to real rates of return. Although the response has been estimated to be large and positive by a few analysts, and negative by a few others, most analysts have found the response to be small.[5] During the last 30 years, for example, the real rate of interest moved over a much wider range than did the personal saving rate. At times the real rate has moved in a direction opposite to the personal saving rate. For example, during the 1980s, real rates of interest and stock market yields both averaged higher than in the 1970s, even though the average of the personal saving rate declined (see Table 17).

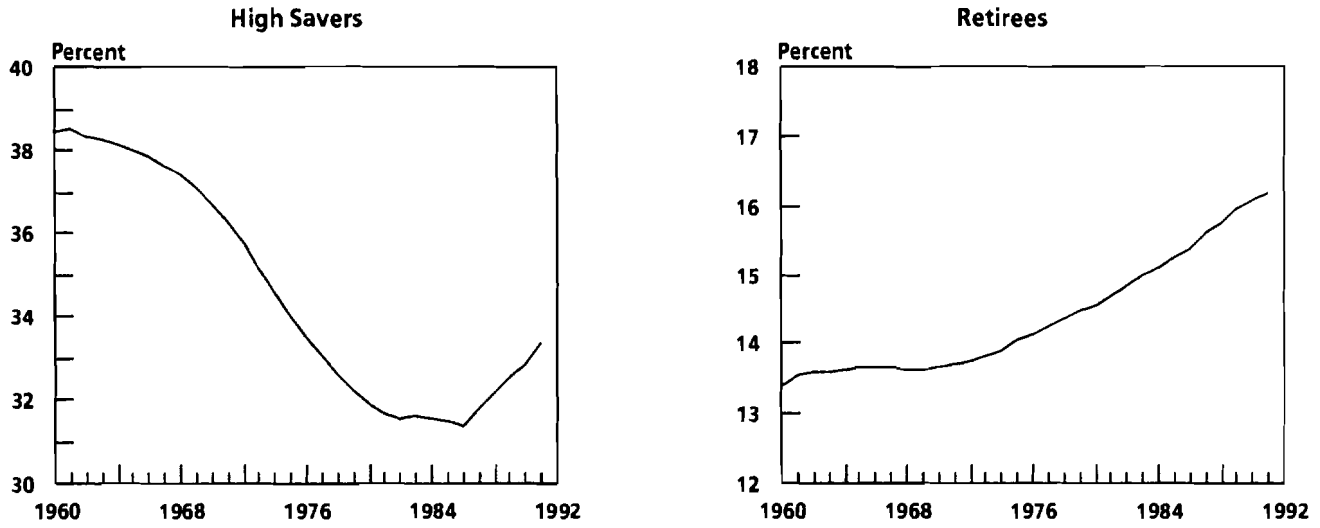
Demographic Influences on the Personal Saving Rate

Standard theories of saving point to two shifts in the population that might have contributed to the decline in the personal saving rate in the 1980s: the declining percentage of people

4. For additional discussion of the ambiguity of the relationship between saving and real rates of return, see Franco Modigliani, "Life Cycle, Individual Thrift, and the Wealth of Nations," *American Economic Review*, vol. 76, no. 3 (June 1986), pp. 297-313; Owen Evans, "Tax Policy, the Interest Elasticity of Saving, and Capital Accumulation: Numerical Analysis of Theoretical Models," *American Economic Review*, vol. 73, no. 3 (June 1983), pp. 398-410.

5. For example, see Michael Boskin, "Taxation, Saving, and the Rate of Interest," *Journal of Political Economy*, vol. 86, no. 2, part 2 (April 1978), pp. S3-S27; Irwin Friend and Joel Hasbrouck, "Saving and After-Tax Rates of Return," *Review of Economics and Statistics*, vol. 65, no. 4 (November 1983), pp. 537-543.

Figure 9.
High Savers and Retirees as a Percentage of Adult Population



SOURCE: Congressional Budget Office calculations based on data from the Bureau of the Census.

