

Are We Investing Too Little?

One of the most disappointing features of U.S. economic performance over the past 20 years has been the slowing of growth in productivity and, as a result, in real incomes. While productivity, or the growth in output per man-hour, increased by an average of 3 percent per year from 1948 to 1973, since then it has averaged only 1 percent per year.¹ For a time, the sharp rise in energy prices seemed an obvious culprit, diverting the focus of much investment from expanding output to conserving energy and rendering prematurely obsolete equipment and structures that were not energy-efficient. With the subsequent decline in energy prices, however, other explanations seem to be required and for many economists, media commentators, and policymakers a prime candidate is the low U.S. saving rate. Since the mid 1980s, national saving has averaged just over 15 percent of GDP, compared to more than 20 percent during the 1960s. Thus, one plausible explanation for slow productivity growth, at least in recent years, is that our low saving rate is constraining investment and thereby depriving the nation of both the tools and the technologies that would leverage human skills.

This seemingly plausible line of reasoning poses problems, however. Most notably, while the U.S. saving rate has fallen quite sharply, private domestic investment has fallen much less. Moreover, implicit in statements that investment is too low is an assertion that the returns to those investments are high. Yet shifts in the composition of investment and the pattern of credit flows in financial markets are more consistent with a shortage of attractive investment opportunities than of investable funds.

This article considers whether the decline in the U.S. saving rate necessarily means that investment spending is “too low.” Part I examines patterns of saving and investment in the post-World War II period. It shows that private domestic investment has fallen less than one might infer from the decline in saving, and it highlights the growing importance of investment in equipment and especially computers during the 1980s and 1990s. Part II looks at the financial market developments that have

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accompanied these saving and investment patterns, showing that business use of credit markets is unusually low even as the cost of capital is low. Part III considers possible explanations of business reluctance to invest more heavily. The discussion suggests that investment is most likely to boost productivity when accompanied by supporting organizational and cultural changes. In addition, any assessment of the adequacy of investment must consider the relative price of investment goods, since lower prices mean that a given expenditure delivers much more capability but also requires much more organizational and

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cultural adjustment in order to be used effectively. These insights suggest that the rapid decline in computer prices and the growing importance of computers in the U.S. investment mix may account for some of the inconsistencies in saving and investment patterns.

In particular, investment spending may be limited by the ability of businesses to absorb the new information technology. Unfortunately, such a situation does not lend itself to obvious policy prescriptions, other than to reduce artificial impediments to change and to increase decisionmakers' exposure to best-practice operations, since it is organizational change as much as investment per se that is critical.

I. Saving and Investment Patterns

From more than 20 percent of GDP in the 1960s and 1970s, gross saving in the United States has fallen to roughly 15 percent of GDP in the 1990s. The decline has been particularly pronounced since the early 1980s, reflecting the emergence of large federal budget deficits in the Reagan Administration and a falloff in personal saving in the second half of the decade. This decline in saving is a source of great concern to many.

¹ This refers to growth in output per man-hour for nonfarm business in the United States.

To some extent, this concern has political and moral overtones. Concern over the federal budget deficit is linked to concern over the size and intrusiveness of the federal government. And some observers see in the decline in personal saving evidence of a self-centeredness lacking in past generations. But for most, the decline in saving is problematic because it implies a decline in investment, and investment is seen to hold the key to productivity growth.

Tending to support such concerns has been the slowdown in U.S. productivity growth since 1973, a period that roughly coincides with the decline in saving. Moreover, until quite recently, such views were reinforced by international comparisons, which typically showed the United States towards the bottom in terms of both its national saving rate and its rate of productivity growth. At the other end of the spectrum was Japan, with both a very high saving rate and very strong growth.²

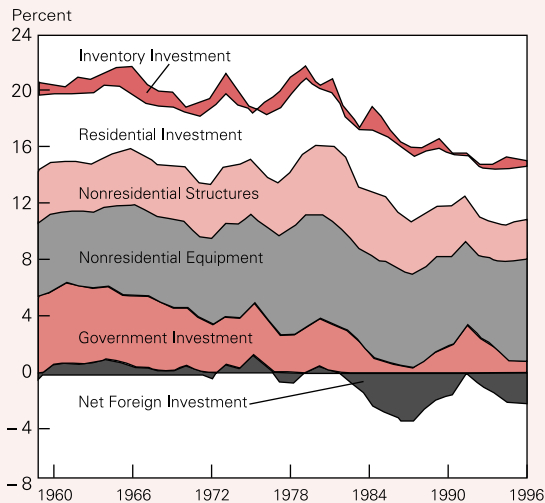
In the National Income and Product Accounts, saving, by definition, must equal investment, so that a decline in saving necessarily translates into a decline in investment. But investment includes not only the business expenditures on equipment and nonresidential structures that are the focus of most concerns about output and productivity growth but also residential investment, government investment, and business inventories. It also includes net foreign investment, which is the difference between the acquisition of U.S. assets in other countries and foreign acquisition of assets within the United States.

As can be seen from Figure 1, shifts in foreign investment have moderated the effect of declining saving on investment within the United States. In particular, the emergence of large federal budget deficits in the first half of the 1980s was accompanied by a sharp swing in net foreign investment as other countries began to invest more heavily in the United States than the United States was investing in other countries. In effect, foreign saving made up for U.S. government dissaving. This has implications for U.S. income, as foreign acquisition of U.S. assets gives foreign investors claims on future U.S. output. Even so, by substituting for U.S. saving, the inflow of

² While policymakers and the public tend to assume that high saving rates cause high growth, the Solow growth model predicts a link between high saving and high levels of output, but not between high saving and growth (except in the early stages of capital accumulation) (Solow 1956). Moreover, some literature argues that the causation runs from growth to saving. Growth models based on life-cycle saving suggest the saving rate is endogenous while the growth rate is exogenous and conclude that the causation is from growth to saving.

Figure 1

Components of Gross Investment as a Share of GDP



Source: U.S. Bureau of Economic Analysis. Current dollars.

foreign capital permits a higher level of domestic investment than otherwise would occur; and while foreigners receive a return on their investments, U.S. residents enjoy any output gains in excess of that return arising from the introduction of new technologies or the acquisition of new skills.

While the swing in U.S. net foreign investment has cushioned the effect of declining saving on domestic investment, the fractions of GDP devoted to investment in housing, government structures and equipment, inventories, and nonresidential structures have nonetheless all declined over the past 20 years. In contrast, investment in nonresidential producers' durable equipment remains as high as or higher than it was in the 1960s and 1970s, although down from the early 1980s.

For many economists, if not necessarily for policymakers and the general public, the decline in the share of GDP devoted to investment in housing is not cause for concern. Martin Feldstein, in particular, has repeatedly pointed out that the tax system favors owner-occupied housing over other investments, since the stream of housing services generated escapes taxation while mortgage interest payments are tax-deductible (Feldstein 1996). Moreover, unlike business

investment, housing is not a vehicle for introducing new technologies or organizational practices and thus cannot expand productive capacity to the same degree.³ In any event, the growth in the adult population, particularly the fraction in the prime home-buying age bracket, has slowed in the past 10 years, so one might expect a smaller fraction of economic activity to be devoted to housing construction.

The decline in inventory investment relative to GDP is almost certainly a positive development. Not only have improved inventory management techniques enabled businesses to reduce their inventory-to-sales ratios, but they have also been associated with organizational changes that are widely believed to have improved product quality and customer service.

In contrast, the implications of the decline in government investment, from over 5 percent of GDP in the 1960s to roughly 3.5 percent beginning in the mid 1970s, has been the subject of considerable debate both in academic circles and the political arena. Several studies have argued that declining rates of public capital investment precipitated the decline in U.S. productivity growth. These findings are quite controversial, however, and other studies, using somewhat different measures of public capital, have found its impact on various measures of economic activity to be quite small. Most of the discussions about the role of public investment have focused on highways and other state and local government investments. But state and local investment accounts for less than half of the decline. More important has been the declining fraction of GDP devoted to national defense. During the 1970s, the federal government substantially curtailed purchases of aircraft, ships, and other defense "equipment"; investment in national defense picked up again in the mid 1980s, but has since fallen back lower than ever. (See the box "Public Capital and the Durability of Structures.")

Regardless of their views on the decline in government investment, the primary concern of most advocates of higher saving and investment is business investment. Here, the pattern is rather different from that shown by the other components of investment, which generally accounted for larger fractions of GDP in the 1960s and early 1970s than in later years. In

³ Housing advocates might counter that investment in housing, especially owner-occupied housing, generates important spillovers in the form of enhanced quality of life that justify its favored status. Some of these benefits, for example, more stable neighborhoods and potentially healthier living conditions, might even enhance the prospects for economic growth.

