

Center for American Progress



Investing for Widespread, Productive Growth

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Introduction and summary

The parlous state of the U.S. economy weighed heavily on Americans' minds as they headed to the polls this past November, with 63 percent citing the economy as the most important issue facing the country this election—well above the second most frequently mentioned issue, the war in Iraq, which 10 percent of respondents thought was the most important.¹ And no wonder, amid bank failures and bailouts, rising job losses and lengthening unemployment lines, a volatile stock market and plummeting 401(k) account balances. With a new Congress and the Obama administration taking office in January, Americans are more than ready to see Washington swiftly enact policies to bring about an economic recovery that would ease the financial pain families are experiencing.

Such stimulus steps are necessary and proper, but policymakers and the American people must recognize that the economic mess we are in did not happen overnight, and that the path to strong and durable long-term growth will not be a short jaunt. Two critical aspects of the long-term structural weaknesses of the U.S. economy are low business investment and declining productivity growth. These two trends go hand in hand. Business investment is one critical ingredient in faster productivity. And faster productivity growth is an important precondition to address some of the nation's largest looming economic problems—low or even negative income growth, massive trade deficits, and the demographic challenges of generating payroll tax income to cover Social Security payments for the aging Baby Boom generation.

How are business investment and productivity growth related? If a local restaurant spends money on upgrades in the kitchen, for example, it can cook food more quickly and thus generate more sales with the same number of workers in the same amount of time as before—the definition of productivity. This kind of business investment is related to a company's productivity and ultimately to the entire economy's performance. More business investment can lead to higher future productivity growth via an enlarged capital base.

Over the long run, the gains from faster productivity growth should be equitably shared, such that higher productivity growth feeds into more jobs and more income for more workers to spend on more consumption items. This extra revenue will provide businesses with an incentive to increase their investments again in their buildings and equipment, thereby laying the foundation for even higher productivity in the future.

This virtuous cycle of higher investment, rising productivity growth, and growing income helped lift almost all economic boats in the late 1990s. Since the turn of the century, however, investment growth has been anemic, productivity growth has declined, and income growth has stagnated and in most years even declined. And now that the power of the U.S. consumer to continue to drive the economy probably has reached its limit, it is even more apparent that a virtuous cycle is in danger of becoming a vicious cycle. Slow to nonexistent income growth does not give business executives an incentive to invest more money in growing their businesses, which in turn hampers the chances for stronger productivity growth in the future, thereby possibly reducing future income growth.

The current crisis is an opportunity to take stock of past policies that contributed to this growing business investment and productivity crisis and, more importantly, to design and implement economic policies that could help the U.S. economy turn the corner on business investment and productivity growth. This paper reviews the existing evidence on business investment and productivity growth and concludes the following:

- **Productivity growth slowed in the 2000s.** Labor productivity (measured as output per hour, the standard definition of productivity) gradually slowed after 2002. Labor productivity, for instance, fell below its long-term average of 2.2 percent for three years in a row, from 2005 to 2007. With growth slowing markedly in the second half of 2008, it is likely that this year will also show productivity growth below 2 percent—a nadir not experienced since the four-year period ending in 1991.
- **Business investment was low throughout the current business cycle.** From March 2001, when the current business cycle started, to September 2008, business investment averaged 10.5 percent of GDP—the lowest average investment level since the 1960s.
- **Investment in this business cycle rested largely on commercial construction.** Investment in commercial structures such as office buildings, hotels, hospitals, and mines soared to 4.0 percent of gross domestic product in the third quarter of 2008, its highest level since March 1986. In contrast, over the course of the current business cycle, the ratio of business investment in equipment and software fell from 9.0 percent of GDP in March 2001 to 7.0 percent in the third quarter of 2008, its lowest point since September 1992.
- **Businesses struggle to replace obsolete capital.** Net investment—total new investment minus depreciation—as a share of GDP averaged 2.0 percent for the entire business cycle, the lowest level of any business cycle since World War II. Businesses invest more in computers, software, and other information technology assets that are necessary but also depreciate more quickly than other investments they made in the past. Businesses must now spend more to replace obsolete equipment, and thus more money must be spent in total, before the nation’s capital base actually begins to expand. The combination of low overall investment and quick depreciation means that the productive asset base in the United States is growing more slowly than in the past.

- **Declining investment in our knowledge-based economy.** While investments in information processing and software equipment expanded relative to GDP by 1.6 percentage points during the 1990s, they have declined by 0.9 percentage points since March 2001. Additionally, during this same period, the capital stock in information processing equipment and software, net of depreciation, declined relative to GDP for the first time since the early 1950s.
- **Businesses used money for share repurchases and dividends instead of capital expenditures.** The share of pre-tax profits used for net share repurchases and dividend payouts was 89.1 percent during the current business cycle, larger than it was for any previous business cycle. The share of after-tax profits used for net share repurchases and dividend payouts was 127.9 percent, another record high for any business cycle.
- **Consumption growth did not provide sufficient incentives for businesses to invest.** Throughout the current business cycle, from March 2001 to September 2008, consumer expenditures increased by an annualized inflation-adjusted rate of 2.5 percent—the lowest consumption growth rate of any business cycle since World War II. In addition, much of the past consumption increases was funded out of new debt, burdening consumers with record amounts of debt and making a quick recovery in consumption less likely.
- **Investment and productivity growth may be linked.** Since 1947, faster productivity growth has been preceded by business investment expansions relative to GDP. Similarly, periods of stronger investment growth were typically followed by an acceleration of productivity growth over a span of five years. Given the low levels of business investment levels in the United States in the 21st century, government policymakers may soon discover that the reverse is also true.
- **Business investment could replace consumers as the driver of the economy.** Stronger business investment growth could give the economy new momentum as consumption growth slows. Consumption has contributed to 74.8 percent of economic growth during this business cycle—the highest share of any business cycle since the 1950s. But this consumption was largely driven by an unprecedented and unsustainable debt expansion that appears to have ended. If investment growth were to rebound to the levels of the 1990s, when it contributed to over one-fifth the total GDP growth rate, investment growth could then substitute for faltering consumption growth.