NOTES: High savers are people aged 45 to 64; retirees are people aged 65 and older; adult population comprises people aged 15 and older.

between the ages of 45 and 64, and the rising percentage of those in their retirement years (see Figure 9). Members of the first group are thought to save the largest amount of their income from employment and past savings because they are much closer to retirement, a time when they will be dependent on accumulated savings to maintain their living standard. In fact, retirees may not even save at all, although the empirical evidence is not clear on this point.

But although these two shifts in the population could have played a role in the decline, empirical research has yielded only skepticism. Studies suggest that saving rates do not differ enough between the two age groups to account for the decline.[6] Furthermore, the changes started occurring between the late 1960s and early 1970s. This time span is much earlier than the beginning of the decline in the personal saving rate. People considered to be peak savers, those roughly between the ages of 40 and 65, declined as a percentage of the adult population from the late 1960s until the middle 1980s. Those individuals in retirement have increased steadily from the early 1970s. A third reason for the skepticism is that the two demographic shifts were too small. Standard theories suggest that shifts would have had to have been larger to affect the decline in the overall rate of personal saving significantly.[7]

In any case, both changes could still have accounted for part of the decline, although the issue of how much remains unresolved. The predominance of the wealth and income effects described earlier might simply have overwhelmed these demographic effects and made them difficult to detect.

6. For recent evidence, see Arthur Kinnickell, "Demographics and Household Savings," Finance and Economic Discussion Series 123 (Board of Governors of the Federal Reserve System, Washington, D.C., 1990).

7. For recent evidence rejecting the role of demographic factors in the decline of the personal saving rate, see Barry Bosworth, Gary Burtless, and John Sabelhaus, "The Decline in Saving: Some Microeconomic Evidence," *Brookings Papers on Economic Activity*, no. 1, (1991), pp. 183-241.

Other Influences on Personal Saving

Many factors besides those already considered probably had some effect on the personal saving rate, but on balance it is not clear whether they increased or reduced it (see Box 2 on page 31). For example, greater competition among financial institutions could have helped or hindered personal saving. Such factors as smaller down payments, lengthier repayment periods for consumer loans, and relaxed credit standards may have led to increased borrowing in order to finance consumption, which would have reduced the saving rate. These factors may, however, have increased expenditures that many economists regard as saving and investment, such as expenditures on durable goods and education. They may have also helped personal saving by offering competitive market returns on saving that, before the 1980s, were precluded by regulations that restricted rates on such retail deposits as passbook savings accounts.

Changes in the Social Security program during the 1980s probably had little net effect. Some changes may have increased and others may have reduced the personal saving rate.[8] Raising the normal retirement age from 65 to 67 in the next century effectively reduced the retirement benefit for persons retiring at any specific age. The lower benefit may have increased other forms of personal saving. Other program changes that advanced increases in contribution rates and increased the contribution rate of self-employed persons may have reduced personal saving in other forms. Some empirical research has suggested that Social Security substitutes for other forms of private saving, but this research has not yielded precise estimates of the amount of substitution.[9]

Will the Personal Saving Rate Recover in the 1990s?

Two features of the factors determining the personal saving rate point to some improvement in the rate over the next few years, although it is impossible to say whether the change will restore saving rates to the levels of the 1960s and 1970s. First, revaluations in wealth like those that arose from soaring real estate prices in the 1980s seem less likely in the 1990s. At the very least, this factor should induce a recovery of saving from the low rates of the late 1980s. Second, the high level of personal debt that was the legacy of low rates of saving has already begun to reverse itself and this, too, should be reflected in an improvement in the personal saving rate for at least the next few years.

Aside from these influences on the course of the saving rate over the next few years, the contribution that prospective demographic changes might have during this and the following decade remains ambiguous. The proportion of peak savers in the adult population is projected to continue rising over the next two decades and should add to the improvement. At the same time, the proportion of retirees is also projected to rise, which should detract from improvement. It is impossible to predict which of these two demographic factors will prevail.