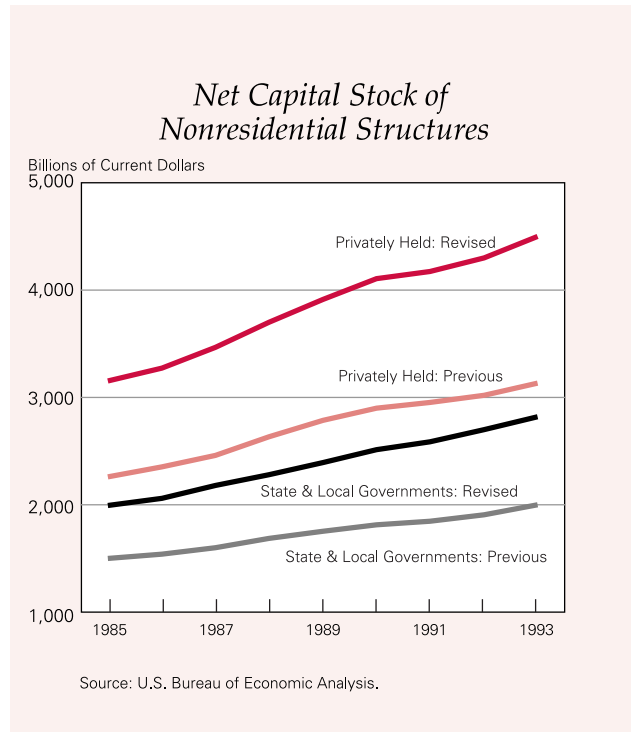
Public Capital and the Durability of Structures

Recent revisions to the National Income and Product Accounts show that state and local governments' net capital stock of nonresidential structures is roughly 50 percent higher than indicated by previous data. These changes result from new depreciation patterns for both equipment and structures. The new geometric patterns were adopted after comprehensive studies concluded they provide the best approximation for the decline in the productive capacity of most types of fixed capital over their service lives (Hulten and Wykoff 1981a, b; Coen 1975).

Compared to the straight-line pattern used previously, geometric patterns lead to faster depreciation for structures in their younger years and slower depreciation in their older years.⁴ That is, structures initially depreciate more quickly but then last much longer. So buildings and other structures now appear to be productive assets for a very long time.

The capital stock revisions also speak to the recent debate over public investment. In particular, several studies had used the previous capital stock data to estimate high marginal products from additional public investment in structures such as sanitation plants, highways, and the like. Such substantial revisions to the capital stock data suggest that previous analyses of the adequacy of our existing public infrastructure should be revisited.

Private stocks of nonresidential structures also appear to be roughly 50 percent higher than previously measured. This may help to explain why



business has felt little need to invest in new structures in the early 1990s. In fact, the recent expansion has been fueled primarily by growth in equipment investment, with negligible growth in structures investment.

contrast, the share of GDP going to business investment increased during the 1960s and 1970s, peaking at the end of the 1970s in the case of equipment and in the early 1980s in the case of structures. The investment shares for both equipment and structures then declined through the second half of the 1980s and into the early 1990s. Recently, however, trends have diverged, with investment in structures remaining at historically low levels, while the share of GDP going

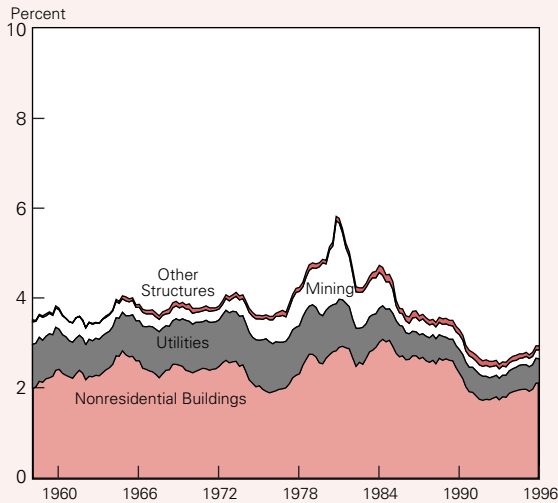
⁴ Depreciation is the decline in value due to wear and tear, obsolescence, accidental damage, and aging, which includes retirements and discards. The former straight-line depreciation pattern was based on equal-dollar depreciation over the life of an asset, while a geometric pattern of depreciation is based on a constant-fraction depreciation of constant-dollar net stocks, resulting in higher dollar depreciation in the early years of an asset's service life than in its later years.

to business equipment has largely recovered.

The three major categories of business investment in structures are nonresidential buildings, utilities, and mining exploration, shafts, and wells. The last is dominated by petroleum and natural gas activities. In all three categories, investment relative to GDP has fallen quite sharply from comparatively high levels in the early and mid 1980s (Figure 2). In the case of nonresidential buildings, these movements have been driven by commercial office buildings, even though offices normally account for less than one-quarter of total nonresidential building (Figure 2a). Office construction surged in the 1980s, but as the decade wore on supply began to outstrip demand. Vacancy rates soared, precipitating a commercial real estate "bust" and a sharp curtailment in office con-

Figure 2

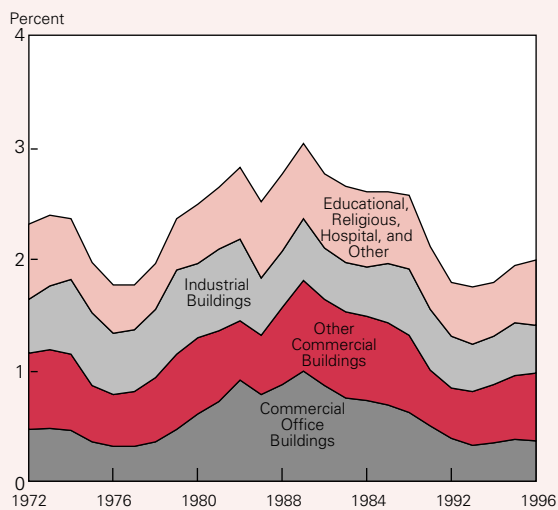
Gross Investment in Nonresidential Structures as a Share of GDP



Source: U.S. Bureau of Economic Analysis. Current dollars.

Figure 2a

Gross Investment in Nonresidential Buildings as a Share of GDP

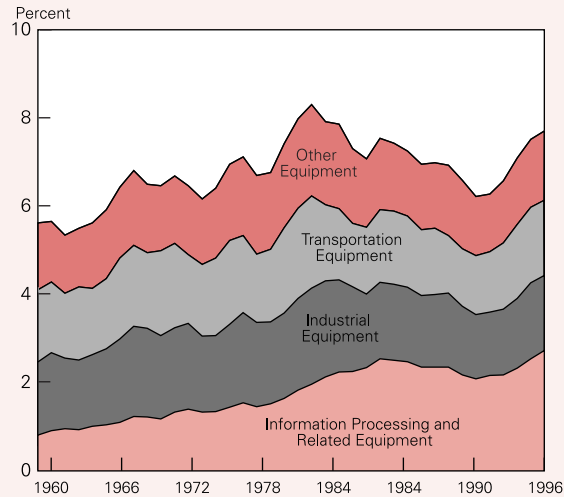


Source: U.S. Bureau of Economic Analysis. Current dollars.

struction. Changes in the tax code, making investment in commercial real estate more attractive in 1981 and less so in 1986, contributed to these swings.

Figure 3

Nonresidential Producers' Durable Equipment Investment as a Share of GDP



Source: U.S. Bureau of Economic Analysis. Current dollars.

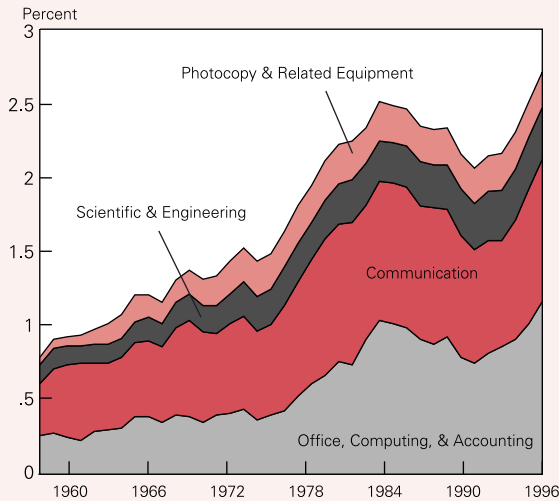
Investment in mining structures has followed an even more pronounced boom-bust pattern. Investment surged following the second oil price shock in 1979, then plummeted when prices collapsed in the mid 1980s. As of the mid 1990s, investment in mining remained at historically low levels. Energy-related utility investments have also fallen, to rates half those of earlier decades. This shrinkage in energy-related investments has occurred in the context of a pronounced slowing in the growth of energy use, amidst continued dependence on foreign energy sources.⁵ Investment in railroad structures and, perhaps more surprisingly, telecommunications has also fallen relative to GDP.

The picture changes when one turns to business equipment, the largest of the major components of investment. As noted above and shown in Figure 3, the fraction of GDP devoted to business equipment rose through the 1960s and 1970s. It fell throughout

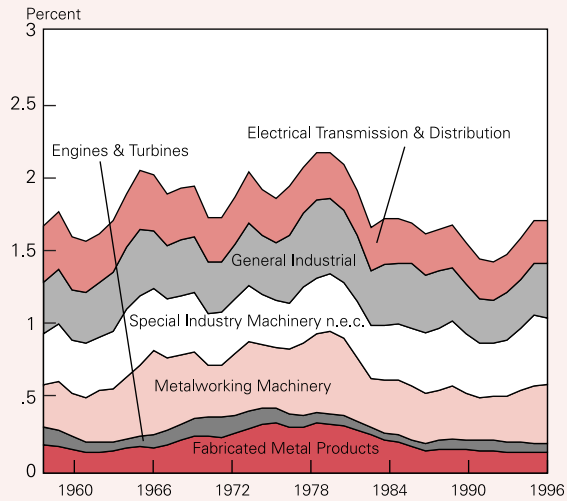
⁵ Consumption of energy, particularly petroleum, per dollar of real GDP has fallen by almost a third since the oil crisis of 1973, while electricity use relative to GDP has been constant after decades of vigorous growth. Meanwhile, the share of energy coming from net imports, after falling in the late 1970s and early 1980s, is now back to 20 percent, roughly the same as in the early 1970s. Source: *Monthly Energy Review*, May 1997, p. 16 and authors' calculations based on data on pages 3 and 95.