Boosting business investment would have positive effects for the economy both in the short term and the long term. In the immediate future, faster investment growth could give the economy a much-needed boost. Faster investment growth alone will not fix all of the nation's economic woes, but it would be one of many steps in the right direction. In essence, it would start putting the economy on a more sustainable economic path than the debt-driven growth of the past seven years. And over the long run, faster investment growth could help lay a stronger foundation for innovation—the key but elusive measure

of our nation's overall ability to address a number of large and sometimes even growing challenges, such as declining incomes, an aging population, and large trade deficits.

Policymakers face many challenges in helping the economy recover, and this area is not an exception. Businesses will not invest unless Americans' incomes rise faster than they have recently. Fundamentally, policymakers need to ensure that workers will begin to see job growth and that the economy will reverse the decline in jobs throughout 2008. At the same time, policymakers must create additional incentives for companies to invest in new technologies appropriate for a creative U.S. economy that remains on the cutting edge of global innovation.

This paper will examine the links between investment, productivity, income, and economic growth as well as consider some worrying trends in all four of these interconnected arenas. In the pages that follow, we will revise and update our first examination of these issues, "Ignoring Productivity at Our Peril: Slowing Productivity Growth and Low Business Investment Threaten Our Economy," which was published in August 2007 by the Center for American Progress, and then detail why more robust business investment growth and higher income growth are necessary for our economy to spark innovation and new economic opportunities to help pull the United States out of its current economic downturn, focus again on our long-term needs, and ultimately provide a path for employees, employers, and the overall nation to grow forward together.

The link between investment, productivity, and economic growth

There is first the short-term impact of more business investment on economic growth. More business investment also means that businesses are buying more capital inputs, which in turn boosts economic demand and translates into faster economic growth right now. Faster economic growth over the near term will mean more jobs, which again means that more workers have more money to buy consumer goods. If consumers spend more money, businesses then have an incentive to invest even more. This chain of events results in faster output growth in the short run and, if all goes well, in faster productivity growth in the long run.

Looking further into the future, business investment lays the foundation for future productivity growth by increasing the capital base of an economy. Over longer periods of time—say, several decades—faster productivity growth translates into faster economic growth, higher wages, increased benefits, and greater profits over the long run.

Under the right circumstances, this faster productivity growth translates into higher living standards in an expanding economy, a truly virtuous cycle that last occurred in the 1990s.² The opposite is true, too. Less investment can result in less economic growth in the short run and slower productivity growth in the long run, which can translate into slower gains in Americans' living standards. Such a vicious cycle may well be upon us today.

Such income growth would mean a great deal to American families. Consider, for example, the sobering income data that the U.S. Census Bureau released earlier this year. Between 2000 and 2007, the last year for which data are available, the income of the typical family fell on average each year by 0.1 percent. Consequently, median household income was 0.6 percent *lower* in 2007 than it was in 2000.³ At the same time, the poverty rate has risen since 2000. In 2007, the poverty rate stood at 12.5 percent, up from 11.3 percent in 2000, meaning that an additional 5.7 million people lived in poverty in 2007 than in 2000.⁴

Faster productivity growth means that more resources are available to raise families' incomes and lift more people out of poverty. Consider that family incomes rose each year by 0.9 percent during the 1990s, when productivity growth accelerated. Also, the poverty rate dropped from 13.5 percent in 1990 to 11.3 percent in 2000, its lowest level since 1974.⁵

It is not just higher living standards that result from faster productivity growth. In essence, faster productivity increases mean that the economic prowess of each worker is rising faster and workers can thus more easily address the challenges that lie ahead.

This would make it easier for current workers to honor the promises made to Baby Boomers. These workers have been assured a specific amount of money. That amount is a larger slice of the total economic pie when the economy and workers' incomes are growing slowly than would be the case in a faster-growing economy with more rapidly rising incomes. Thus, increased productivity growth can help ease the burden of paying for Baby Boomer retirement.⁶

As Edith Rasell, Max Sawicky, and Dean Baker noted a decade ago, "Future living standards and society's ability to support the elderly depends primarily on the productivity of workers."⁷ Making it a priority now to invest in America's productivity will help us to ensure that we can support the aging population *and* continue to enjoy rising living standards throughout the 21st century.⁸ With the first Baby Boomers already entering retirement, it is tantamount to quickly generate additional economic resources to pay for their basic necessities in retirement.

Faster productivity growth also helps the United States tackle its large trade deficit in a constructive manner. In the third quarter of 2008, the U.S. trade deficit stood at 4.9 percent of GDP, which is still high by historical standards. Importantly, a closer look at the trade data reveals that the United States is increasingly losing its competitive edge with other nations, as made evident by our rising high-tech trade deficit.⁹ Until 2002, the high-tech trade balance essentially made the overall U.S. trade deficit lower than it otherwise would have been. In 2002, the high-tech deficit accounted for less than 4 percent of the total trade deficit, whereas by 2007, it accounted for more than 7 percent of it.¹⁰

Regaining lost productivity ground would mean that U.S. products would become more competitive in global markets and thus would boost exports. Faster exports then would help to lower the high trade deficit. Increasing business investment could help the nation become more innovative and potentially a leader in emerging technologies, which could contribute to shrinking trade deficits in the future.

Productivity growth has slowed since its 1990s acceleration

During the 1990s, the U.S. economy experienced a period of accelerating productivity growth. Beginning in the mid-1990s, output per hour began to grow faster than it had in prior years, reversing the productivity growth slowdown of the 1980s. Specifically, from 1990 to 1995 productivity grew at an annual rate of 1.5 percent, compared to an annual rate of 2.4 percent between 1995 and 2000. This translates into an acceleration of 64.9 percent over a span of just five years (see Figure 1).