Conclusion

The personal saving rate deteriorated during the 1980s. That is clear, whether it was measured conventionally or by a broader gauge adjusted for consumer durables, inflation, the

8. For a discussion of these and other changes, see "Social Security Programs in the United States," *Social Security Bulletin*, vol. 49, no. 1 (January 1986), pp. 5-59.

9. For example, see Martin Feldstein, "Social Security Induced Retirement, and Aggregate Capital Accumulation," *Journal of Political Economy*, vol. 82, no. 5 (September/October, 1974), pp. 905-926; Dean R. Leimer and Selig D. Lesnoy, "Social Security and Private Saving: New Time-Series Evidence," *Journal of Political Economy*, vol. 90, no. 3 (June 1982), pp. 606-629.

market value of federal debt, and defined-benefit pension plans offered by private businesses. No single factor seems to account for the decline. Instead, several factors, such as an increase in the ratio of wealth to disposable income, expectations about future income prospects, and, in the case of the conventional measure, declines in inflation, probably contributed. Increases in real rates of return could have increased or lowered the personal saving rate, but no clear-cut evidence for either influence exists. Changes in the age distribution of the population could have played a role, but since these changes began to occur much earlier, and were gradual as well, their roles were probably not influential. Similarly, other influences on the personal saving rate, such as changes in Social Security legislation, do not seem to have had significant effects.

Appendix

Data and Methods

The five tables in this appendix contain the basic data and adjustments to national saving that appear in Chapters 2 and 3.

Table A-1.
GNP, Net National Saving, Capital Consumption, and Discards, 1960-1991 (In billions of dollars)

		Net	Capital Consumption[a]			Discards[a]		
		National		Nonresidential			Nonresidential	
	GNP	Saving	Total	Equipment	Structures	Total	Equipment	Structures
1960	516.6	38.8	46.3	23.6	11.8	33.1	17.3	10.7
1961	535.4	36.7	47.7	24.3	12.1	34.0	18.2	10.5
1962	575.8	43.5	49.3	25.1	12.5	35.0	18.9	10.7
1963	607.7	49.1	51.3	26.3	12.9	36.1	19.9	10.7
1964	653.0	56.1	53.9	27.7	13.4	37.6	21.1	10.8
1965	708.1	67.6	57.4	29.6	14.2	39.5	22.5	11.0
1966	774.9	69.4	62.2	32.3	15.4	41.9	23.8	11.6
1967	819.8	63.3	67.5	35.6	16.4	44.2	25.5	11.8
1968	895.5	67.8	73.9	39.3	17.8	47.5	27.6	12.6
1969	965.6	78.0	81.5	42.6	19.8	51.0	29.1	13.5
1970	1,017.1	66.4	88.8	46.4	21.8	54.0	30.7	14.4
1971	1,104.9	76.2	97.6	50.6	24.3	58.4	33.2	15.3
1972	1,215.7	91.8	109.9	55.1	28.5	66.7	36.3	18.4
1973	1,362.3	132.0	120.4	59.8	31.2	70.8	38.8	19.1
1974	1,474.3	109.3	140.2	69.9	36.8	80.5	44.2	21.9
1975	1,599.1	76.3	165.2	84.9	42.6	95.8	54.3	25.5
1976	1,785.5	102.0	182.8	95.6	46.0	106.1	61.5	26.9
1977	1,994.6	133.0	205.2	107.1	51.2	120.3	69.5	30.2
1978	2,254.6	181.0	234.8	121.8	58.4	135.5	79.0	33.1
1979	2,520.8	196.1	272.4	140.2	68.5	157.9	91.3	39.1
1980	2,742.1	153.6	311.9	161.3	78.4	181.5	106.1	44.2
1981	3,063.8	194.3	362.4	186.4	93.7	210.1	124.5	50.3
1982	3,179.8	109.3	399.1	207.4	106.4	238.5	142.2	58.2
1983	3,434.5	83.1	418.5	217.2	106.9	252.5	154.4	57.3
1984	3,801.5	200.7	433.3	228.6	110.5	266.3	165.2	58.8
1985	4,053.6	155.9	454.5	239.7	118.2	286.5	175.9	63.2
1986	4,277.8	96.1	478.6	255.8	122.2	304.0	190.4	66.2
1987	4,544.5	116.8	502.2	270.2	124.6	322.8	204.0	67.5
1988	4,908.2	170.0	534.0	285.5	134.1	346.8	216.2	75.9
1989	5,266.8	161.5	580.3	306.3	144.7	385.0	234.8	85.8
1990	5,542.9	115.2	602.8	321.0	149.7	396.9	245.5	89.5
1991	5,694.9	82.2	626.1	333.8	155.0	423.5	260.2	96.0

