

Board of Governors of the Federal Reserve System

Speech

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Productivity and Economic Outlook

I appreciate the opportunity to speak with you today about productivity and the outlook for the U.S. economy. As you know, long-term growth in productivity is critically important to improving the standard of living in any economy. The rate of growth of productivity can significantly affect inflation and economic expansion. But before I comment on productivity, I'd like to begin with a review of recent economic developments.

Economic Developments

Real economic activity has continued to expand at a solid pace. Clearly, the tragedy that hurricanes inflicted on New Orleans and surrounding areas of the Gulf Coast will have major implications for the people and the economy in those regions for a long time. However, for the nation as a whole, employment and industrial production indicators were only briefly disrupted by the hurricanes during the late summer and early fall. At the national level, consumer spending has been well maintained, and the fundamentals--such as income growth and household balance sheets--remain supportive. Many news reports and anecdotes suggest that the housing market is cooling and that investors are participating less actively. However, the construction of new homes has remained near recent highs. In the business sector, investment in new equipment continues to expand at a good clip, boosted by robust sales as well as ongoing replacement and upgrading needs. In addition, as I'll discuss in a moment, corporate financial conditions are favorable for investment.

Turning to prices, core inflation has stayed relatively low in recent months despite the run-up in energy costs. For example, the twelve-month change in the price index for personal consumption expenditures excluding food and energy, a widely watched indicator of core inflation, moved down from 2.3 percent in November 2004 to 1.8 percent in November 2005.

Although energy prices have receded from the highs last fall, crude oil costs are still well above year-earlier levels. As a result, gasoline prices remain elevated despite a decline of about 70 cents per gallon from the peak recorded in the aftermath of the hurricanes. The prices for home heating oil and natural gas will add to consumers' budget pressures this winter; although spot prices have moved lower in recent weeks, they are still well above year earlier levels.

Higher energy prices have also affected businesses, particularly in those industries with energy-intensive production processes and those that purchase a large share of energy-intensive products, such as industrial chemicals and plastics. There is only limited evidence, most of it anecdotal, of pass-through to consumer prices from the run-up in energy prices. However, we are seeing the effects in the price data for certain energy-intensive categories, such as transportation.

Futures markets currently expect only limited increases in the price of crude oil this year. Nevertheless, tight resource utilization is likely to put pressure on prices. The unemployment rate, at 5 percent in the second half of 2005, was down about 1 1/4 percentage points from its recent peak in early 2003 and at its lowest level in four years. Meanwhile, the factory operating rate--a measure of resource utilization in the manufacturing sector--was 79.6 percent in December, a rate that is approaching its 1972-2004 average of 79.8 percent. Within manufacturing, industries operating at utilization rates above their long-run averages include plastics and rubber products, iron and steel

products, machinery, electronic products (excluding computers), and electrical equipment, appliances, and components. And although the overall high technology aggregate is below its long-run average rate of utilization, the operating rate at firms making computers and peripherals is above average, and the rate at manufacturers of communications equipment has risen significantly over the past year. As in the mid- to late-1990s, resilient productivity growth appears to be helping contain the inflationary pressures that might otherwise be expected to accompany a narrowing margin of resource slack. That said, we at the Federal Reserve will remain vigilant for any sign of a deterioration in the inflation outlook.

As I mentioned earlier, the core inflation rate has stayed relatively low in recent months, as rapid gains in productivity have tended to offset cost increases. Reflecting these developments is a continued rise in corporate profits, which has allowed firms to further bolster their strong balance sheet positions. Corporate balance sheets have improved dramatically over the past couple of years because of surging profits, low interest rates, and a concerted deleveraging, which have combined to reduce debt burdens and increase liquidity in the form of cash assets. Generally speaking, the growth of profits and the related buildup of cash have been broadly distributed across industries. And with the sound corporate financial positions, credit spreads remain narrow, and bank lending terms remain favorable. These beneficial financial conditions, combined with rising utilization rates, bode well for further increases in business capital expenditures. Indeed, capital expenditures for most types of equipment increased significantly during the third quarter, and Census data on orders and shipments suggest that investment continued to expand in the fourth quarter, with much of the gain in spending for information technology--that is, computers, communications equipment, and software.