Another measure of productivity growth is so-called multifactor productivity, which approximates innovation. Multifactor productivity captures aspects of companies' performance that are not directly attributable to better-trained workers and improved

machinery and buildings. The measure is intended to capture the gains that result from some of the more intangible changes at the company level, such as strategic investments and technological synergies, among others.

One important issue for multifactor productivity growth may be, for example, the intangible benefits from the successful integration of information technology systems in a company. The pattern in multifactor productivity growth is similar to the more basic measure of labor productivity: both accelerated in the late 1990s and slowed in recent years, in this instance after peaking in 2004. The multifactor productivity growth rate in 2007 was 0.6 percent, following 0.4 percent growth in 2006. This was the first time since 1994 and 1995 that this technology measure was below 1 percent.¹¹

Many researchers have argued that the high productivity growth of the second half of the 1990s can be largely attributed to expanding business investment in high-technology hardware and software.¹² Businesses began to invest in computers and software and other information technologies to lower costs, improve their organization, and offer new and improved goods and services with fewer inputs and thus at lower costs.

Specifically, in inflation-adjusted terms, business investment in computers and related information technology equipment more than doubled from the end of 1995 through March 2001, when the last business cycle ended.¹³ Studies vary in their estimates of the percentage contribution from the use of information technology to productivity growth, but all conclude that it made a considerably larger contribution in the second half 1990s than it did in the first half and hence was critical to the acceleration of productivity growth.¹⁴

Worryingly, business investment in information processing equipment and software declined from a peak of 4.9 percent of GDP in the fourth quarter of 2000 to 3.6 percent by the third quarter of 2003—the lowest level since the end of 1995. Moreover, investment in information processing equipment and software has remained between 3.6 percent and 3.9 percent of GDP since June 2003. In the third quarter of 2008, investment in information and equipment processing was 3.8 percent of GDP, or 18.3 percent below the level at the end of the last business cycle in March 2001.¹⁵

At the same time, productivity growth has slowed markedly in recent years. Consider the average productivity growth for the past five years in historical context, which we present here to eliminate typical short-term fluctuations that make longer-term trends harder to discern. From 2002 to 2007, labor productivity growth—measured as output per hour—averaged 2.1 percent, well below the five-year average of 3.2 percent from 1998 to 2003 (see Figure 1).

In addition, the productivity growth rate for the past five years was the lowest five-year average since the five-year period that ended in 1999.¹⁶ This reflects the fact that labor productivity growth was below its long-term average of 2.2 percent for the past three

Five year average productivity growth rate

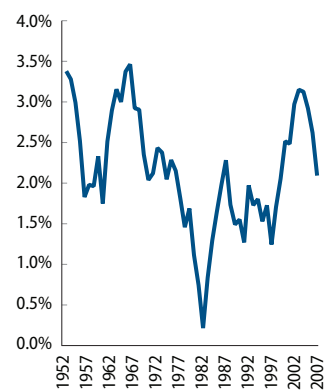


FIGURE 1

Note: Figures are annualized five-year average growth rates. Authors' calculations based on Bureau of Labor Statistics "Major Sector Productivity and Costs Index" data released in 2008.

years, from 2005 to 2007, the first time this has happened since the period from 1993 to 1995. And with growth slowing markedly in the second half of 2008, it is likely that this year will also show productivity growth below 2 percent—a nadir not experienced since the four-year period ending in 1991.

The changes in long-term productivity growth rates may seem small, but they can be critical over extended periods of time. Typically, economists believe that a worker's compensation should rise in line with productivity growth.¹⁷ A 1.5 percent annual increase in productivity could mean that, after 20 years, a worker's income might have risen by 34.7 percent. By contrast, an annual productivity growth of 2 percent could mean a 48.6 percent increase in income after 20 years. And with annual income growth of 2.5 percent, the income gain could be 63.9 percent after 20 years, which is 84.0 percent higher than what an annual productivity growth of 1.5 percent could deliver.

Moreover, the drop in long-term average productivity growth is certainly troublesome. The five-year average productivity growth rate has decreased consistently for four years in a row, from 2003 to 2007. The last time this happened was from 1967 to 1970, at the beginning of the last major productivity growth slowdown. In other words, the current slowdown in productivity growth should be taken very seriously by policymakers since it has few precedents and they did not bode well for the U.S. economy.

Have we already lost the gains of the 1990s?

Much of the debate over productivity growth focuses on whether the recent slowdown in productivity growth will continue into the future. If the answer is yes, then the gains from the introduction of new information technologies in the 1990s may have maxed out. If the answer is no, then other factors, such as a weakening economy, may be slowing productivity growth. Indications are that the answer is a tentative “no.”

Part of the discussion that points toward low productivity growth is a realization that productivity data may have overstated productivity gains in recent history. Susan Houseman of the Upjohn Institute, for example, argues that productivity growth has inappropriately included input costs that have been offshored.¹⁸ Because the production no longer occurs in the United States, the gains associated with offshoring should not be included in the calculation of U.S. worker productivity. Accounting for this measurement change would substantially reduce productivity growth.

Additionally, Dean Baker, co-director of the Center for Economic and Policy Research, argues in two studies that what matters for future living standards is the productivity growth that actually adds new value to the economy.¹⁹ He notes that some added productivity growth must go toward replacing obsolete capital equipment and is therefore not laying a foundation for living standards rising more quickly in the future.

Because capital goods depreciate more quickly today than in the past, businesses now have to run faster just to stay in place. After adjusting for depreciation, Baker argues that productivity growth between 1995 and 2006 should be reduced by about 10 percent. That means productivity growth between 1995 and 2006 would have been 2.06 percent, instead of 2.23 percent. Put differently, businesses must ensure that their workers become increasingly innovative just to cover the rising share of depreciation in our economy before there is new value added to the economy.

