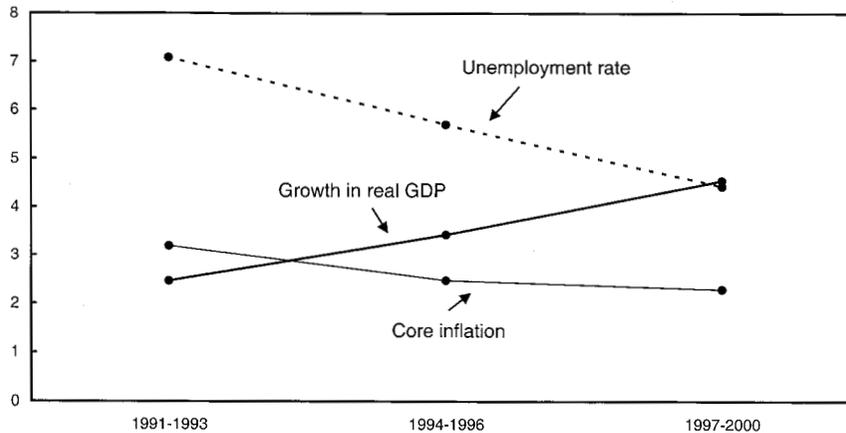


The Making of the New Economy

GDP Growth, the Unemployment Rate, and Core Inflation, 1991-2000
Percent



Note: Real GDP growth (chained 1996 dollars) and inflation (measured by the CPI-U-RS) are average annual rates from the end of the preceding year through the end of the period. Unemployment rates are monthly averages. Data for 2000 are through the third quarter for real GDP and through November for unemployment and inflation.

Sources: Department of Commerce (Bureau of Economic Analysis) and Department of Labor (Bureau of Labor Statistics).

An extraordinary expansion: rising growth, a falling unemployment rate, and falling core inflation.

Over the last 8 years the American economy has transformed itself so radically that many believe we have witnessed the creation of a New Economy. This *Report* presents evidence of fundamental and unanticipated changes in economic trends that justify this claim. In the 1990s, after two decades of disappointing performance, the economy enjoyed one of its most prosperous periods ever. Strong and rising growth in real gross domestic product (GDP), declining and then very low unemployment, and a low, stable core inflation rate characterize the long expansion. Even though growth moderated in the second half of 2000, the achievements of the past 8 years remain impressive.

From the first quarter of 1993 through the third quarter of 2000, real GDP grew at an average annual rate of 4.0 percent—46 percent faster than the average from 1973 to 1993. This exceptional growth reflects both strong job creation and increased productivity growth. Americans are working in record numbers: the number of payroll jobs has increased by more than 22 million since January 1993, and in 2000 the share of the population employed reached its highest level on record. Also in 2000 the unemployment

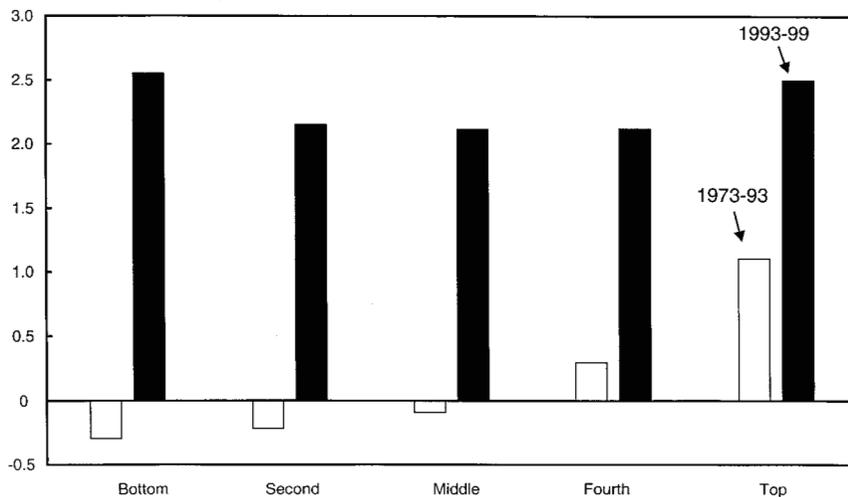
rate dipped to 3.9 percent, the lowest level in a generation. Unemployment rates for African Americans and Hispanic Americans were the lowest since separate statistics for these groups were first collected in the early 1970s.