Productivity and Technology

Let me now turn from the overall economic outlook to productivity and technology developments. Productivity growth receives a considerable amount of attention from policymakers because its rate is an important determinant of a nation's standard of living. The development of farm machinery in the early 1800s, for example, boosted the productivity of farmers and consequently freed up labor to shift to the industrial sector. More recently, continued increases in industrial productivity have enabled a relative shift of employment into the production of services. Although manufacturing employment has fallen sharply in recent years, both in absolute terms and as a share of total employment, the output of the nation's manufacturers has continued to increase because of impressive productivity gains.

Looking beyond manufacturing to the broader nonfarm business sector, we see that productivity growth has risen significantly over the past decade in the United States. Labor productivity gains accelerated from an average annual increase of 1 1/2 percent over 1973-95 to an average annual increase of 2 1/2 percent over 1995-2001. From the first quarter of 2001 through the third quarter of 2005, labor productivity growth picked up even more--to an annual rate of nearly 3 1/2 percent. Thus, despite a recession, a tech-sector meltdown, a stock market correction, terrorism, and corporate governance scandals, our economy has proven remarkably resilient and productive.

These productivity gains result from many forces, including business investment that has increased the amount and quality of capital available to the workforce, business process innovations, and the growth of innovative, research-intensive industries such as information technology and biotechnology. Because firms may take a while to absorb a rapid run-up in investment, the productivity payoffs to investment may be drawn out for some time as firms learn more effective ways to use the capital they have acquired. Anecdotal information suggests that some of the recent productivity gains appear to reflect firms making better use of existing capital and improving business processes.

As I noted, the growing importance of the innovative technology sector has spurred productivity growth. I will focus on developments in the information technology (IT) sector; we at the Federal Reserve know more about IT than other high technology areas because of the availability of a wide variety of data. Moreover, economists better understand the role of IT in the U.S. economy, particularly its influence on productivity growth, because developments in this sector are more

easily quantified than developments in other pioneering fields, such as biotechnology.

In thinking about information technology equipment and productivity, I find a useful starting point to be recalling the role of IT capital accumulation during the last business cycle. Work by Federal Reserve economists suggests that a large chunk of the increase in the rate of productivity growth in the late-1990s was due to the accumulation of IT capital. During that period, many firms invested heavily in IT in an effort to stay on top of the so-called "technological revolution." One consequence of this drive to acquire high-tech equipment appears to have been a massive overhang of IT capital that has only recently been largely worked through. An example of this overhang has been the great amount of underutilized fiber optic cable resulting from the race to build fiber optic networks.

The accumulation of IT capital boosted productivity growth in many industries. At least some of the capital, however, may have been accumulated without a clear understanding of how to fully utilize the technology to create value for the adopting organizations. As a result, in recent years firms appear to be realizing further productivity gains as they discover new and better methods for using IT.

As I'm sure many in this audience know better than I do, one way in which firms have started to use IT more effectively is by exploiting synergies among network equipment, computing equipment, and software. These synergies may spur adoption of new technologies and increase the potential for further productivity gains. For example, in the 1990s, the combination of cheap modems, faster semiconductors, and browser software helped to jumpstart the World Wide Web. More recently, firms have been using leading-edge IT products to consolidate their networks, effectively enabling a single communications network to carry data, voice, and video. Besides innovations in hardware, ongoing developments in software have helped firms augment the capabilities of their communications equipment and computer networks. Increasingly, software upgrades are used to roll out new features without the need for heavy investment in new hardware. For example, a business using an Internet-based telephone system, better known as VoIP (voice over internet protocol), may be able to upgrade the features on its phones through a software update rather than buying new phones or installing new cables.