This debate over the measurement of productivity growth, however, does not detract from the overall fact that productivity growth has slowed in recent years. Rather, the new calculation simply means that productivity growth has slowed from lower levels than previously assumed. The different measure does, however, require a careful discussion over what the appropriate measures of productivity growth are so that we can accurately understand the growth of the foundation of future living standards. Since the scope of this paper does not extend to make all of the proposed adjustments to productivity growth, it is important to keep in mind during the ensuing discussion that we may be overstating the productivity growth, at least since the 1990s.

Many researchers attribute the slowdown in productivity growth in recent years to cyclical factors. That is, productivity growth is slower now than it was in the late 1990s because employment has not fallen as quickly as the attendant decline in output growth. Once employment growth further slows, however, productivity growth should accelerate again.^{20,21} In short, if businesses were to lay off more workers then productivity would rise as remaining workers were persuaded to work harder and longer at their given assignments.

This standard explanation of the end of a cyclical downturn in productivity growth, however, rests on a pivotal caveat—it assumes that businesses will continue to invest, particularly in equipment such as machinery, computers, and software, to help their remaining workers become more productive. This isn't happening today.

As long as business investment picks up steam again, the slowdown in productivity growth may be cyclical and not structural, and hence will not persist for longer periods of time. Should investment growth stay slow, however, productivity growth could also remain low. Less productivity growth would essentially be the result of eroding buildings and equipment that are not being replenished through more investment.

This lack of investment growth would then contribute to a slowing economy that generates less income and slower consumption growth than would otherwise be the case. This could spell the beginning of a vicious cycle whereby less investment translates into lower income and economic growth. This decreased growth would provide businesses even fewer incentives to invest, while the capital base erodes and the chance for living standards to rise more quickly in the future diminishes. As the economic downturn suggests, there is a danger of this downward spiral coming to life, especially since both consumption and investment growth have now turned negative.²²

Total investment growth, especially in equipment, has been meager

Business investment is a critical determinant of faster productivity growth in the future—a point to which we will return shortly. There are two types of business investment: investment in structures—such as office buildings and manufacturing plants—and investment in equipment, such as computers, software, and machinery. As pointed out earlier, investment in equipment, especially in computers and software, has been found to be particularly important for productivity growth in recent years.

But it is business investment in equipment and software that has shown a particularly weak performance over the current business cycle. After growing to 9.4 percent of GDP by the middle of 2000, business investment in this area dropped precipitously and amounted to just 7.0 percent of GDP in September 2008, which is the lowest level since September 1992 (see Figure 2). For the business cycle as a whole, equipment investment amounted to an average of 7.5 percent, below the averages of the business cycles of the late 1970s, 1980s, and 1990s.²³

Given the particular role that equipment investment has played in the acceleration of productivity growth in the 1990s, the fact that it has remained at low levels after its initial sharp decline in this business cycle may be cause for concern.

Net investment (after depreciation) is lowest for any business cycle

The fact that total investment spending on equipment relative to the size of the economy has essentially remained flat since its dramatic decline between 2000 and 2004 is actually more worrisome than it may at first seem. The main reason for this is that it takes more business spending now than it did in the past simply to replace obsolete equipment.

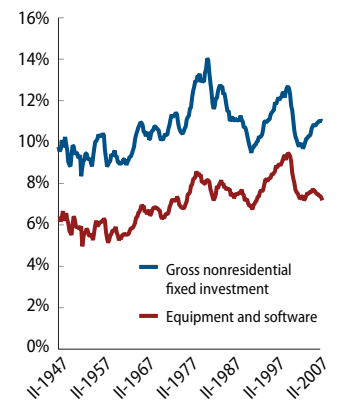
Capital tends to depreciate more quickly now than it has in the past as a result of a shift in investment toward information processing equipment and software. While information processing equipment and software constituted less than 10 percent of all investment in the 1940s and 1950s and less than 20 percent of investment throughout the 1960s and 1970s, it has made up over 30 percent of investment since the second quarter of 1991.²⁴

What really matters for the future of rising living standards is how much businesses actually add to our nation's capital base. With capital goods that depreciate quickly, such as computers and software, now in the mix, our capital base tends to erode faster and more investment must be dedicated to replacing obsolete equipment. To see how much actual new capital is added to the nation's existing capital stock, we need to calculate net investment, or the amount of total investment minus depreciation in a given year.

Net investment—the difference between total investment and depreciation—declined to its lowest level of any business cycle during the current business cycle (see Figure 3). For

Business investment as a share of GDP

II-1947 to III-2008



Note: Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" data released in 2008.

the entire business cycle, net investment averaged to 2.0 percent of GDP, down from 3.0 percent in the 1990s. This is not a fluke whereby a few bad quarters skew the average. There was not a single quarter in the current business cycle when net investment exceeded 3.0 percent—the average of the previous business cycle.²⁵

Moreover, net investment has begun to slow again in the past year after beginning to recover since 2004. Net investment as a share of GDP dropped from 2.6 percent in September 2007, the last peak of net investment, to 2.1 percent in September 2008.²⁶

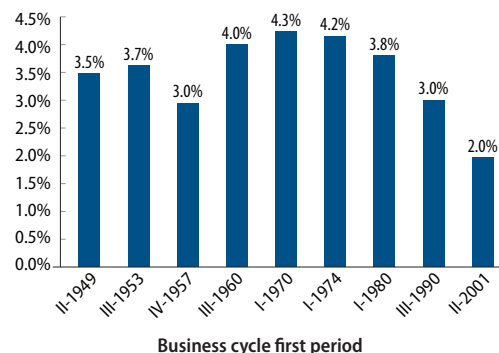
This low level of net investment is even more stunning when it is compared to the five years immediately preceding it, from the end of 1995 to the end of 2000, during which business investment accelerated and net investment averaged 3.8 percent of GDP. By the middle of the year 2000, net investment reached 4.2 percent of GDP, the highest ratio since the second quarter of 1985.

In comparison, even after net investment accelerated during this business cycle, it peaked at just 2.6 percent of GDP in the third and fourth quarters of 2007.²⁷ That is, the best quarters of this business cycle were approximately 40 percent lower than the best net investment performance quarters of the 1990s. That translates into a lot of addition to the national capital base that did not happen.