Figure 4

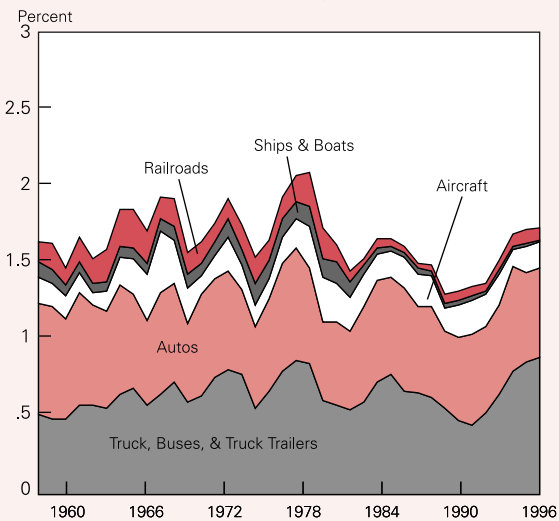
a. *Investment in Information Processing Equipment as a Share of GDP*



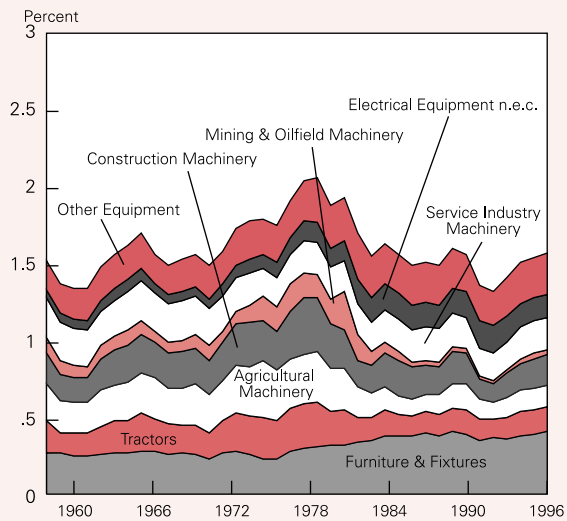
b. *Investment in Industrial Equipment as a Share of GDP*



c. *Investment in Transportation Equipment as a Share of GDP*



d. *Investment in Other Producers' Durable Equipment as a Share of GDP*



Source: U.S. Bureau of Economic Analysis. Current dollars.

the 1980s and into the 1990s, but then, in contrast to structures, business investment in equipment rose sharply. As of 1996, investment in business equipment had recovered to slightly more than 7.5 percent of GDP, close to the highs of the late 1970s. Underlying this pattern are three distinct investment behaviors—a

generally rising trend for investment in information processing equipment, with a hiatus in the second half of the 1980s; a highly cyclical pattern for investment in transportation, industrial, and “other” equipment; and since 1980, a falloff in the fraction of GDP going to industrial and other equipment (Figures 4a through 4d).

The bulge in investment in business equipment in the late 1970s reflected a confluence of forces—a cyclical peak, superimposed on the rising trend for investment in information processing equipment, plus a boom in agricultural machinery and oil field equipment (both in “other”) in response to rapidly rising food and energy prices. In addition, the rapid inflation of the 1970s, interacting with the high marginal tax rates of that time, spurred a search for tax shelters; and imaginative accounting firms and investment banks responded with a variety of programs, whereby individuals invested in railroad cars, fishing boats, tractors—even book plates—in order to generate investment tax credits.

The recessions of the early 1980s produced a sharp falloff in the more cyclical components of investment; at the same time, oil prices began to fall and more moderate growth in agricultural prices created financial pressures for farmers, many of whom had expanded aggressively in the previous decade. In addition, challenges from the Internal Revenue Service and changes in the tax code made investment tax credit (ITC) tax shelters unattractive, even as new opportunities to shelter income were found in commercial real estate.

Investment in information processing equipment was unaffected by the recessions and continued to grow rapidly until the mid 1980s, sustaining a relatively high level of investment in equipment, overall, despite a falloff in the other major categories. Investment in both computers and communications equipment then slowed, relative to GDP, even as the share of GDP devoted to other major categories of investment remained close to recession levels.

The recession of the early 1990s brought business equipment’s share of GDP to its lowest level in more than 20 years. Since then, however, investment in business equipment has picked up sharply. Information processing equipment accounts for the biggest part of the gain but most of the largest categories have increased. Investment in transportation equipment, especially trucks and buses, has been strong.

This review of investment patterns highlights two important points. First, the impact of declining national saving on U.S. business investment has been cushioned, as net foreign investment, housing, and government investment in defense equipment have absorbed a substantial part of the falloff. Thus, while national saving has fallen almost 6 percentage points since the 1960s, business investment in equipment and structures has averaged roughly the same fraction of GDP in the 1990s as it did in the 1960s. Comparisons

with the late 1970s and early 1980s show a bigger drop, with business investment falling from a peak of about 12.5 percent of GDP in the early 1980s to 9.5 percent in the 1990s (but 10.5 percent in 1995 and 1996). However, business investment in the late 1970s and early 1980s was buoyed by special factors. Key components of investment could not—and probably should not—have continued at such high levels.

In particular, investment in mining and oil field structures and machinery could not be sustained once oil prices collapsed. By itself, oil-related investment accounts for half of the decline in business investment’s share of GDP since the early 1980s. Similarly, a decline in investment in agricultural machinery and tractors was probably warranted once agricultural

The failure to sustain the investment program of the late 1970s and early 1980s is not surprising or even undesirable.

prices ceased to rise so rapidly. In addition, some of the tax shelter investments were probably not justified on economic grounds.

The early and mid 1980s were also characterized by very high levels of investment in office buildings. While a substantial pickup in activity was called for initially, given low vacancy rates and rising rents, the office market is prone to overshooting and, in view of the problems that subsequently emerged, seems to have done so. Thus, the very low office investment of the 1990s reflects excessive investment in the 1980s, although with vacancy rates now falling sharply it is possible that the market over-corrected again.

None of this tells much about the appropriate level of investment. It could be argued—and many have—that the initial level of business investment was too low. Moreover, the resources devoted to investment in oil field machinery, tractors, and office buildings could have been diverted to other categories of investment. But the failure to sustain the investment program of the late 1970s and early 1980s is not surprising or even undesirable.

Nominal versus "Real" Investment Shares

The preceding discussion of investment patterns has been based on nominal, or current dollar, expenditures. For many purposes, it is customary to use "real" or chained (1992) dollar expenditures, which adjust for the effects of inflation and thus allow one to distinguish changes in the quantities of goods and services produced from changes in prices. Because price trends for investment goods have diverged quite markedly from the changes in the overall price level, comparisons of investment and GDP in real dollars present a different picture from that shown by the nominal figures.⁶

Which measure better represents economic truth? Measuring investment relative to GDP in current dollars may provide a more accurate indication of the labor and capital resources devoted to investment and of investment's opportunity cost in forgone consumption and government spending. The chained measure may provide a better measure of value received. To illustrate, consider expenditures on oil-related structures. The boom in oil and gas exploration during the 1970s bid up the costs of drilling wells and building rigs. Thus, while nominal expenditures on oil-related structures rose from 0.25 percent of GDP in the early 1970s to 1.4 percent in 1982, much of this spending was dissipated in higher construction costs. Real investment, measured as chained 1982 dollars, rose from 0.25 percent of GDP to 0.7 percent.

Of far greater significance is the effect of declining computer prices. Computer prices have fallen dramatically over the past 40 years, so adjusting for price changes raises more recent expenditures on information processing equipment relative to those of the past. Thus, while nominal expenditures on information processing equipment rose from 2.2 percent of GDP in 1992 to 2.7 percent in 1996, real spending as measured by 1992 chained dollars rose from 2.2 to 3.5 percent. In other words, because computer prices have fallen so much, the capabilities of our investment in information processing equipment have risen much faster than our expenditures.

From today's vantage, real expenditures present a much more favorable picture of current investment rates than do the nominal figures. (Compare Figures 5a through 5d.) Declining computer prices impart a clear uptrend to investment in equipment, with the

⁶ Both Auerbach and Hassett (1991) and Henderson and Liebman (1992) use real dollar figures in their estimations of the growth in investment in computers.

rise since the early 1990s particularly pronounced. Meanwhile, the bulge in investment in the late 1970s and early 1980s is dampened, as a portion of the increase in expenditures is absorbed in higher-than-average inflation in investment costs. The net result is that investment's share of GDP, measured in real dollars, rose only modestly in the late 1970s, fell only modestly in the late 1980s and early 1990s, soared in the mid 1990s, and was higher in 1996 than at any time in the past 40 years.⁷

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Adding to the interpretative difficulties is the fact that computers are not a standardized product and over the years they have changed along many dimensions. The computer price indexes are based heavily on the processing speeds and memory capacity of computers, the value of which is estimated using hedonic regressions (Oliner 1993). Although processing speeds and memory capacity clearly are central to computer performance, one can question whether they adequately capture all the attributes that are sought in a computer and whether other attributes, such as reliability and ease of installation, have improved at the same extraordinarily rapid rate.