SOURCE: Congressional Budget Office using data from the Department of Commerce.

a. Capital consumption and discards for residential investment, not shown in the table, are the difference between the totals and the respective sums for nonresidential equipment and structures.

Table A-2.
Adjustments for Investments in Consumer Durables and Government and Intangible Capital, 1960-1991 (In billions of dollars)

	Net Investment[a]			Private and Government Expenditures			
	Consumer Durables	Federal Government Nonmilitary	State and Local Government	Nondefense Research and Development[b]	Educational Services[c]	Students' Forgone Earnings[d]	Millions of Full-Time-Equivalent Students[e]
1960	4.9	0.9	7.9	13.5	19.7	30.2	12.8
1961	2.3	1.0	8.8	14.3	21.6	33.1	13.6
1962	5.9	1.2	9.1	15.4	23.7	37.3	14.7
1963	8.8	1.7	10.3	17.1	26.0	41.6	15.8
1964	11.5	1.7	11.2	18.9	29.0	46.7	16.8
1965	16.3	2.3	12.2	20.0	32.2	51.7	17.6
1966	18.5	2.4	13.9	21.8	37.1	56.9	18.4
1967	16.7	1.0	15.9	23.1	41.8	62.2	19.2
1968	21.8	0.9	17.4	24.6	46.6	70.5	20.1
1969	20.8	0.6	16.7	25.6	52.6	78.1	20.7
1970	14.4	0.3	15.8	26.1	60.5	87.2	21.4
1971	19.5	1.0	15.7	26.7	67.5	97.1	22.3
1972	25.9	0.2	15.0	28.5	74.3	104.5	22.5
1973	32.7	0.5	14.7	30.7	81.5	113.0	22.8
1974	20.6	0.2	17.6	32.9	90.5	124.4	23.2
1975	18.7	-0.5	16.2	35.2	104.4	140.9	24.1
1976	31.1	-0.1	14.0	39.0	115.0	149.7	24.0
1977	40.8	1.4	11.0	42.8	124.6	160.5	24.0
1978	46.7	3.5	11.3	48.1	135.6	171.4	23.9
1979	41.0	5.7	14.4	54.9	150.8	184.2	23.5
1980	17.1	7.8	14.9	62.6	167.7	203.5	23.4
1981	17.1	8.3	12.9	71.9	184.3	221.9	23.2
1982	12.2	0.7	11.4	80.0	198.6	236.6	22.9
1983	38.6	1.9	11.7	89.1	213.4	248.3	22.8
1984	69.6	1.9	15.0	101.1	230.2	256.2	22.7
1985	86.4	5.6	20.3	113.7	248.5	267.9	22.7
1986	102.6	3.0	26.1	119.9	266.8	280.4	22.8
1987	91.6	5.1	29.7	127.3	285.5	290.8	22.6
1988	102.0	1.0	31.7	135.2	308.7	305.9	22.4
1989	96.8	3.4	35.1	142.0	336.8	318.0	22.3
1990	76.7	2.8	39.8	150.0	363.9	n.a.	n.a.
1991	39.9	4.2	38.5	n.a.	385.0	n.a.	n.a.

SOURCE: Congressional Budget Office using data from sources described in footnotes.