Americans are not only working more; they are also working smarter. The economy has rapidly become more productive. Since the beginning of 1993, output per hour in the nonfarm business sector has grown at an average rate of 2.3 percent per year, compared with an average of 1.4 percent per year for the previous 20 years. Even more remarkably, since the fourth quarter of 1995 productivity growth has averaged 3 percent per year. This acceleration in productivity has produced higher incomes and greater wealth. From 1993 to 1999, the real income of the median household grew more than in any period of similar length in the last 30 years. Meanwhile the value of corporate stocks has nearly trebled, even after taking into account the downward adjustment in stock prices during 2000.

These income gains have also been widely shared: even incomes at the bottom of the distribution have risen rapidly (Chart 1-1). Disadvantaged groups have seen their situation improve markedly. The overall poverty rate declined to 11.8 percent in 1999 (the most recent year for which data are available), its lowest level since 1979 and 3.3 percentage points below the rate in 1993. The poverty rate for African Americans was 23.6 percent in 1999—still too high, but far below the 1993 level of 33.1 percent. The poverty rates for Hispanic Americans and elderly Americans have also fallen sharply.

Growth in household income since 1993 has been both stronger and more equally distributed than it was over the previous 20 years.

Chart 1-1 Growth in Real Household Income by Quintile, 1973-93 and 1993-99
Average annual percent change



Source: Department of Commerce (Bureau of the Census).

This chapter describes the remarkable achievements of the 1990s and the factors that gave rise to the New Economy. The chapter identifies the sources of the economy's faster growth and estimates the contribution of each. The focus is on information technology and the factors that reinforce its impact: organizational change and sound economic policy. Updated, sector-specific data on productivity gains indicate that those sectors that have invested the most in information technology—wholesale trade and finance, among others—experienced some of the greatest productivity gains during the 1990s. The chapter then highlights the importance of innovation in business practices in firms throughout the economy. It goes on to discuss the importance of sound fiscal policy, competition-enhancing trade and technology policy, and effective social policy—all working together to further the progress of the New Economy—and the gains that have already been made. The chapter concludes by looking ahead to the challenges we will face in the coming years to sustain the virtuous cycle of growth and innovation—and to share fully in its rewards.

The Economy from 1973 to 1993

The remarkable economic trends of the 1990s took many by surprise. They represent a distinct change from the 1970s and 1980s, decades in which the economy was plagued by persistent inflation, periodically high unemployment, slow growth in productivity, rising inequality, and large Federal budget deficits. Stagflation was an unwelcome phenomenon of the 1970s, as two major oil shocks were followed by simultaneous inflation and recession. The massive and costly recession of the early 1980s and the collapse of oil prices in 1986 broke the back of the very high inflation rates that had emerged in the late 1970s. But as unemployment fell below 6 percent in the late 1980s, core inflation started to climb again. Between 1973 and 1993, GDP growth received a boost from the large numbers of women and baby-boomers entering the work force. But at the same time, persistently slow productivity growth (averaging less than half of what it had been during the preceding 25 years) kept GDP growth in check.

These trends affected the incidence of poverty. In the 1960s and early 1970s, poverty had been declining as economic progress gradually raised the incomes of those at the bottom. The nationwide poverty rate, which had stood at 22.2 percent in 1960, fell to 11.1 percent in 1973. But the combination of slow productivity growth and a relatively slack labor market likely played a role in ending this improvement, dragging down household incomes, especially for the poorest. The poverty rate continued to fluctuate, falling during expansions in the business cycle and rising during contractions.

However, throughout the 1980s it never fell lower than 12.8 percent, far above the low of the early 1970s. And by 1993 poverty had risen to 15.1 percent, almost matching the 1983 level of 15.2 percent, its worst since the 1960s.