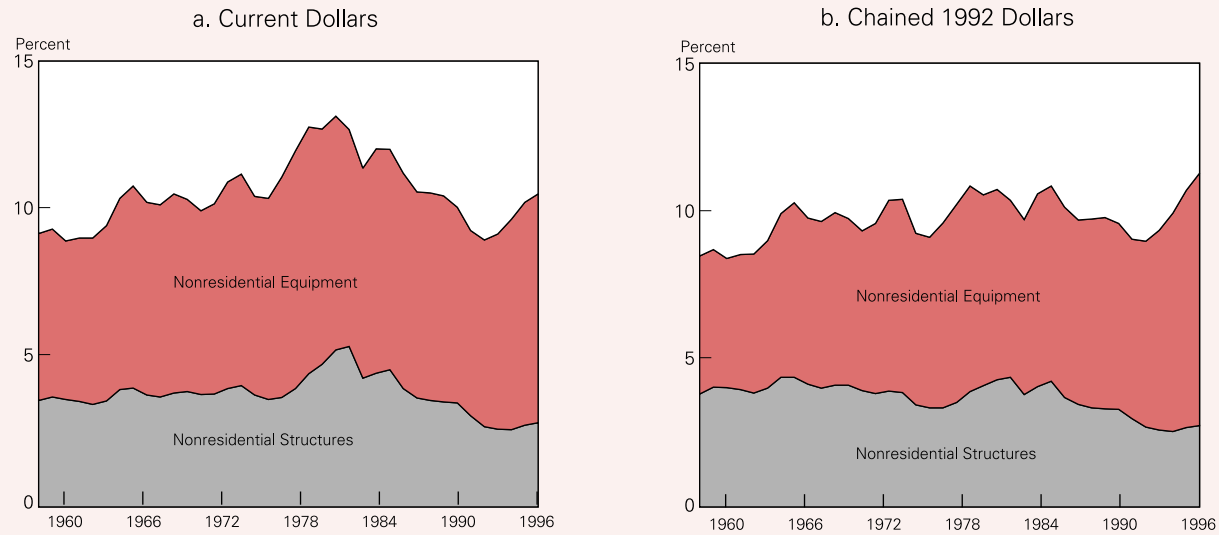
II. Financial Markets and Investment

Over two-thirds of current business investment in structures and equipment is undertaken by nonfinancial corporations. Nonfarm noncorporate business is responsible for about 15 percent, followed by financial institutions with roughly 10 percent. The balance is

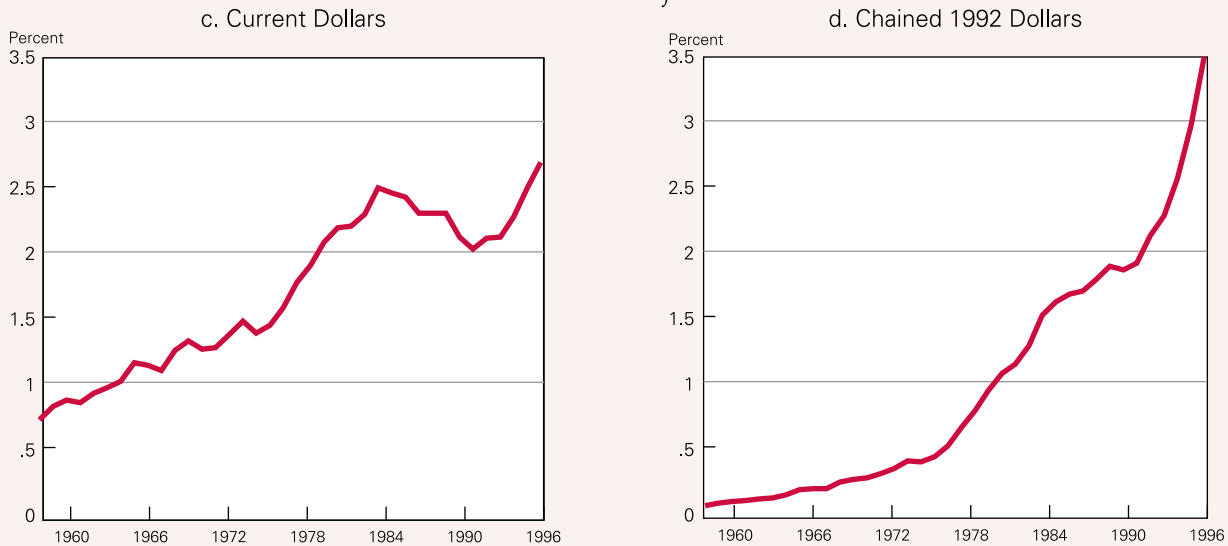
⁷ These figures are based on summing chained (1992) dollar values for the major components of nonresidential structures and equipment. Under the chained approach, components will not necessarily add up to totals. If one uses either the sum of equipment and structures or total investment in chained (1992) dollars, the uptrend is even more pronounced. Earlier base years also produce a stronger upward tilt, because computers carry a larger weight.

Figure 5

Business Fixed Investment as a Share of GDP



Investment in Information Processing and Related Equipment as a Share of GDP



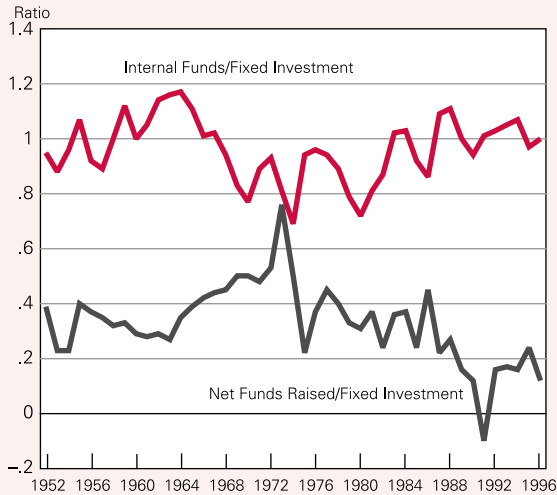
Source: U.S. Bureau of Economic Analysis.

undertaken by farms and nonprofit organizations. With the exceptions of financial institutions, whose share of investment increased in the 1980s, and farms, whose share has diminished, these patterns have been fairly stable over the years.

Corporations finance their investment activities through a combination of internally generated funds and funds acquired from external sources. They may also choose to invest in financial assets rather than plant and equipment. In other words, Internal funds + External

Figure 6

Sources of Investment Funds Relative to Fixed Investment, for Nonfinancial Corporations



Note: Net funds raised include net new equity issues and credit market instruments including loans.
Source: Flow of Funds, Board of Governors of the Federal Reserve System.

funds = Plant & equipment⁸ + Financial assets + Inventories. Internally generated funds consist of depreciation (or consumption of fixed capital, in the National Income and Product Accounts⁹) and retained earnings (or profits less taxes and dividends). Of the two sources of internal funds, depreciation is by far the larger.

Internal funds are much more important than funds raised from external sources. Indeed, as can be seen in Figure 6, corporations' internally generated funds, in the aggregate, commonly approach or even exceed their fixed investment expenditures. Individual corporations make extensive use of external funds; but in a sense, the corporate sector as a whole can be said to be self-financing, since corporate saving, in the form of depreciation and retained earnings, is roughly equal to corporate investment in plant and equipment.

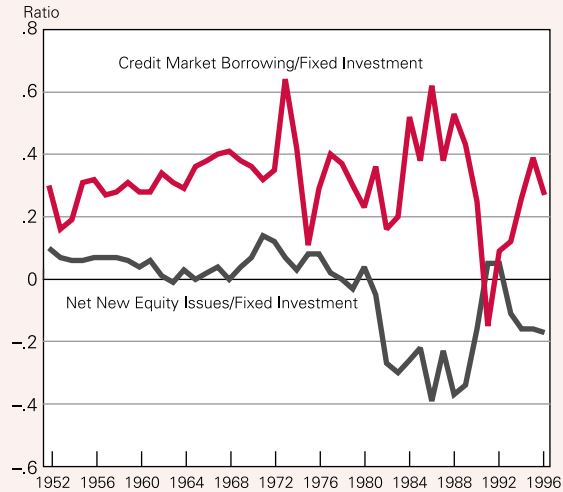
Of course, corporations do raise funds from external sources to finance investments in both plant and

⁸ Nonfinancial corporations also undertake a small amount of investment in residential construction.

⁹ Consumption of fixed capital also includes charges for accidental damage. It refers to economic depreciation rather than tax-return-based depreciation.

Figure 7

Sources of Investment Funds Relative to Fixed Investment, for Nonfinancial Corporations



Source: Flow of Funds.

equipment and financial assets. This reliance has varied considerably over time. In particular, use of the credit markets, that is, equity, corporate bonds, bank loans, mortgages, and the like, has ranged quite markedly, reaching as high as 75 percent of fixed investment (in 1973) and turning negative in 1991.¹⁰ As one might expect, corporations have looked to the markets more when internally generated funds have not kept pace with the growth in investment, as was the case in the late 1960s and early 1970s; and they have curtailed their use of credit markets when internal funds have risen relative to investment, as happened in the 1980s. The link is not tight, however. Reliance on the credit markets has been unusually low in the 1990s, even allowing for the relatively high level of internal funds compared to fixed investment.

The preferred vehicles for raising funds have also varied considerably, as can be seen in Figure 7. During

¹⁰ At one time, funds raised in credit markets accounted for the bulk of the net increase in corporate financial liabilities; most of the balance consisted of trade payables. Since the late 1970s, however, foreign direct investment in the United States and "other" miscellaneous liabilities have become increasingly important. The growth in "other" liabilities has been paralleled by growth in the acquisition of "other" miscellaneous assets; U.S. foreign direct investment has also grown.

the early 1970s, corporations both issued stock and borrowed aggressively to fund their investment programs. The 1980s, in contrast, were a time of increasing leverage, as corporations took on more debt while extinguishing equity through stock buybacks and mergers. In the recession of the early 1990s, bond issuance slowed and borrowing from banks and other mortgage lenders declined. Both banks and life insurance companies, the latter key buyers of corporate bonds, were financially impaired at the time; and so, perhaps by necessity, corporations turned to issuing equities. More recently, bank lending has picked up, while net new equity issues have turned negative once again.