The low level of net investment reflects two trends. One is the aforementioned low level of total investment relative to the size of the economy. The second is that an ever-larger share of investment is needed to replace obsolete capital and, inversely, that an ever-smaller share of total investment can actually be counted as an addition to the capital stock. In this business cycle, only 18.9 percent of total investment was net new additions, down from 26.9 percent in the 1990s and a peak of 40.5 percent in the late 1960s (see Figure 4).

As the composition of investment shifts to more quickly depreciating capital equipment, it requires additional total investment to achieve the same level of capital expansion that was generated in the past. Net additions to the capital base have been relatively low during this business cycle, which means that capital stock in equipment has eroded relative to the economy. In 2007, the last year for which data are available, the existing stock of usable equipment equaled 38.3 percent of GDP, the lowest share since 1973 (see Figure 5).

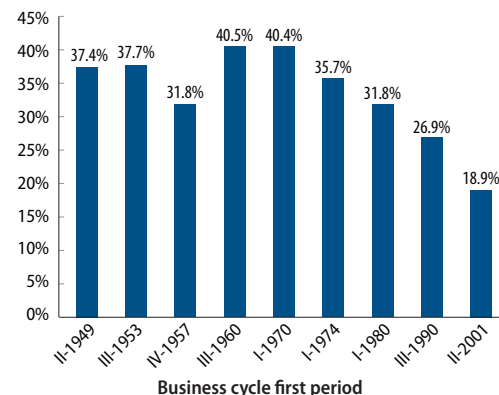
Net investment relative to GDP, business cycle averages



Note: All figures are percent of GDP. Averages are taken from business cycle peak to business cycle peak. Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" data released in 2008.

FIGURE 3

Net investment as share of gross investment, business cycle averages



Note: All figures are percent of total nonresidential fixed investment. Averages are taken from business cycle peak to business cycle peak. Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" data released in 2008.

FIGURE 4

In comparison, the previous business cycle's existing stock of usable equipment was roughly 41 percent of GDP (see Figure 5).²⁸

Critical inputs for knowledge-based economy are declining

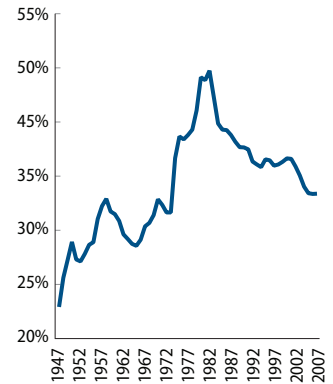
Investments in equipment have been fairly uneven across the different types of investment goods in recent decades. Since the 1980s, investment and capital stock in information processing equipment has grown faster than for other business or industrial equipment (see Table 1). This shift largely reflects the transformation of the U.S. economy from an industrial economy to a knowledge-based economy.

It is especially worrisome to note that since 2000—amid the continued transformation of the economy toward a knowledge-based economy—there has been a marked decline in investment and net capital stock of information processing and software equipment. While investments in these types of equipment expanded relative to GDP by 1.6 percentage points during the 1990s, they have declined by 0.9 percentage points since March 2001—a larger drop than that of industrial equipment and transportation equipment (see Table 1). Also, real investment in information processing and software equipment grew only at an average annualized rate of 5.0 percent in the current business cycle compared to an increase of 15.1 percent in the previous business cycle.²⁹

Finally, the net capital stock in information processing equipment and software declined relative to GDP for the first time since the early 1950s during this business cycle. Specifically, the ratio of information processing equipment and software capital relative to GDP was one percentage point lower in 2007 than it was in 2000. Thus, the capital stock of equipment critical to a knowledge-based economy seems to have eroded noticeably since 2000.

Equipment stock relative to GDP, 1947 to 2007

FIGURE 5



Note: Authors' calculations based on Bureau of Economic Analysis "National Incomes and Product Accounts" and "Fixed Assets" data released in 2008.

Table 1: Equipment and software

Business cycle start date	Total	Information processing and software				Industrial	Transportation	Other
		Total	Computers	Software	Other			
Change relative to GDP (total percentage point change)								
Sept. 1960	0.3%	0.7%	0.2%	0.2%	0.3%	0.2%	0.2%	0.5%
March 1970	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.2%	0.3%
March 1974	0.8%	0.7%	0.2%	0.1%	0.4%	0.2%	0.0%	0.6%
March 1980	-1.3%	0.5%	0.2%	0.5%	-0.1%	-0.6%	-0.4%	-1.4%
Sept. 1990	-0.1%	1.6%	0.3%	1.0%	0.3%	0.0%	0.2%	0.2%
March 2001	0.7%	-0.9%	-0.3%	-0.1%	-0.4%	-0.3%	-0.7%	-1.2%
Real growth rate (annualized percent change)								
Sept. 1990	9.1%	15.1%	n.a.	14.5%	8.4%	3.6%	5.1%	3.0%
June 2001	1.9%	5.0%	n.a.	4.5%	2.6%	-1.0%	-6.3%	1.9%
Capital stock relative to GDP (total percentage point change)								
1949	2.2%	-0.1%	0.0%	0.0%	n.a.	1.5%	0.1%	0.9%
1954	3.2%	0.3%	0.0%	0.0%	n.a.	2.8%	-0.3%	0.4%
1958	0.7%	0.3%	0.0%	0.0%	n.a.	0.6%	-0.2%	0.0%
1961	-0.4%	1.6%	0.5%	0.3%	n.a.	-1.1%	-0.4%	-0.5%
1970	0.3%	0.7%	0.2%	0.1%	n.a.	-0.6%	-0.1%	0.2%
1974	9.4%	1.4%	0.1%	0.2%	n.a.	3.8%	1.7%	2.5%
1980	-3.4%	3.4%	0.8%	0.9%	n.a.	-2.4%	-2.5%	-2.0%
1991	-1.0%	1.9%	0.1%	1.7%	n.a.	-2.2%	0.5%	-1.2%
2000	-3.2%	-0.8%	-0.4%	0.1%	n.a.	-1.3%	-1.1%	-0.1%

Note: Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" and "Fixed Assets" data released in 2008.