Federal budget deficits had become commonplace in the 1970s, but they increased rapidly in the 1980s in the presence of a fiscal policy based on overly optimistic budget forecasts. Efforts to restore fiscal discipline in 1990 failed because of a weakening economy, and deficits grew worse rather than better, reaching almost \$300 billion in fiscal 1992. By the end of fiscal 1981, publicly held Federal debt had fallen to 25.8 percent of GDP. By the end of fiscal 1993 it had almost doubled, to 49.5 percent.

Given these problems, few believed in 1993 that the U.S. economy could achieve and sustain low unemployment rates, moderate inflation, or robust productivity growth, let alone all three. The Federal Government seemed incapable of balancing its budget, and there was little to suggest that U.S. incomes could grow more rapidly than those in other major industrial countries. Yet in the years that followed, all of these seemingly improbable events occurred—and at the same time.

What Makes the Economy New?

The U.S. economy today displays several exceptional features. The first is its strong rate of productivity growth. Since 1995 the trend rate of productivity growth has been more than double that of the 1973–95 period. A second is its unusually low levels of both inflation and unemployment. In the past, low levels of unemployment have usually meant sharply rising inflation. Yet despite an unemployment rate that has been close to (and at times below) 4 percent for 2 years, core inflation has remained in the 2 to 3 percent range. A third is the disappearance of Federal budget deficits. Federal fiscal policy often becomes more expansionary as a period of economic growth is sustained, yet in the past 8 years the structural budget balance has moved steadily from a massive deficit to a large surplus. A fourth is the strength of the U.S. economy's performance relative to other industrial economies. As a world technological leader, the United States might have been expected to grow more slowly than countries that can benefit from imitating the leader's technological advances. Yet over the second half of the 1990s, the United States continued to enjoy both the highest income per capita and the fastest income growth of the major industrial nations. These developments reveal profound changes in economic trends that justify the term "New Economy."

Three interrelated factors lie behind these extraordinary economic gains: technological innovation, organizational changes in businesses, and public

policy. Information technology has long been important to the economy. But in the early 1990s a number of simultaneous advances in information technology—computer hardware, software, and telecommunications—allowed these new technologies to be combined in ways that sharply increased their economic potential.

In part to realize this potential, entrepreneurs instituted widespread changes in business organizations, reconfiguring their existing businesses and starting new ones. These changes included new production methods and human resource management practices, new types of relationships with suppliers and customers, new business strategies (with some firms expanding the scope of their enterprises through mergers and acquisitions, and others streamlining them to best utilize core competencies), and new forms of finance and compensation.

Public policy was the third driving force. This Administration embraced policies and strategies based on fiscal discipline, investing in people and technologies, opening new markets at home and abroad, and developing an institutional framework that supported continued global integration. Together these created an environment in which the new technologies and organizational changes could flourish.

The interactions among these three factors have created a virtuous cycle in which developments in one area reinforce and stimulate developments in another. The result is an economic system in which the whole is greater than the sum of its parts. New technologies have created opportunities for organizational innovations, and these innovations in turn have engendered demand for these technologies and others still newer. The increased growth prompted by the new technologies helped the Federal Government restrain its spending growth and boosted its revenue; the resulting smaller budget deficits (and later surpluses) have helped keep interest rates down, encouraging further investment in new technologies. Economic policies directed toward promoting competition have prodded firms to adopt the new technologies, spurring other firms to innovate or be left behind. Policies aimed at opening foreign markets have increased earnings in the U.S. technology sector, leading to yet more innovation, including innovation in information technologies, which have lowered barriers to trade and investment still further. These market-opening policies have also allowed U.S. producers to become more productive, by expanding the variety of key inputs available to them.

This Report defines the New Economy by the extraordinary gains in performance—including rapid productivity growth, rising incomes, low unemployment, and moderate inflation—that have resulted from this combination of mutually reinforcing advances in technologies, business practices, and economic policies.

Sustaining the Virtuous Cycle

Americans can be gratified by the achievements of the last 8 years, but we must not become complacent. The economy has been performing well for so long now that there is a danger of taking growth for granted. There are good reasons to believe that the long-term trend rate of productivity growth has increased relative to the post-1973 trend, and many new technologies do not yet appear to have exhausted their potential for further improvements. On the other hand, more moderate economic growth is projected for 2001 and beyond. Hence the economic forecast described in Chapter 2 is optimistic, but also cautious about the future.