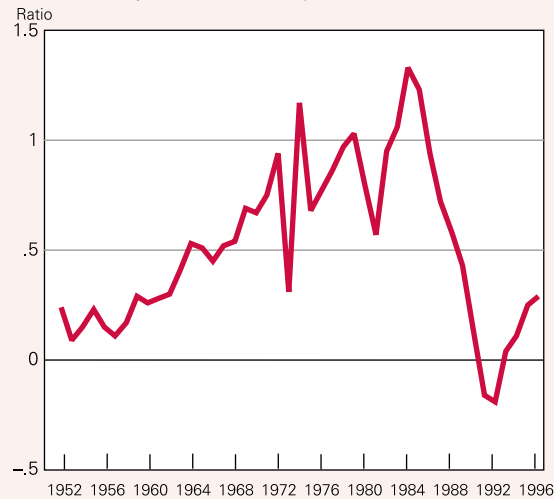
Unincorporated businesses, as a group, are much more dependent on external funds than are corporations. Since the late 1950s, credit market borrowing by unincorporated businesses has averaged about 65 percent of their investment in fixed assets, which includes residential construction as well as investment in nonresidential plant and equipment.¹¹ Borrowing is very volatile, however, with periods of high borrowing often followed by greatly reduced activity (Figure 8). To a large degree, both the high average level of borrowing and the volatility are related to real estate. Most real estate development is undertaken by unincorporated businesses; in addition, unincorporated businesses that are not actually in the business of real estate often possess substantial assets in the form of buildings and land. These assets can be used as collateral for loans for various purposes. One consequence is that in periods of rapidly rising real estate values, borrowing by unincorporated businesses has sometimes exceeded their investment expenditures. At the other extreme, in the real estate bust of the early 1990s, both mortgage and total debt outstanding of unincorporated businesses declined. By mid decade, borrowing remained subdued by historic standards, even though investment by unincorporated businesses had picked up quite sharply.

Both the corporate sector and unincorporated businesses have made relatively little use of credit markets in the 1990s. Is this linked in any way to the decline in personal saving? Are funds being rationed? Are they excessively high-priced? Or are businesses simply able to undertake the investments they want without relying so heavily on the credit markets?

¹¹ Residential construction represented roughly 30 percent of fixed investment in the 1970s, less than 20 percent in the 1980s and 1990s; but residential buildings account for a much larger share of unincorporated business assets, because they are so long-lived and values have increased substantially at times.

Figure 8

Credit Market Borrowing Relative to Fixed Investment, for Nonfarm Noncorporate Business

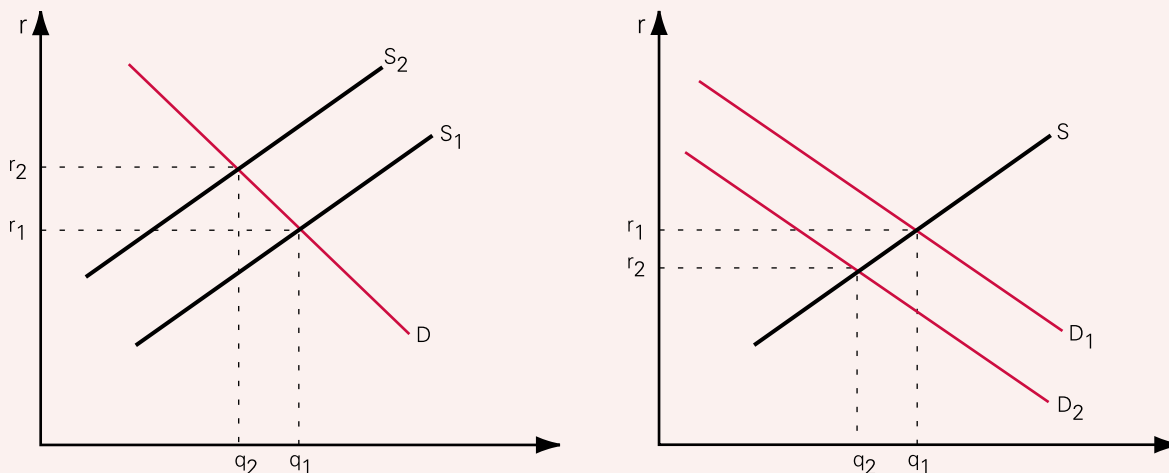


Source: Flow of Funds.

Distinguishing developments arising from changes in the supply of credit from those emanating from the demand side is always difficult, because factors affecting lenders' willingness to supply funds often affect both the borrowers' investment opportunities and their creditworthiness. The commercial real estate problems of the late 1980s and early 1990s provide a clear example of these simultaneities. In New England, southern California, and some other parts of the country, overbuilding resulted in very high office vacancy rates and falling property values. In New England, extensive nonperforming real estate loans led to many bank failures. Lending for commercial real estate became taboo and new lending to other businesses was sharply curtailed, not just in New England but through much of the country. In the media and certainly in the opinions of many business executives, the nation experienced a "credit crunch," with creditworthy borrowers unable to obtain loans because of the banks' own financial difficulties and reluctance to lend. But there is no doubt that the outlook for commercial real estate had deteriorated dramatically and, at least in New England, the prospects of more locally oriented businesses were adversely affected by the fallout from the real estate bust.

Figure 9

Supply and Demand Shifts in the Market for Capital



Nevertheless, despite the rather circular nature of credit markets, it does appear that businesses' failure to make greater use of credit markets in recent years represents a lack of demand for financing rather than a lack of supply and, by extension, that the decline in saving is not constraining business investment. The most compelling evidence in this regard is the low cost of capital. As shown in Figure 9, an inward shift in the supply of capital will result in a reduction in the volume of financial capital and an increase in the price, other things equal, while an inward shift in the demand for capital will also result in less capital but a lower price.

The cost of raising funds in the equity markets is especially low. Stock prices have risen very strongly during the 1990s, resulting in price-earnings (PE) ratios that have been very high by historic standards. The reciprocal of the PE ratio, the earnings-price ratio, is commonly used as a crude indicator of the cost of capital. Given expected earnings, a lower earnings-price ratio (higher PE ratio) means that investors require a lower return and that corporations seeking to raise funds in the equity market can do so more easily, since investors are willing to pay more to share in the expected income stream. As can be seen in

Figure 10, earnings-price ratios in the 1990s have been much lower than they were through most of the 1970s and 1980s and comparable to the ratios of the 1960s.

Interpreting *observed* earnings-price ratios as a measure of the cost of capital is complicated, however, by cyclical and other temporary fluctuations in earnings. A firm with cyclically depressed earnings and therefore a very low ratio of earnings to price will not necessarily find the equity markets receptive to a stock issuance.¹² An alternative measure that is somewhat less sensitive to current earnings is the ratio of market to book value (or market price to book value per share). A market-to-book value ratio in excess of one means that the current market evaluation of the corporation's worth exceeds the value of the existing shareholders' equity and, thus, that new investors will pay more than those of the past to share equally in the firm's future earnings. Conversely, market-to-book values below one mean that new investors will pay

¹² A recent paper by Richard Kopcke examines the determinants of the price-earnings ratio: "Are Stocks Overvalued?" *New England Economic Review*, September/October 1997, pp. 21-40. Kopcke notes that the price-earnings ratio generally depends on the dividend-payout ratio, the anticipated growth rate, the risk premium, and taxes.

Figure 10

Earnings-Price Ratio for the S&P 500



Source: Standard & Poor's.

less per share than existing shareholders have contributed for an equal claim on future earnings. Not surprisingly, firms are very reluctant to issue stock when market-to-book values are below one, since doing so dilutes the ownership stake of existing shareholders. The ratio of market-to-book value, shown in Figure 11, confirms that the 1990s have been a very attractive time in which to issue stock.¹³ If anything, recent circumstances appear even more favorable than when one looks at earnings-price ratios.

The picture is somewhat less clear when one looks at the cost of borrowing. Nominal interest rates today are low compared to rates through most of the 1970s and 1980s, but to the firm contemplating a long-term investment, the relevant concept is the rate of interest adjusted for expected inflation. A high nominal rate will not be an impediment to investment if inflation is expected to be high, since the income stream generated by the asset will grow over time with inflation. The expected rate of inflation is unob-

¹³ The price-to-book value ratios in Figure 11 are based on the value of shareholders' equity and *not* the tangible book values that are published by Standard & Poor's. They are actually calculated as the product of the return to equity and the price-earnings ratio for the S&P 500. Market prices to tangible book value ratios have risen even more dramatically in recent years, indicating that intangible assets are an increasingly important part of corporate net worth.

servable, however. Most analysts fall back on estimating expected inflation based on past experience or, more crudely, using actual inflation; but if these proxies do not accurately represent expectations, real interest rates are misstated.