Faster productivity growth requires stronger investment growth

The slowdown in investment over the past few years is worrisome because it may suggest a lower likelihood of faster productivity growth in the future. If the slowdown of productivity growth to a level below its long-term average of about 2 percent persists as a structural problem, then the anticipated simultaneous slowdown in investment growth makes it less likely that productivity growth will grow faster in the near future.

Since 1947 there appears to be a close relationship between changes in business investment and productivity growth. To calculate this connection, we first identify five-year periods during which productivity growth was substantially faster than it was in the preceding five years. We then calculate the change in investment relative to GDP during the five years before the acceleration, since it takes some time for capital investments to fully affect productivity.

Employing these investment parameters, we focus on three types of investment: total investment, net investment, and investment in equipment. We then compare the average increases in productivity growth for the five-year periods that were followed by faster productivity growth with the five-year average investment increases that were not followed by faster productivity growth. This (admittedly) simplistic methodology provides us with some indications that investment growth and productivity growth are correlated.³⁰

Since there is no clear definition of what constitutes productivity growth acceleration, we calculate it for several thresholds. We identify a five-year period as clearly having higher productivity growth than the preceding five years if its average productivity growth rate is at least half a standard deviation, a full standard deviation, or one and a half standard deviations greater than the average productivity growth rate for the preceding five years. The standard deviation used here is the standard deviation for the average productivity growth rate over all five-year periods between 1947 and 2007.

The results show that periods of accelerated productivity growth were preceded by increases of investment relative to GDP (see Table 2). For instance, if productivity growth acceleration is defined as a five-year period that has average productivity growth that was at least one standard deviation greater than the average productivity growth of the preceding five years, then the typical investment change in the earlier five years was 1.5 percentage points relative to GDP. When there was no acceleration in productivity growth, there was also no change in the investment preceding it.

In addition, net investment relative to GDP increased by 0.6 percentage points on average before an acceleration of productivity growth defined as productivity growth being at least one standard deviation above the long-term average. It declined by 0.4 percentage points on average before periods with unchanged productivity growth.

Finally, the data also indicate that productivity growth accelerations followed stronger equipment growth. Take again the example of a productivity growth acceleration at least one standard deviation above the long-term average. Prior to such periods, equipment investment relative to GDP increased by 0.8 percentage points, while there was no change before periods with no acceleration. These simple calculations suggest that, since 1947, faster productivity growth has been preceded by strong investment expansions.

Periods of faster productivity growth were preceded by periods of faster investment growth. But is the opposite also true? Were periods of strong investment growth typically followed by an acceleration of productivity growth? Put another way, were there a substantial number of instances in which investment grew noticeably but productivity growth did not accelerate?

To find the answer, we first identify periods of strong investment growth. In this case, periods of strong investment growth are defined as five-year periods during which investment relative to GDP expanded by 1.5 percentage points.³¹

We then calculate the ratio of productivity growth during the five years following the strong investment growth relative to productivity growth during the prior five years. Again, our primary focus is on total investment, net investment, and equipment investment.

The figures do in fact show that periods of strong investment growth were typically followed by an acceleration of productivity growth. When investment relative to GDP expanded at a rate of at least 1.5 percentage points, productivity growth was typically

Table 2: Average change in investment to GDP during periods preceding productivity growth acceleration

Acceleration compared to preceding five years	Median change in investment before acceleration	Median change in investment if there was no acceleration	Median change in net investment before acceleration	Median change in net investment if there was no acceleration	Median change in equipment investment before acceleration	Median change in equipment investment if there was no acceleration
At least half a standard deviation greater	0.8%	0.0%	0.3%	-0.5%	0.4%	0.1%
At least a full standard deviation greater	1.5%	0.0%	0.6%	-0.4%	0.8%	0.0%
At least one and a half standard deviations greater	1.9%	0.0%	1.4%	-0.4%	1.0%	0.1%

Note: All figures are based on five-year percentage point changes in the ratio of (net) investment relative to GDP. Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" and "Fixed Assets" data released in 2008.

59.6 percent higher in the following five years than it was during the years of the investment expansion. Conversely, periods of weaker investment growth were typically followed by a small productivity growth slowdown.

Productivity growth also expanded slightly more following strong net investment growth. In this case, productivity growth accelerated by 65.0 percent, following periods of strong net investment growth, which is marginally faster than the acceleration following strong total investment growth. Finally, accelerations in productivity growth were even slightly larger after five-year periods during which equipment investment increased by at least one percentage point relative to GDP. Typically, productivity growth was 73.3 percent higher in the five years following a one percentage point increase in equipment investment relative to GDP over five years (see Table 3).

If these figures are any indication of future correlations between business investment and productivity growth, then it is worryingly unclear whether the U.S. economy will experience a deceleration in productivity growth in the upcoming months or years.

After all, total investment has fallen over the course of this business cycle, especially due to declining equipment investment. Relevant to this exercise is whether there has been an acceleration of investment. There are some indications of an investment acceleration in the past five years, but only if the lowest standards for an investment acceleration are used. Importantly, the past five years compare to the prior five-year period that included the last recession and a massive investment slowdown. That is, it should have been very easy to exceed the sharp deceleration that happened in the early 2000s.