In addition, it would be a grave error to assume that the economy has been so transformed that the basic rules of economics no longer apply. The potential for faster growth exists, but demand cannot run ahead of supply without the danger of rising inflation. The economy also remains susceptible to cyclical fluctuations. Indeed, the rewards of the New Economy are associated with increased risk, since the economy depends more heavily than before on financial markets, which remain volatile.

Abandoning the public policies that have helped transform the economy would also be a mistake. The current prosperity certainly reflects, above all, the efforts of the private sector, but it would be wrong—and dangerous—to ignore the contribution of policy. In particular, it would be risky to put aside the policies that have helped us move from huge budget deficits to large surpluses and have laid the groundwork for the capital formation that has been so important in stimulating growth. It would be just as dangerous to undermine the policies that have supported the investments in people and technologies that are the keys to advancing productivity. It would be folly to abandon the efforts to increase competition in markets at home and abroad, because it is this competition that helped create a domestic business environment in which entrepreneurs can flourish and a global economy from which all Americans can benefit. Finally, the government should continue its efforts to ensure that prosperity is more widely shared, because this is something the private sector will not automatically accomplish on its own.

A strong economy, even the extraordinary economy of the last 8 years, cannot solve all America's problems or guarantee that every American will be better off. Important steps have been taken to spread the benefits of economic growth to disadvantaged regions and families. But much remains to be done. The resources are available to tackle the problems of insufficient access to health insurance, of aging educational facilities, and of a Social Security system that lacks adequate long-term reserves, to name a few. The challenge is how best to use these resources to improve the well-being of all Americans.

Information Technology and the New Economy

Spending on information technology has clearly played a leading role in the recent acceleration of economic growth. Although this sector remains a fairly small part of the economy—its share of GDP was an estimated 8.3 percent in 2000—it accounted for almost one-third of all output growth between 1995 and 1999 (Chart 1-2). Even more remarkable, in 1999 business spending on information technology equipment and software was responsible for more than 11 percentage points of the 14 percent real growth in total equipment and software spending by business. The information technology sector is also one that has seen a surge in innovation. To be sure, the computer, the cell phone, optical fibers, lasers, and the Internet had all been invented before the mid-1990s. But over the course of that decade, a series of innovations in computer hardware and software and in telecommunications took place that has allowed for new and complementary interactions among these technologies on an unprecedented scale—a dramatic example of which is the emergence and increasing commercial use of the World Wide Web.

There is a broad consensus that information technology has been important in the recent surge in economic performance. But the role of developments beyond this sector remains more controversial. One view of the recent economic transformation identifies the New Economy narrowly with the production and use of information technology. Some proponents of

Roughly 30 percent of the growth in gross domestic income since 1995 has come from the information technology sector.

Chart 1-2 Growth in Gross Domestic Income Due to the Information Technology Sector
Percent of total growth



Note: The information technology sector encompasses computer and communications hardware manufacturing, software development, and computer and communications services. Data for 1998 and 1999 are estimates.
Source: Department of Commerce (*Digital Economy 2000*).

this view argue that performance in the rest of the economy has simply followed previous trends, or that the recent strong economic growth has boosted it only temporarily.

Although the innovation and diffusion of information technology have clearly been important, the broader definition of the New Economy adopted in this *Report* more accurately conveys the pervasiveness of the recent economic changes. A growing body of evidence now shows that the widespread application of information technologies has stimulated remarkable improvements in production processes and other business practices outside the information technology sector. But innovations in information technology and its use have not been the only source of such change. Indeed, there has been a surge in innovation in other technologies as well. Together with supportive public policies, these changes have fundamentally transformed the economy. An examination of recent productivity growth supports this view.