NOTE: n.a. = not available.

a. Data obtained from Department of Commerce.

b. Data obtained from John E. Jankowski, *National Patterns of R&D Resources: 1990*, Final Report NSF 90-316 (Washington, D.C.: National Science Foundation, 1990).

c. Data obtained from Department of Commerce. The series shown is the sum of (1) private consumption expenditures on education (as shown in Table T2.7, line 91, in Department of Commerce, *Survey of Current Business*); and (2) government expenditures on educational services (estimated as total government expenditures on education less expenditures on educational structures, Table T3.15, line 7, less Table T5.6, line 41, *Survey of Current Business*).

d. Data obtained as four-fifths of the product of annual wages and salaries per full-time-equivalent employee in domestic industries (Table 6.6C, line 2, *Survey of Current Business*) and the number of full-time-equivalent students shown in last column, above. The factor, four-fifths, adjusts the computation for the approximate time spent in school per year.

e. Data from various issues of Department of Education, National Center for Education Statistics, *Digest of Education Statistics*. The data are constructed as one-half the number of high school students plus the number of full-time-equivalent college students. Multiplying the number of high school students by one-half is meant to approximate juniors and seniors who could otherwise enter the work force. Data for full-time-equivalent college students before 1970 is partly estimated as the number of full-time students plus one-third the number of part-time students.

Table A-3.
NIPA Net National Saving Adjusted for Revaluations, 1960-1991 (In billions of dollars)

	NIPA Net National Saving Including Revaluations at		Revaluations at Replacement Prices for	
	Market Value[a]	Replacement Prices[b]	Consumer Durables[b]	Government Nonmilitary Fixed Investment[b]
1960	6.3	29.4	-1.7	-5.3
1961	130.8	23.8	1.4	-1.4
1962	-55.7	25.6	-0.2	-1.6
1963	101.3	34.0	0.5	1.4
1964	14.0	47.6	0	-0.7
1965	185.8	64.2	-4.4	-1.1
1966	-27.1	68.3	-4.2	2.4
1967	186.8	63.1	-1.7	4.2
1968	177.2	67.3	-2.4	-0.2
1969	-105.7	98.0	-6.0	6.4
1970	-34.1	51.6	-8.0	12.0
1971	101.3	85.1	-5.5	11.2
1972	268.4	107.6	-10.5	9.9
1973	-93.5	167.4	-16.1	11.8
1974	-214.8	192.7	-5.2	53.9
1975	123.5	137.7	-0.8	15.8
1976	212.1	103.4	-5.2	-34.1
1977	54.2	198.2	-14.2	-14.2
1978	247.6	296.6	-14.1	41.3
1979	377.2	305.3	-10.9	67.8
1980	708.7	273.1	-2.5	21.5
1981	-617.9	215.0	-31.0	-66.2
1982	16.8	34.5	-20.2	-69.2
1983	218.7	-175.4	-16.7	-42.3
1984	-65.8	-15.9	-32.9	-22.1
1985	494.1	-22.9	-26.9	5.7
1986	424.9	50.2	-14.6	-1.6
1987	75.8	93.8	0.1	-22.3
1988	171.2	179.2	-31.2	-18.0
1989	670.0	43.2	-40.0	-30.7
1990	-619.7	-76.5	-55.5	-48.6
1991	532.3	-245.5	-45.1	-58.8

SOURCE: Congressional Budget Office using data from sources described in footnotes.

a. Data obtained as the change in a wealth measure consistent with investment expenditures in the national income and product accounts with an adjustment for inflation. The wealth measure is based on data taken from the Board of Governors of the Federal Reserve System, *Balance Sheets for the U.S. Economy, 1960-91*. The wealth measure consists of household wealth less the sum of land, consumer durables, and debt of the federal government. With the exception of the subtractions for land and consumer durables, such a measure also appears in the *Economic Report of the President* (January 1993). The inflation adjustment for a given year is constructed as the product of the inflation rate for that year and the level of wealth at the end of the previous year.

b. Data obtained from the Department of Commerce. Revaluations for a given year are computed as the product of the capital stock at the end of the previous year and the difference between the percentage change of the investment deflator associated with the capital stock and the percentage change in the deflator for GNP.