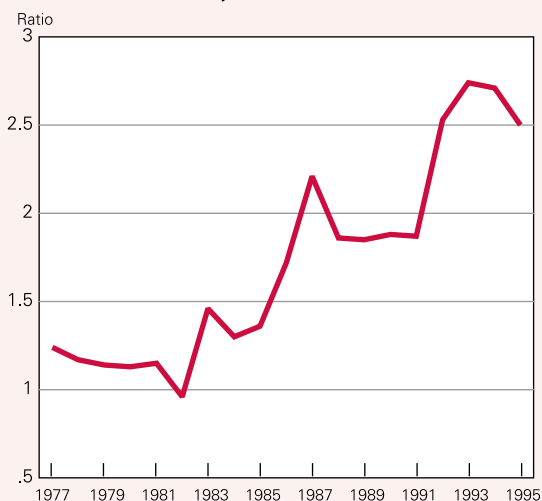
With that caveat, Figure 12 presents several interest rate series adjusted for actual inflation, as measured by the GDP deflator. In effect, tomorrow's inflation is expected to be the same as today's. Also included is a more sophisticated real interest rate series developed by Fuhrer and Moore (1995) in which expectations of inflation are estimated using a model in which market participants take into account the responses of monetary policymakers.

As can be seen, real interest rates in the 1990s have generally been lower than in the 1980s, although higher than in the 1970s and 1960s. To the degree that recent low inflation rates have been somewhat better than expectations and the high inflation of the late 1970s worse than expected, as the Fuhrer series suggests, real rates in recent years have been a little lower relative to the past. In either event, the rate data do not provide an explanation for businesses' unusually low reliance on borrowed funds, at least in comparison with the 1980s.

Interest rates are only one element of the loan

Figure 11

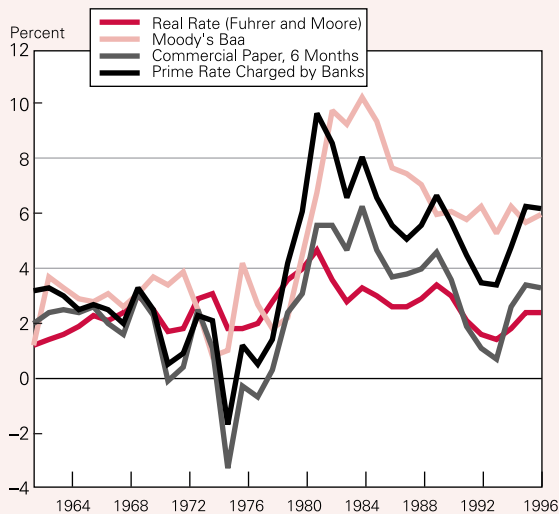
Ratio of Market Price to Book Value per Share for the S&P 500



Note: Ratio is calculated as the product of the percent return to equity and the price-earnings ratio for the S&P 500.
Source: Standard & Poor's.

Figure 12

Real Rates of Interest, 1962 to 1996



Source: *Economic Report of the President*, Fuhrer and Moore (1995).

contract, and the terms and conditions under which a loan is made also affect its cost to the borrower and even whether the borrower is willing or able to take up the loan. In the 1980s real estate boom, banks were willing to accrue interest during the construction period; thus, even though real interest rates were high, developers did not confront them until their projects were completed, at which time the lenders could be paid out of rental income. Of course, as markets became overbuilt and the expected rents did not materialize, developers could not pay. In response, many banks refused to consider new commercial real estate loans under any circumstances and curtailed their other business lending. Although real interest rates did not increase, bank credit was difficult to obtain.

Since the early 1990s, however, conditions have eased considerably. Surveys of bank lending practices by the Federal Reserve System indicate that banks have substantially relaxed the stringent conditions imposed in the wake of the real estate bust. For the past several years, the net percentage of respondents to the Fed's senior loan officer survey reporting tighter standards for commercial and industrial loans has been negative, as has the net percentage reporting increasing spreads between loan rates and market

rates.¹⁴ In the past year or so, moreover, comments in the Beige Book and other anecdotal sources have expressed some anxiety that competition among lenders may be driving down credit standards. Banks responding to the senior loan officer survey confirm the strong competitive pressure, but claim it is focused on loan terms rather than credit standards.

In sum, businesses are not looking to credit markets to finance their investments, even though the cost of issuing equity is very low and even though banks, after withdrawing earlier in the 1990s, seem once again eager to lend. Access to credit is not an impediment to investment.

III. So Why Not Invest More?

In combination, the two preceding sections suggest that business investment has not been constrained by the decline in saving. The cost of capital, especially equity capital, is very low and rates of return compare favorably with the recent past; yet businesses are making relatively modest use of the capital markets. Why are they not taking advantage of this opportunity to engage in more investment? (See the boxes: "The Rate of Return to Capital" and "Investment in the United States and the Golden Rule of Capital Accumulation.")

Several possible explanations present themselves. One is almost certainly the time required to plan large real estate projects. It was not very long ago that real estate investment was taboo. The improvement in commercial real estate markets is very recent and many banks and other financial institutions may still be leery of this particular form of investment. Moreover, these projects have a long gestation period. Time is required to put together the appropriate partnerships, identify properties, and explore possible sources of takeout financing and potential lead tenants.

But office construction is only a small part of the investment picture. The far more interesting question is why we are not seeing more investment in equipment and other nonresidential structures. And here one possible answer is that businesses are doing as much investment as they can handle.

As was discussed in Section I, business investment in equipment and structures exceeded 10 percent of GDP by the mid 1990s. Investment in structures was

¹⁴ See Board of Governors of the Federal Reserve System, *Senior Loan Officer Opinion Survey on Bank Lending Practices*, January and May 1997.

The Rate of Return to Capital

The rate of return to the stock of equipment and structures of nonfinancial corporations is sometimes used as an indicator of the attractiveness of investment. Measured as operating profits (as defined in the National Income and Product Accounts) plus net interest, all divided by the current dollar stock of structures and equipment, the rate of return to capital has generally been higher in the 1980s and 1990s than in the 1970s.

Investment decisions presumably are based on the expected return to new investments; so one would prefer a measure of the marginal return to capital rather than the average, which includes returns to investments made many years in the past. In addition, corporations' stock of structures and equipment represents only a portion of their income-generating assets. They also own land, inventories, and intangible assets such as patent rights, brand names, and distributor networks. The contributions of these assets to income are included in the numerator of the return to capital. The value of land and inventories was roughly 45 percent of the value of structures and equipment through most of the 1970s and 1980s; it has been less in the 1990s, largely because of declining land values. Thus, adding land and inventories to the stock of capital, while reducing the return to capital, tends to increase recent returns relative to past values. In contrast, adding some measure of intangible assets to the denominator probably would work in the opposite direction, since intangible assets appear to have become more important in recent years. (For the S&P 500, tangible book value has fallen relative to shareholders' equity since the mid 1980s.)

Rate of Return to Capital for Nonfinancial Corporations



Capital stock is lagged one period.
Source: U.S. Bureau of Economic Analysis.

In sum, to the degree that the rate-of-return data are meaningful indicators of future returns, investment is relatively attractive by historic standards, but the data show no clear upward trend or sharp break that suggests unusually promising investment opportunities are being thwarted by a low saving rate.

relatively low, but investment in equipment was relatively high, exceeded only in a few years in the late 1970s and early 1980s. Moreover, of the investment in equipment, one-third was devoted to information processing and related equipment, the price of which has been falling rapidly. This means that businesses are getting a lot more capability per dollar of expenditure. Thus, while the share of GDP devoted to information processing and related equipment was only slightly higher in 1996 than in 1985 (2.7 percent compared to 2.5 percent), because computer prices have fallen so much, real investment in information

processing equipment was twice as high (3.5 percent versus 1.7 percent). In other words, for investments amounting to essentially the same share of GDP, businesses received twice the capability in 1996.

As noted previously, one can question whether the estimated computer prices, which are heavily based on processing speeds and memory, might not overstate the decline in the effective cost of information processing capability, since other attributes of computers as well as those of essential software and associated products may not have improved as rapidly. Nevertheless, the point remains—raw computing

Investment in the United States and the Golden Rule of Capital Accumulation

A simple but revealing model of long-term economic growth was developed in the 1950s and 1960s by Robert Solow. The Solow growth model serves as a takeoff point for many analyses of growth rates in different countries. It highlights the link between a high capital stock—and thus high rates of saving and investment—and a high level of income. However, one of the provocative insights of the Solow growth model is that it is possible to save and invest too much. If additional units of capital increase output by progressively smaller amounts while depreciation is a constant fraction of capital, at some point increasing the capital stock will reduce rather than augment sustainable (steady-state) consumption. The level of capital accumulation at which steady-state consumption is highest has been called “The Golden Rule” level. Could the United States be beyond the Golden Rule?

The Golden Rule level of capital is that at which the marginal product of capital (MPK) less the rate of depreciation (d) equals total output growth or the sum of the rates of population growth (p) and technological progress (t). Thus,

$$MPK - d = p + t.$$

If MPK exceeds the rate of depreciation plus output growth, a higher saving/investment rate would increase long-term consumption, whereas if MPK falls short of depreciation and output growth the nation is investing too much.

Over the past 20 years, output has grown about 2.5 percent per year, with population increasing 1 percent per year and output per capita somewhat more. Depreciation in 1995 amounted to 4 percent of the current cost of the capital stock. Accordingly, if the MPK exceeds 6 or 7 percent, investment is falling short of the rate associated with the Golden Rule.