For many years, companies in the United States have been at the forefront of new technology developments. With demand for IT continually evolving, taking a moment to review the U.S. role in the production of IT equipment is worthwhile. Despite the globalization of high-tech production, the U.S. capacity to produce high-tech products is still increasing. The Federal Reserve Board's estimates of capacity in industries that manufacture high-tech equipment--which includes semiconductors and related electronic components, computers, and communications equipment--increased more than 20 percent between the fourth quarter of 2004 and the fourth quarter of 2005, after rising at an annual average rate of about 8 percent during the previous three years.

So, what high-tech equipment do we produce in the United States, when every item at the local computer store appears to have been made abroad? A significant portion of the U.S. capacity for high-tech production focuses on leading edge products and on customized products for which close proximity to customers is an advantage. Most desktop computers sold in this country are assembled here, as are many high-end computer servers and storage network devices. Within the category of communications equipment, much of the high-end networking equipment (such as the routers and switches used by telecom service providers) is produced domestically. U.S. factories also produce leading-edge microprocessors, certain flash memory products (used in portable media players, digital cameras, and cell phones), and a variety of semiconductors used in communications equipment. In contrast, laptops tend to be imported in a nearly completed state, and we are largely importers of mobile phones, computer peripherals (monitors, printers, and so forth), consumer communications equipment (such as home routers), and a great variety of semiconductors. But we must keep in mind that, even for products that are produced abroad and imported, U.S. companies continue to perform a significant share of the research and development that those products entail.

Because the development and the production of IT products play a vital role in the U.S. economy, the Federal Reserve continually watches for new developments in the pace of technological change

and tries to gauge the likely influences of these developments on productivity growth. In most cases, data on the pace of technological change are hard to come by, so we carefully examine data on production and price trends. For example, the production of communications equipment dropped sharply during the last recession, and these products accounted for a large share of the capital overhang in high-tech equipment. However, since its trough in 2002, the Federal Reserve Board's industrial production index for communications equipment has risen about 75 percent, with particularly pronounced increases in the production of high-end routers and switches. These devices are needed to support advanced mobile technologies, the upgrading of telecom service provider equipment, and the attempts to solve the so-called "last-mile" problem--that is, a low-cost way to bring a fiber-optic speed data pipe down your street and into your home or business.

The pace of change in communications equipment and computers is, to some degree, related to the pace of change in the components of these products, particularly semiconductors. Even in the semiconductor industry, however, measuring the pace of technological change is difficult and fraught with uncertainty. The difficulty is partly that improvements along one dimension may introduce challenges along other dimensions. For example, as the industry shrinks the features of a semiconductor, such as the microprocessor in your personal computer, the chip can conduct calculations more quickly, but it also produces more heat. Another part of the difficulty is determining exactly when changes occur and how much of any change is due to a particular improvement. Industry data, for example, suggest that the introduction of improvements in calculation speed accelerated in the late 1990s and may have decelerated around the beginning of this decade. However, the exact dates are difficult to pin down, and they tend to vary with the type of semiconductor. In addition, any deceleration in the pace of introducing faster semiconductors may have been offset by innovative efforts to reduce energy consumption or to improve wireless capabilities. With the growing use of mobile, battery-powered communications technologies and computers, energy consumption and connectivity may be just as important as speed.

In light of the difficulties and uncertainties that are associated with measuring the pace of technological change, I want to take a moment to comment on the risks for the appropriate conduct of monetary policy that are associated with technology and productivity. Because technology feeds into various macroeconomic aggregates--including household and business spending, productivity, and inflation--its implications for the U.S. economy will continue to necessitate careful observation, improved measurement, and study. Members of the Federal Reserve staff, both at the Board and at the Reserve Banks, have contributed significantly along all three of these dimensions by improving measures of high-tech prices and output and by studying the implications of technology on U.S. productivity. A significant slowing in the pace of technological change could have inflationary consequences. Accordingly, monetary policy makers will remain alert, carefully monitoring technological developments that have the potential to mitigate inflationary pressures as well as developments that could raise the risk of overheating.

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