The New Trend in Productivity Growth

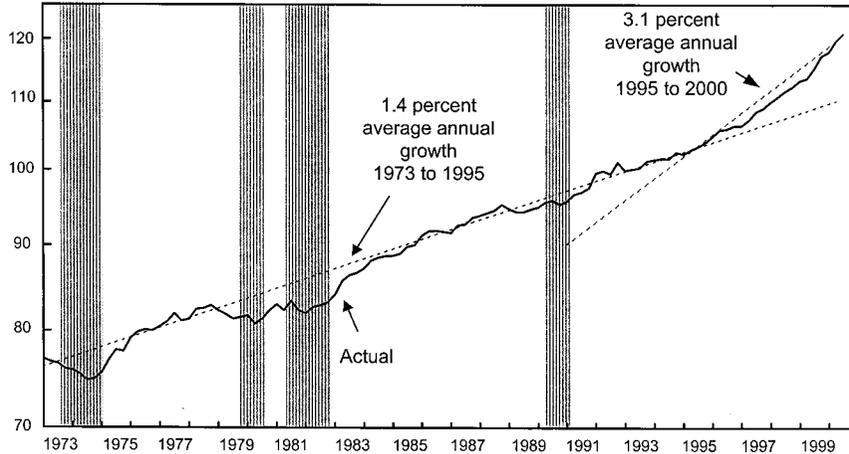
Productivity is now growing considerably faster than it did over the 20 years after 1973 (Chart 1-3). What can be said about the sources of this acceleration? Two simple analyses help to answer this question. The first estimates the contributions to growth in aggregate private nonfarm business productivity from each of the different sources of that growth, such as increases in the amount of capital per worker. The second uses data on output and employment by industry to pinpoint the areas of economic activity where the acceleration has taken place.

Sources of Growth: Capital, Labor Quality, and Total Factor Productivity

A standard model of economic growth allows us to estimate how various sources have contributed to the recent acceleration of productivity. Table 1-1 shows that productivity, measured as output per hour in the private nonfarm business sector, accelerated in the late 1990s. Its growth rate rose from an annual average of 1.4 percent before 1995 to an annual average of 3.0 percent from 1995 through 2000. The total acceleration from the first period to the second is thus slightly more than 1.6 percentage points. (The results reported in Chart 1-3 and Table 1-1 are based on real output increases that are averages of growth in production and growth in income, each of which is a valid measure of private nonfarm output. The chart and the table differ slightly in that the latter covers the *private* nonfarm sector and therefore excludes government enterprises.) The first question to ask about this

The rate of productivity growth increased after 1995.

Chart 1-3 Output per Hour in the Nonfarm Business Sector
Index, 1992 = 100



Note: Productivity is the average of income- and product-side measures. Productivity for 2000 is inferred from the first three quarters. Shading indicates recessions.
Sources: Department of Commerce (Bureau of Economic Analysis) and Department of Labor (Bureau of Labor Statistics).

total acceleration is how much, if any, of it is the result of business cycle effects and how much is structural.

Productivity Growth and the Business Cycle

Productivity growth varies over the course of the business cycle, typically speeding up in the early stages of booms and slowing or even turning negative in slumps. But changes in productivity also have an underlying structural, or trend, component. There is no foolproof way to tease apart these cyclical and structural components in the productivity changes one actually observes. The increase in productivity growth after 1995, however, is noteworthy in that it occurred at a time when the economy already was enjoying a high rate of resource utilization. Sharp increases in productivity have usually occurred in economies recovering from recession (Chart 1-3). By contrast, since 1995 the U.S. economy has followed a steeper productivity trend, which started well after the 1990–91 recession was over.

Statistical estimates suggest that almost none of the acceleration in productivity after 1995 has been cyclical. An econometric model in which hours worked adjust gradually to changes in output indicates that, by 1995, strong demand had already pushed actual productivity about 2 percentage points above where it would have been otherwise. From 1995 through 2000, the cyclical component of productivity edged up only slightly relative to its trend, so that actual productivity grew only slightly faster (by 0.04 percentage point) than structural productivity (Table 1-1). As of the third quarter of

TABLE 1-1.— *Accounting for the Productivity Acceleration in the 1990s*
 [Private nonfarm business sector; average annual rates]

Item	1973 to 1995	1995 to 2000	Change (percentage points)
Labor productivity growth rate (percent)	1.39	3.01	1.63
<i>Percentage point contributions:</i>			
Less: Business cycle effect .....	.00	.04	.04
Equals: Structural labor productivity	1.39	2.97	1.58
Less: Capital services .....	.70	1.09	.38
Information capital services .....	.41	1.03	.62
Other capital services .....	.30	.06	-.23
Labor quality .....	.27	.27	.00
Equals: Structural TFP .....	.40	1.59	1.19
Less: Computer sector TFP .....	.18	.36	.18
Equals: TFP excluding computer sector TFP .....	.22	1.22	1.00

Note.—Labor productivity is the average of income- and product-side measures of output per hour worked. Total factor productivity (TFP) is labor productivity less the contributions of capital services per hour (capital deepening) and labor quality.
 Productivity for 2000 is inferred from the first three quarters.
 Detail may not add to totals because of rounding.