In particular, the data suggest that there was no acceleration in equipment investment, regardless of which standard is used. There is also no net investment acceleration if acceleration is defined as an increase of at least one percentage point. And there is no acceleration of total investment if acceleration is taken to mean an increase of at least

Table 3: Average change in productivity growth during and after periods of strong investment growth

Investment growth during first five years was	Median ratio of productivity growth after and during strong investment growth	Median ratio of productivity growth of five-year periods without strong investment growth	Median ratio of productivity growth after and during strong net investment growth	Median ratio of productivity growth of five-year periods without strong net investment growth	Median ratio of productivity growth after and during strong equipment investment growth	Median ratio of productivity growth of five-year periods without strong equipment investment growth
At least 0.5 percentage points relative to GDP	107.5%	93.9%	108.2%	93.9%	94.3%	97.8%
At least 1.0 percentage points relative to GDP	119.0%	94.7%	125.4%	93.9%	127.1%	92.6%
At least 1.5 percentage points relative to GDP	159.6%	90.4%	165.0%	93.2%	173.3%	93.9%

Note: All figures are based on five-year percentage point changes in the ratio of (net) investment relative to GDP. Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" and "Fixed Assets" data released in 2008.

1.5 percentage points relative to GDP. Against this background, there is a good chance that the productivity growth slowdown of the past few years may be more than just a cyclical, passing phenomenon.

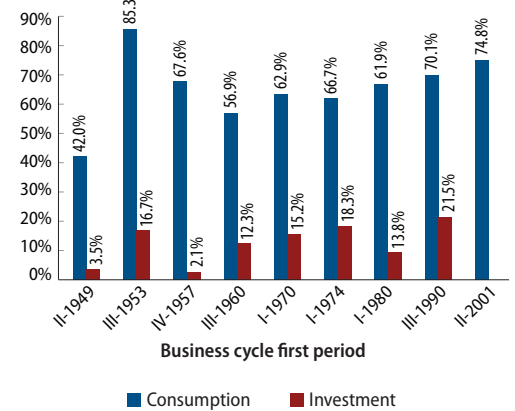
Stronger investment needed to drive economy

Aside from laying the foundation for faster productivity growth in the future, stronger investment growth could provide momentum for our flagging economic growth. To a much larger degree than in the recent past, U.S. economic growth has been carried by consumer spending throughout this business cycle. Between March 2001 and September 2008, 74.8 percent of economic growth came from consumption spending, a larger share than during any business cycle since the 1950s (see Figure 6).

During the same period, however, investment contributed the least to the total economic expansion of any business cycle since the late 1950s. Business investment contributed a total of 7.6 percent of economic growth between March 2001 and September 2008. In comparison, during the 1990s business investment contributed more than one-fifth of the growth rate, the highest share of any business cycle.

This should be reason for concern, since consumer spending has largely been driven by an unprecedented debt expansion that is now coming to an end. Consumer spending has been showing signs of slowing for some time now. In the third quarter of 2008, consumer spending dropped by an annualized rate of 3.7 percent in inflation-adjusted terms. This was the largest such decline since the second quarter of 1980. Clearly, consumers have run out of steam.

Relative growth contribution from consumption and investment, business cycle averages



Note: Authors' calculations based on Bureau of Economic Analysis "National Income and Product Accounts" data released in 2008.

FIGURE 6

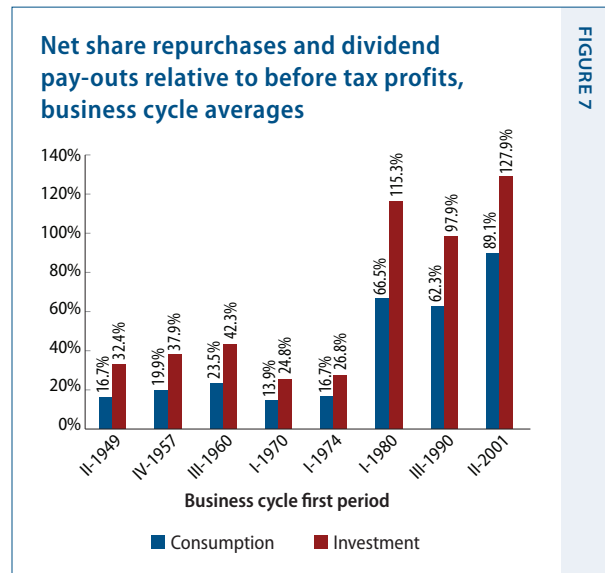
Firms decided to spend their money elsewhere

Getting businesses to spend more money on investment is easier said than done, as there are essentially two short-run obstacles. First, businesses have used an increasing share of their profits over the current business cycle for purposes other than capital equipment expenditures, mostly on share buybacks and dividend payouts.³² Second, with consumer spending spurred by an unsustainable debt boom, businesses may well find they have fewer incentives to invest more since they have experienced a slowdown in sales.

Certainly, businesses held back on investing their resources in productive capital, despite very high profits. For example, the share of capital expenditures relative to pre-tax profits has sunk to its lowest level in decades. For the entire business cycle, corporate capital expenditures averaged to about one and a half times current before-tax profits and about two times after-tax profits, the lowest level since the mid-1970s.³³

This low ratio of capital expenditures in part resulted from high corporate profits. For the entire business cycle, the ratio of before-tax profits to corporate assets averaged 3.1 percent and after-tax profits averaged to 2.2 percent of total assets. This was the highest level since the 1970s of the ratio of after-tax profits to corporate assets.³⁴ In other words, there was more money available than in the past, but corporations were much less likely than in the past three decades to use those funds for investments in plants and equipment.

Instead, corporations have used their funds to buy back their own shares and pay out dividends. The share of pre-tax profits used for net share repurchases and dividend pay-outs was 89.1 percent during the current business cycle, larger than it was for any previous business cycle (see Figure 7). The share of after-tax profits used for net share repurchases and dividend pay-outs was 127.9 percent, another record high for any business cycle.



Note: Calculations based on the Federal Reserve Board of Governors "Flow of Funds Accounts of the United States" data released in 2008. All figures are percent averages from business cycle peak to business cycle peak.

Conclusion

Business investment and productivity are key components of economic growth and stability. Investment increases the capital base and lays the foundation for future productivity growth. Growing levels of business investment mean that businesses are demanding more capital inputs, which in turn increases economic demand in the short run and translates into faster economic growth. Greater economic growth means more jobs and higher levels of consumption overall, which provides businesses an incentive to invest more in their operations, leading to faster output growth in the short run and, if all goes well, in faster productivity growth in the long run and ultimately higher living standards in an expanding economy.