If one assumes that capital is paid its marginal product, then one can infer the marginal product of capital from capital’s share of output. Capital’s share of GDP is commonly taken to be about 30 percent, implying that $MPK * K/Y = .30$. The current cost of the fixed capital stock in 1995 was \$20.3 billion (not including durable goods owned by consumers), while GDP was \$7.3 billion. The MPK indicated by these values is 11 percent, above the rate associated with the Golden Rule level of capital accumulation.¹⁵

¹⁵ The results are the same using chained 1992 dollars.

$$\begin{aligned} MPK * K/Y &= .30 \\ MPK &= .30 * 7.3/20.3 \\ &= .11 \end{aligned}$$

Cohen, Hassett, and Kennedy (1995) have approached the question in terms of the Golden Rule capital stock relative to GDP. Again assuming that capital is paid its marginal product and that capital’s share of output is 30 percent, $MPK = d + p + t$ at the Golden Rule level of capital accumulation and

$$\begin{aligned} K/Y &= .30/(d + p + t) \\ &= .30/ (.04 + .01 + .015) \\ &= 4.6 \end{aligned}$$

Since the actual ratio of the stock of fixed capital to GDP in 1995 was 2.8, the United States appears to be well below the Golden Rule level of capital accumulation.

Cohen, Hasset, and Kennedy also calculated Golden Rule capital/output ratios for different types of capital. Making similar calculations for 1995, using their estimates of capital’s share of output but the new figures for the capital stock and depreciation, results in the following Golden Rule and actual ratios of capital to GDP:

	Golden Rule	Actual
Private Nonresidential Structures	1.2	.7
Private Nonresidential Equipment	1.1	.4
Residential Capital Stock	1.5	1.0

Thus, the United States is further from the Golden Rule level of capital accumulation for equipment than structures.

Cohen, Hasset, and Kennedy qualify their findings by pointing out that an alternative approach to estimating the optimal capital stock that takes into account the social rate of time preference and declining marginal utility of consumption results in substantially lower estimates of the optimal stock, so that the actual residential capital stock is slightly above the “Golden Rule” level and the stock of nonresidential structures roughly on target. The stock of equipment is still much too small, however.

In addition, it should also be noted that these simple calculations attribute all of the return to capital to the stock of fixed structures and equipment, with none attributable to land, inventories, or intangibles.¹⁶

¹⁶ Cohen, Hasset, and Kennedy modify residential capital’s share of income to reflect a return to land, but not their other calculations.

power is cheap. By extension, business can purchase a lot of computer capacity from internally generated funds.

A number of authors have addressed the question of why so much computing power has not yielded more benefits in higher productivity growth and noticeably higher returns to capital. Some are very optimistic that substantial gains will be forthcoming; others are more skeptical. But regardless of their views of the future, a recurring theme in these analyses is the systemic nature of information processing technology and the profound changes it

The limiting factor for investment in computer equipment may not be financing, but rather the human resources needed to make such investment effective.

makes possible. Realizing gains depends upon complementary improvements in different technologies and on complex organizational changes. Workers with new skill sets are needed, requiring either retraining or replacement. Bresnahan and Greenstein (1997) highlight some of these difficulties in discussing the changeover from mainframe to client-server computers. They note that it is technically difficult to link computers and that the systems are not as reliable as the old mainframes they replace. Businesses engaged in scientific and "number crunching" uses are able to shift to client servers more readily than those that use computers for administrative tasks or on-line transactions. The latter often must undertake widespread organizational changes in order to effectively exploit the new approach. Often conflict arises between the less technical end-users and the automation specialists.

Paul David (1990) draws comparisons between the computer and the electric dynamo. Not only did the dynamo yield benefits in the form of reduced power requirements and more accurate machine control, but it also permitted new and less costly forms of factory layout which, in turn, led to better materials handling and equipment arrangement. Businesses

were slow to adopt the new electrical technology, however, in part because existing plants, based on the old mechanical technologies, were still serviceable; electrification could best be exploited in a new facility. David is guardedly optimistic that computers will yield large productivity gains as they become more widely distributed and transform how business is conducted. But his comparison once again highlights that investing in computers poses many challenges for businesses.

Computers are not simply pieces of machinery. The computer is often part of a complex package of equipment, software, and support services. Rapid innovation means that evaluating alternative configurations of products is a never-ending, complex process. Installations must be continually modified. Employees must be continually retrained or at least refreshed. At the same time, these investments and the capabilities they embody force businesses to confront the possibility of reorganizing their activities. Change, even if offering potentially large payoffs, is risky and always disruptive. Substantial technical and management resources must be devoted to assessing the promise.

Other investments may pose some of the same questions, but the challenges arising from computer systems appear to be particularly demanding. Thus, the limiting factor for investment in information processing equipment may not be financing but the human resources needed to make such investments effective.

David's comparison with the electric dynamo suggests another possible implication of the extensive investment in computers. The steam- and water-driven systems that electricity replaced required heavy shafts supporting a complex network of belts connecting the power source to the machines. This required sturdy, multistory structures. Thus, as already noted, one consequence of the shift to electricity was a reduction in the costs of factory construction. It is at least conceivable that the computer and the organizational changes to which it is giving rise require less capital than the systems they replace. Certainly, one can cite instances in which this has happened, such as automated teller machines reducing the need for neighborhood bank branches and the adoption of just-in-time inventory techniques reducing the need for warehouse capacity.

Yet for all the investment in computers and for all their potential to transform the economy, computers and other information processing equipment represent a very small fraction of the nation's capital

stock.¹⁷ Because of product enhancements, equipment is replaced well before it has worn out in any physical sense. As a consequence, while information processing and related equipment has absorbed between 20 and 25 percent of businesses' investment dollars for more than 10 years, it represented less than 10 percent of businesses' stock of tangible capital in 1995. Indeed, the value of the stock of computers alone was less than the value of businesses' stock of furniture.

This rapid obsolescence raises the question of whether business is to some extent like the Red Queen in *Alice Through the Looking Glass*, running ever faster simply to keep in the same place. Of course, business is not standing completely still; the investments in computers are conferring benefits. But the contrast between their contribution to the stock of capital and their share of investment highlights the degree to which the ultimate payoff must be in new ways of doing business and new businesses. In the absence of organizational changes, it is hard to imagine that such modest increments to our capital stock will yield large gains.

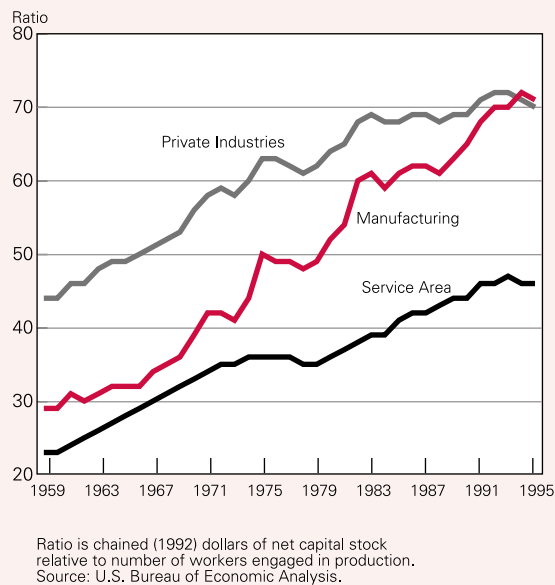
In contrast, buildings and other structures last a long time, raising the possibility that the nation may have "enough" capital of certain kinds. A case in point is railroads. For most of the past 40 years, railroads have been a shrinking industry. Employment has fallen by two-thirds and investment has not kept pace with depreciation. But railroad tracks and related structures last a *very* long time; so that railroads still account for a significant fraction (4 percent) of the nation's private nonresidential capital stock. Trucking, with three times the workers but far less capital per worker, accounts for only 1 percent. And since railroad employment has fallen so much, the capital stock per railroad worker is much higher today than it was in the 1960s and 1970s.

Mining, or more accurately oil and gas exploration and development, is another example of an industry where heavy investment in the past has been sufficient to sustain subsequent activity levels. As noted in section I, investment in oil and gas surged in the late 1970s and early 1980s, but then dried up as oil prices collapsed. Investment has fallen short of depreciation over the past 10 years and the nation's stock of mining capital has declined. Nevertheless, for each

¹⁷ In his recent book, *The Computer Revolution*, Daniel Sichel, Senior Economist at the Federal Reserve Board, makes a similar point. Sichel writes how in spite of information technologies' clear and dramatic impact on many individual companies and jobs, caution with respect to their macroeconomic effects is in order because their share of the U.S. capital stock is so surprisingly small.

Figure 13

Capital-Labor Ratios for Key Sectors



worker employed in mining, there is more than \$600,000 of capital, almost double the level in the late 1970s.

Figure 13 shows the total stock of private nonresidential capital (valued in 1992 dollars) relative to employment. As can be seen, investment has been sufficient to augment the capital-labor ratio in recent years, but not at the rate of the past. This slowing in the rate of capital accumulation per worker is all the more striking when one considers that the work force has been growing more slowly in recent years. The picture is quite different, however, when one looks at individual industries.