Sources: Department of Commerce (Bureau of Economic Analysis) for output and computer prices; Department of Labor (Bureau of Labor Statistics) for hours and for capital services and labor quality through 1998; and Council of Economic Advisers for the business cycle effect and for capital services and labor quality for 1999 and 2000.

2000, the cyclical component of productivity was still above trend, suggesting that actual productivity growth is likely to fall below trend growth over the next year or so, as GDP growth moderates. But the estimates indicate that there has been a structural acceleration in productivity since 1995 of slightly less than 1.6 percentage points.

Even though economists differ as to the correct way to adjust for responses to the business cycle, the finding that a structural acceleration has taken place is robust. For instance, even if the cyclical adjustment used here proved to be in error, and in fact productivity growth after 1995 received a boost of as much as 0.5 percentage point a year from shifts due to the business cycle, one would still conclude that a structural acceleration of productivity of greater than 1 percentage point has taken place.

The fact of a shift in the trend of structural productivity growth does not tell us how permanent that shift will turn out to be. All one can say is that the post-1995 acceleration does not appear to be associated with the normal business cycle variation of productivity. Whether the structural trend that emerged in 1995–2000 will continue for many more years, or whether structural productivity growth will moderate sooner, remains uncertain. We could be observing not a long-term shift to a faster productivity growth rate but simply a shift to a higher level of productivity, with faster growth for a while followed by a return to the pre-1995 trend. Or we may be witnessing

the opportunity for faster trend growth over a longer time span. Chapter 2 revisits this issue in the discussion of the forecast.

Contributors to the Structural Productivity Acceleration

In general, a structural acceleration in productivity can come from an increase in any of the following four sources of growth or their combination:

- growth in the amount of capital per worker-hour throughout the economy (capital deepening)
- improvements in the measurable skills of the work force, or labor quality
- total factor productivity (TFP) growth in computer-producing industries, and
- TFP growth in other industries.

TFP growth is the increase in aggregate output over and above that due to increases in the quantities of capital or labor inputs. For example, TFP growth may result when a firm redesigns its production line in a way that increases output while keeping the same number of machines, materials, and workers as before.

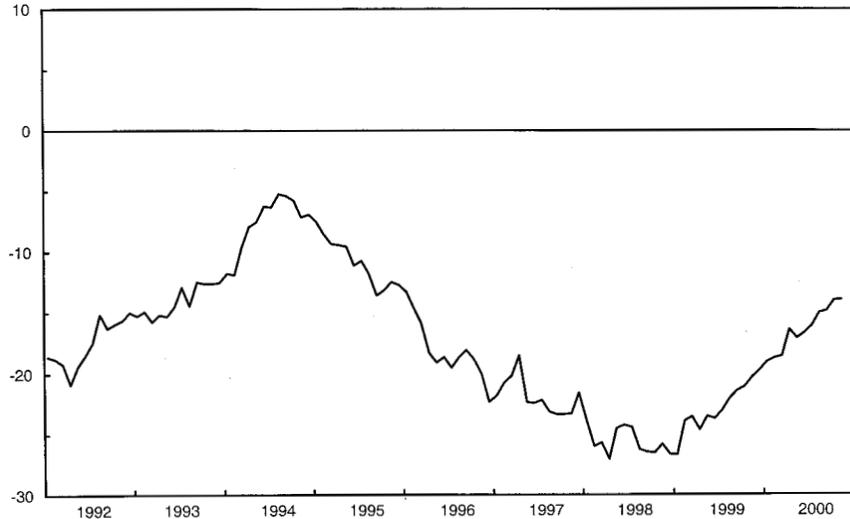
Capital investment has been extremely strong during the current expansion. Particularly after 1995, investment in computers and software responded markedly to robust economic growth, low real interest rates, a strong stock market, and rapidly falling computer prices. As Table 1-1 shows, investment in information technologies added slightly more than 0.6 percentage point to the increase in structural productivity growth after 1995. Because the rate of investment in capital goods other than computer hardware and software slowed during that period, the contribution of overall capital deepening to increased productivity growth was only about 0.4 percentage point, or roughly 24 percent of the post-1995 acceleration of structural productivity.