This virtuous circle of productivity-driven growth characterized the mid- to late-1990s, but over the past six years economic growth—before the current financial crisis hit the economy—has largely been driven by consumer spending. The recent economic downturn may be a demonstration of how this new engine of growth is unsustainable in the long run because of the low personal savings rate, slow income growth, and high household debt financing consumption. Even though the economy has experienced ongoing replacement investment in new capital equipment and services, there has not been a high level of net new capital investment in recent years. Despite record profit levels, many companies have chosen to use their money in ways other than investing directly in growing their businesses overall productivity.

Now that consumption growth and the economy overall have slowed, businesses do not have an incentive to increase investment in their capital goods since income growth is also anemic. Combine these observations with the fact that productivity growth has slowed from its accelerated pace of the 1990s and does not appear to be increasing in the near future, and one can see that signs might in fact point to a continued slowdown in economic growth over at least the next few quarters.

Many economists now believe it is only a matter of “when” rather than “if” the U.S. economy will be declared to have entered a recession. But the U.S. economy also may very well have started to settle into a long-term, slow-growth pattern that could last well beyond any official recession. This means that we need to pay more attention to income growth and to business investment, especially in new technologies appropriate for a knowledge-based economy.

The U.S. economy, which had to run faster simply to stay in place for several years, may now be at risk of slipping off the treadmill altogether. Ignoring the need to concentrate more on improving income growth and business investment would open the door for substantially lower living standards in the future.³⁵

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- 3 Carmen DeNavas-Walt et al., "Income, Poverty, and Health Insurance Coverage in the United States: 2007" (Washington: U.S. Census Bureau, 2008).
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- 7 Edith Rasell et al., "America's Golden Years: Ensuring Prosperity in an Aging Society" (Washington: Economic Policy Institute, 1998).
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- 10 Ibid.
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- 15 Authors' calculations based on U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts" (2008).
- 16 Note: Data, not shown here, are taken from Bureau of Economic Analysis, "National Income and Product Accounts."
- 17 Note: Not only is this the foundation of modern economics, the alternative would also imply unrealistic long-run outcomes. If productivity grew faster than workers' compensation over sufficiently long periods of time, workers would receive an ever-smaller share of national income. In the extreme, the labor share of national income would ultimately approximate zero. In the opposite case, workers would receive all the gains and companies would get nothing. Neither scenario is likely.
- 18 Susan Houseman, "Outsourcing, Offshoring, and Productivity Measurement in U.S. Manufacturing," Working Paper No. 06-130 (W.E. Upjohn Institute for Employment Institute, 2007).
- 19 For details see Dean Baker, "The Productivity to Paycheck Gap: What the Data Show" (Washington: Center for Economic and Policy Research, 2007); Dean Baker and David Rosnick, "Usable Productivity Growth in the United States: An International Comparison, 1980-2005" (Washington: Center for Economic and Policy Research, 2007).
- 20 For details see Goldman Sachs, "Slower Productivity Growth? Not So Fast!" *U.S. Economic Analyst*, No. 07/16 (2007).
- 21 Note: One possible explanation for this cyclical discrepancy is that much of the recent growth was driven by the boom in construction. It is possible that a substantial share of workers in construction may have been undocumented. Since these workers were not counted in the run-up during the boom years, productivity growth may have been overstated. In turn, since these undocumented workers are not counted as disappearing from the labor force, recorded employment changes are smaller than they actually are, thus also reducing productivity growth.
- 22 Bureau of Economic Analysis, "National Income and Product Accounts."
- 23 Authors' calculations based on Board of Governors, Federal Reserve System, "Flow of Funds Accounts of the United States" (2008).
- 24 Note: Details are not shown here. Authors' calculations based on U.S. Department of Commerce, Bureau of Economic Analysis, "National Income and Product Accounts."
- 25 Ibid.
- 26 Ibid.
- 27 Ibid. Details are available from authors upon request.
- 28 Note: The total capital stock and the capital stock in structures relative to GDP show an increasing trend starting in 2003. Similarly, as Figure 2 suggests, investment in structures relative to GDP increased in recent years while investment in equipment relative to GDP stayed flat. Importantly, the apparent increase of commercial real estate capital stock and of investment in structures is a result of accelerated commercial real estate inflation. For instance, after accounting for inflation, commercial real estate investment did not begin to accelerate until the middle of 2005, even though the non-inflation-adjusted ratio of commercial real estate investment relative to GDP began to increase in the middle of 2003.
- 29 Authors' calculations based on Bureau of Economic Analysis, "National Income and Product Accounts."
- 30 Note: The authors also conducted the same analysis with the quantity indexes available from Bureau of Economic Analysis, "National Income and Product Accounts." The analysis of the quantity index data also supported the paper's conclusion.
- 31 Note: The average quarterly change in gross investment relative to GDP was 0.00 percentage points from 1947 to 2007 and the average quarterly change in net investment relative to GDP was -0.01 percentage points.
- 32 L. Josh Bivens and Christian E. Weller, "The 'Job-Loss' Recovery: Not New, Just Worse," *Journal of Economic Issues* XL (3) (2006): 603-628.
- 33 Authors' calculations based on Board of Governors, "Flow of Funds Accounts of the United States."
- 34 Ibid.
- 35 Note: For some initial ideas of how we could help innovation and productivity back on track in the economy, see two papers in the Center for American Progress' *Progressive Growth* series: Tom Kalil and John Irons, "A National Innovation Agenda: Progressive Policies for Economic Growth and Opportunity through Science and Technology" (Washington: Center for American Progress, 2007); John Podesta, Todd Stern, and Kit Batten, "Capturing the Energy Opportunity: Creating a Low-Carbon Economy" (Washington: Center for American Progress, 2007).

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