For most of the major industries, capital-labor ratios have been rising quite rapidly. However, these industry-by-industry increases have been offset by a shift in employment from more capital-intensive industries to less capital-intensive. Table 1 shows capital-labor ratios for all the major industry groupings for selected years, along with each industry's shares of employment and of the total capital stock. The differences among industries are huge. Some of these differences reflect patterns of ownership rather than use. In particular, the real estate industry owns buildings that are used by other industries. Many financial

Table 1
Effect of Industry Shifts on Overall Private Capital-Labor Ratio

Industry	1969			1979			1995		
	Share of Capital (Percent)	Share of Workers ^a (Percent)	Capital/Labor ^b (\$000)	Share of Capital (Percent)	Share of Workers ^a (Percent)	Capital/Labor ^b (\$000)	Share of Capital (Percent)	Share of Workers ^a (Percent)	Capital/Labor ^b (\$000)
Agriculture, Forestry, Fishing	7.1	5.0	77.8	7.1	4.0	109.0	4.5	3.5	90.6
Mining (including oil and gas)	7.0	1.0	389.6	6.7	1.2	340.9	5.3	.6	644.9
Manufacturing	20.7	31.2	35.9	20.8	26.3	48.6	18.1	17.9	70.7
Construction	1.7	6.6	14.1	1.9	7.1	16.4	1.1	6.6	11.3
Transportation	16.7	4.4	205.5	12.9	4.0	200.0	8.4	4.0	145.4
Communications	4.3	1.6	149.8	5.7	1.5	230.6	6.9	1.3	372.1
Public Utilities	13.6	1.0	711.3	13.4	1.0	824.3	12.5	.9	1006.0
Wholesale Trade	2.0	6.3	17.0	2.8	6.7	25.9	4.7	6.2	52.7
Retail Trade	5.3	16.5	17.4	5.5	17.7	18.9	6.4	18.6	23.9
Services	6.0	20.7	15.8	7.1	23.8	18.3	8.6	33.4	18.0
Real Estate	13.6	1.2	632.3	12.8	1.6	494.7	14.7	1.6	646.2
Finance and Insurance	1.9	4.5	23.0	3.5	5.1	41.9	8.9	5.5	114.3
"Service Area" ^c	28.8	49.2	31.7	31.6	54.9	35.5	43.2	65.2	46.4
Total	3,475.2 ^d	64.2 ^e	54.1	4,903.5 ^d	79.6 ^e	61.6	7,347.3 ^d	104.9 ^e	70.0
Estimated Capital/Labor Ratio									
Using 1969 Ratios			54.1			53.2			49.4
Using 1979 Ratios			63.4			61.6			56.9
Using 1995 Ratios			79.0			77.8			70.0

^aWorkers are "persons engaged in production;" estimate for 1995 workers is based on 1994 persons engaged in production and growth in persons engaged between 1993 to 1994, extrapolated.

^bChained (1992) dollars per worker.

^cSum of trade; services; and finance, insurance, and real estate.

^dBillions of dollars.

^eMillions of workers.

Source: U.S. Bureau of Economic Analysis.

institutions also own buildings that are rented out to tenants in other industries. On the other side, many services companies and retail outlets rent space in buildings owned by others. To remove the effects of these ownership patterns, a combined "service area" category is shown that includes all of wholesale and retail trade, services, and finance, insurance and real estate.

Capital-labor ratios are very low in this "service area." They have increased in recent years, largely because of investments by financial institutions and the real estate industry. But even with these recent increases, the capital-labor ratios are well below those in most other industries. Thus, the rapid growth in the service area, from 55 percent of total employment in the late 1970s to 65 percent in the mid 1990s, pulled down the overall ratio of capital to labor.

Most of the growth in the service area's share of employment has come at the expense of manufacturing; but manufacturing also has had a relatively low

ratio of capital to labor. Thus, the shift from manufacturing to services has had less impact on the overall capital-labor ratio than the much smaller decreases in the shares of employment in the much more capital-intensive mining, communications, and utility industries.

In other words, the relatively modest rate of increase in the stock of business capital per worker reflects the rapid growth in the service area industries, where the ratio of tangible capital to labor is quite low, and the slower growth and, in some cases, decline in employment in very capital-intensive activities. In most of the individual industry groups, capital-labor ratios have increased fairly rapidly in recent years. In particular, in the "service area," where employment has increased by 50 percent since the late 1970s, the value of the stock of capital per worker increased from \$35,000 at the end of the 1970s to over \$45,000 in the mid 1990s (both in 1992 dollars). Manufacturing capital-labor ratios have also increased substantially, as

the total capital stock has risen even as employment has fallen. Among the “infrastructure” industries, the capital-labor ratio has fallen in transportation, reflecting the declining importance of the very capital-intensive railroad industry and the increasing importance of trucking; but in both communications and the utility industries, the capital stock has increased relative to both industry employment and employment economywide.

To sum up, businesses may not be investing more heavily, even though the cost of financing is low, because the focus of much investment activity, computers and other information processing equipment, while very cheap in dollars—so a small expenditure buys a great deal of capability—is very costly in terms of management and technical resources. At the same time, those sectors of the economy that are growing most rapidly employ relatively little tangible capital per worker. Most of the very capital-intensive industries are growing slowly or shrinking (communications being the exception). The capital in these industries is often quite long-lived, however; so even where investment has been minimal, capital-to-labor ratios have generally risen.

IV. Summary and Conclusions

The ratio of national saving to GDP in the United States, already low by international standards, has fallen over the past 20 years. The emergence of large federal budget deficits in the early 1980s was a key early contributor to the decline in saving, but over the past 10 years the primary culprit has been declining personal saving. This falloff in saving has been a persistent concern because it implies a comparable decline in investment; and despite some debate in the academic community over cause and effect, investment is generally seen as critical to achieving higher living standards. Moreover, the fact that productivity growth has been disappointing through most of the 1980s and 1990s, a period in which U.S. national saving has fallen, has reinforced the view that the nation is not saving and investing enough.

An examination of the composition of investment, however, raises some questions about this chain of reasoning. While most of the discussion about the pernicious effects of low saving focuses on the implications for business investment, it has not been business investment that has borne the brunt of lower saving. Declines in net foreign investment, housing, and government investment in defense equipment

have cushioned the impact on business capital expenditures. Moreover, such cutbacks as have occurred in business investment have been concentrated in structures, not equipment. Particularly pronounced were the reductions in spending on oil and gas exploration and development starting in the early 1980s and in expenditures on office buildings in the latter half of that decade. Given the collapse in oil prices and the high vacancy rates that emerged in many office markets, the drop in investment in these areas seems neither surprising nor inappropriate. Indeed, less investment earlier might have prevented the boom-bust patterns that brought considerable hardship to the oil-patch states in the mid 1980s and to New England and southern California several years later.

The constraint on investment may lie less in the supply of saving than in business's ability to realize the potential of its investment expenditures.

The share of GDP devoted to business investment in equipment, especially information processing equipment, is actually relatively high by past standards. Moreover, information processing equipment is unusual in that the price of computers has been falling dramatically. In other words, while prices for most other goods and services have risen over time, the dollars spent on computers today purchase far more computing capability than the same dollars spent in the past. Thus, adjusting for price changes, the real value of investment in information processing equipment rises steeply, from a minuscule fraction of GDP in the 1960s and 1970s to 3.5 percent in the mid 1990s. So steep is this rise that the real values of both investment in equipment and total business investment are presently larger relative to GDP than at any time in the past 40 years. In the terminology of De Long and Summers (1991), a smaller investment effort is yielding more realized investment.

The cloud in this picture is the rapid obsolescence of computers and other types of information processing equipment. While investment in real terms is high, the investment pie in recent years has been allocated to shorter-lived categories of investment—equipment

rather than structures and within equipment, computers and information processing equipment rather than things like steam engines and turbines and electrical apparatus, which can last 30 years. As a consequence, the nation's stock of tangible capital is not growing as fast as in the past. Output per worker is rising, but not as fast as in the past, even though the work force is growing more slowly.

Before concluding that this slow growth in capital per worker argues for public policies to stimulate saving and investment, however, one must recognize that the composition of the economy is shifting to less capital-intensive activities. Within most individual industries, including the rapidly growing finance-real estate-services-trade group, capital-labor ratios have been rising. One implication of these shifts is that increasing the overall capital-labor ratio of the economy requires either more growth in mining, utilities, and other capital-intensive industries, or a substantial increase in the capital intensity of the growing industries. Apart from communications, the prospects for substantial growth in the capital-intensive sectors seem limited. Moreover, in the electric utility area, less capital-intensive technologies, notably combined-cycle gas turbines, are currently favored over the capital-intensive nuclear plants constructed in the 1970s and early 1980s. Thus, even if growth were to pick up, as it might if deregulation and competition lower prices, there may be an offset from shifting technologies.

In the finance, real estate, services, and trade area, increasing capital intensity means stepping up the pace of investment in commercial buildings and information processing equipment. There is reason to believe, however, that business cannot absorb much greater investment in information processing equip-

ment. Computing power has become very cheap; but effectively integrating computers into business operations can be very consuming of management and technical resources and can entail extensive organizational changes. These changes may yield large and unforeseen payoffs, but they can also be disruptive and put further strains on management. Some indication that business has enough investment on its plate comes from the financial markets. Although the cost of equity is very low and the cost of debt fairly low by the standards of the past 15 years, business is making relatively little use of credit markets. The ratio of externally raised funds to fixed investment is low.

That the payoffs from computers and other forms of equipment come from changes in the way business is conducted may imply that the social return to these investments exceeds the private return. In that case, efforts to stimulate more investment could be desirable, provided that business can make effective use of the funds. If management capacity is the bottleneck, efforts to stimulate further investment could be dissipated in higher costs—not necessarily in higher prices for the equipment itself, but in higher costs for technical support and accelerated replacement cycles that do not yield expected benefits.

None of this argues against policies that would correct the tax biases against saving and investment. The cost of capital will not always be as low as it is now. Rather, the point is simply, first, that the implications of the low U.S. personal saving rate on business investment may be less dire than often portrayed and, second, that the constraint on investment, and thus growth, may lie less in the supply of saving than in business's ability to realize the potential of its investment expenditures.

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