Table A-4.
Adjustments for Market Value of Federal Debt, Inflation, and Defined-Benefit Pensions, 1960-1991 (In billions of dollars)

	Market-Value Adjustment to Federal Saving[a]	Inflation Adjustment to					Defined-Benefit Adjustment to Business and Personal Saving[c]
		Federal Saving[b]	State and Local Saving[b]	Business Saving[b]	Personal Saving[b]	Net Foreign Investment[b]	
1960	-9.8	2.3	0	-0.7	-1.7	0.1	3.4
1961	1.9	1.1	0	-0.3	-0.9	0.1	3.6
1962	-2.7	2.4	0.1	-0.7	-2.0	0.2	3.8
1963	2.5	3.1	0	-0.9	-2.5	0.3	4.0
1964	-0.3	1.9	0	-0.5	1.5	0.1	4.6
1965	3.4	4.4	-0.2	-0.9	-3.7	0.4	5.3
1966	-1.3	5.7	-0.4	-0.3	-5.3	0.4	5.7
1967	4.2	6.4	-0.6	0.8	-7.2	0.5	6.2
1968	7.4	9.3	-0.8	0.7	-9.7	0.4	6.9
1969	-0.7	10.8	-1.0	1.7	-11.1	-0.3	7.4
1970	-11.0	10.6	-1.3	3.6	-12.4	-0.5	8.0
1971	-3.8	7.6	-0.8	2.5	-9.3	-0.1	9.1
1972	1.3	8.2	-0.9	1.9	-8.8	-0.5	10.6
1973	3.9	23.4	-3.6	4.9	-21.9	2.7	12.5
1974	-0.8	31.9	-6.8	13.5	-35.8	-2.8	14.9
1975	-2.6	21.1	-4.0	6.1	-21.9	-1.3	17.5

(Continued)

SOURCE: Congressional Budget Office using data from sources described in footnotes.

a. Data obtained from the Federal Reserve Bank of Dallas.

b. Data obtained using interest flows estimated by the Department of Commerce (Table 8.17, *Survey of Current Business*), the annual percentage change in the consumer price index, and the constant-maturity, five-year interest rate published by the Federal Reserve Board of Governors (Statistical Release H.15). Inflation-adjusted interest flows are calculated as the product of published net interest flows and the ratio of the inflation measure to the interest rate. This method of adjusting for inflation was originated by William Poole, "The Role of Interest Rates and Inflation in the Consumption Function," *Brookings Papers on Economic Activity*, no.1 (1972), pp. 211-220. It has the advantage of preserving consistency of adjusted interest flows among the government, business, household, and foreign sectors.

c. Data obtained using employers' contributions to pensions and profit-sharing plans, benefits paid by such plans, and imputed interest earned on them (Table 6.11C, lines 20 and line 29, and Table 8.17, line 51, respectively, *Survey of Current Business*). The series shown equals adjusted employers' calculations less adjusted benefits plus adjusted interest.

Table A-4.
Continued

	Market-Value Adjustment to Federal Saving[a]	Inflation Adjustment to					Defined-Benefit Adjustment to Business and Personal Saving[c]
		Federal Saving[b]	State and Local Saving[b]	Business Saving[b]	Personal Saving[b]	Net Foreign Investment[b]	
1976	-9.4	18.8	-2.9	-0.1	-16.3	0.4	21.5
1977	11.6	27.8	-4.5	0.3	-25.2	1.5	25.1
1978	16.1	37.4	-8.6	1.4	-29.4	-0.8	31.6
1979	6.1	58.6	-18.7	9.0	-46.2	-2.8	36.1
1980	11.1	56.6	-20.7	17.6	-52.7	-0.9	41.5
1981	3.8	44.9	-14.8	16.8	-49.5	2.6	38.4
1982	-55.6	24.8	-8.5	8.9	-26.1	0.8	36.6
1983	28.9	32.6	-10.8	5.3	-26.8	-0.2	37.3
1984	-16.7	37.4	-11.2	3.3	-27.2	-2.2	38.4
1985	-71.9	47.5	-14.5	-1.2	-26.0	-5.9	35.6
1986	-50.0	21.3	-6.6	-0.5	-10.4	-3.8	24.8
1987	81.0	76.1	-23.0	-2.2	-31.5	-19.5	23.7
1988	30.4	76.0	-23.0	-4.8	-26.8	-21.4	28.7
1989	-75.2	89.8	-28.5	-0.3	-37.4	-23.6	35.6
1990	8.0	130.1	-38.6	-3.4	-55.1	-33.0	29.6
1991	-97.0	75.6	-19.6	-10.3	-26.0	-19.7	26.2

c. Continued

Adjusted contributions equal employers' contributions multiplied by the fraction of employers' pension contributions that go into defined-benefit plans. The fraction is assumed equal to 0.66 before 1975 and for 1975-1991 is based on data obtained from Department of Labor, Pension and Welfare Benefits Administration, *Trends in Pensions 1992* (1992), Table A5.

Adjusted benefits equal benefits paid from pension plans multiplied by the fraction of benefits coming from such plans. The fraction is assumed equal to 0.68 before 1975 and for 1975-1991 is based on data obtained from *Trends in Pensions 1992*, Table A6. Benefits paid in 1991 have been estimated at 9 percent above their 1990 level.

Adjusted interest equals imputed interest from life insurance carriers and noninsured private pension plans multiplied first by the fraction of pension assets in defined-benefit plans and second by the ratio of life insurers' pension reserves and other private pension assets to life insurers' assets and other private pension assets. The first fraction is assumed equal to 0.72 before 1975 and for 1975-1991 is based on data obtained from *Trends in Pensions 1992*, Table 16.11. The second fraction is based on data for reserves and assets of life insurers and for assets of other private pension funds obtained from the Board of Governors of the Federal Reserve System (*Flow of Funds Accounts, Flows and Outstandings*, Federal Reserve Publication Z.1).

Table A-5.
National Income and Product Account Measures of Personal, Business, Federal, and State and Local Government Saving, 1960-1991 (In billions of dollars)

	Private Saving		Government Saving	
	Personal	Business	Federal	State and Local
1960	20.6	14.6	3.5	0.1
1961	24.9	14.8	-2.6	-0.4
1962	25.9	20.6	-3.4	0.4
1963	24.7	22.8	1.1	0.4
1964	31.5	26.1	-2.6	1.0
1965	34.6	31.8	1.3	0
1966	36.4	34.0	-1.5	0.5
1967	45.8	31.2	-12.7	-1.1
1968	43.9	28.6	-4.7	0
1969	43.3	24.8	8.5	1.5
1970	57.5	19.5	-13.3	1.8
1971	65.4	29.2	-21.7	2.5
1972	59.8	35.2	-17.3	13.4
1973	86.1	39.0	-6.6	13.4
1974	93.4	22.3	-11.6	7.2
1975	100.3	40.8	-69.4	4.6
1976	93.0	47.2	-52.9	14.6
1977	87.9	61.9	-42.4	25.6
1978	107.8	70.3	-28.2	31.1
1979	123.3	62.2	-15.7	25.1
1980	153.9	33.8	-60.1	24.8
1981	191.8	31.7	-58.8	28.5
1982	199.5	18.4	-135.5	26.9
1983	168.7	54.2	-180.1	40.3
1984	222.0	87.5	-166.9	58.0
1985	189.3	91.9	-181.4	56.1
1986	187.5	55.4	-201.1	54.3
1987	142.0	86.5	-151.8	40.1
1988	155.7	112.7	-136.6	38.4
1989	152.1	87.0	-122.3	44.8
1990	175.6	75.8	-166.2	30.1
1991	199.6	75.8	-210.5	17.1

SOURCE: Congressional Budget Office calculations based on data from the Department of Commerce.

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