The Bureau of Labor Statistics measures labor quality in terms of the education, gender, and experience of the work force. Using statistical methods, the Bureau determines differences in earnings paid to workers with different characteristics and infers that these relative wage differences reflect relative productivity differences. Measured in this way, labor quality has risen as the education and skills of the work force have increased. Because that increase occurred at about the same rate before and after 1995, however, the contribution of labor quality to the recent acceleration in productivity has been negligible.

The rate of growth in TFP in computer-producing industries has been rising. Computer prices have been falling as technological improvements are adopted and made available commercially. The decline in prices was particularly marked from 1997 to 1999 (Chart 1-4). Calculations based on

Declines in computer prices were especially rapid between 1997 and 1999.

Chart 1-4 Producer Price Index for Electronic Computers
12-month percent change



Source: Department of Labor (Bureau of Labor Statistics).

these price changes indicate that computer manufacturing accounts for about 0.2 percentage point, or about 11 percent, of the acceleration in structural productivity.

The final contribution comes from accelerating TFP in the economy outside the computer-producing industries. The contribution of this “non-computer sector TFP” category is calculated as a residual; it captures the extent to which technological change and other business and workplace improvements outside the computer sector have boosted productivity growth since 1995. This factor accounts for about 1.0 percentage point of the acceleration in productivity, or about 63 percent of the total. (The percentages do not sum to 100 because of rounding.) This implies that improvements in the ways capital and labor are used throughout the economy are central to the recent acceleration in productivity. Some of these gains have likely resulted as firms learn to apply innovative information technology to their particular business and production methods.

Productivity Increases by Sector and Industry

The figures reported above indicate that both the more widespread use of information technology and improvements in business practices have boosted productivity growth. Data on productivity growth by industry provide a further means of exploring this idea. If the story is correct, these

data should show, for example, an acceleration in productivity in wholesale and retail trade as a result of improvements in distribution and supply chain management. Improvements would also be expected in financial and business services, both of which are heavy users of information technology.

Table 1-2 shows growth in value added per full-time equivalent employee by industry in 1989–95 and 1995–99. With some important qualifications, the evidence does show that productivity growth increased after 1995 in industries that are heavy users of information technology. A further analysis sorted industries into two groups according to the intensity with which they use information technology (as indicated by the ratio of their spending on information technology to their value added in 1996). The dividing line between the two groups was determined such that each group accounted for roughly half of the value added in the economy in 1996. The analysis found that growth in value added per employee was considerably more rapid in the more information technology–intensive group of industries between 1989 and 1999. In addition, the acceleration of value added per employee in this group was more than 50 percent greater than the acceleration in the less information technology–intensive group (Table 1-2).

Striking evidence of improvements in distribution and in the management of the supply chain comes from wholesale and retail trade, both of which experienced much faster productivity growth after 1995. In 1999 these industries accounted for 25 percent of full-time equivalent employees in private industry. Output in these industries increased significantly without corresponding increases in employment.

Data for financial institutions as a group also show an acceleration in productivity after 1995, supporting the view that these heavy users of information technology have performed well. Within financial institutions, however, this observation holds true only for nondepository institutions and brokers. Banks and other depository institutions experienced a reduction in productivity growth after 1995. The insurance industry also experienced an acceleration in productivity, reversing what had previously been negative productivity growth.

The services sector showed an acceleration in productivity, but this sector still experienced negative productivity growth after 1995. Business services shifted from negative to positive productivity growth, as did personal services. Health services, the largest industry in this sector, reduced its rate of productivity decline.

On balance, the pattern of productivity growth by industry is consistent with (although it does not prove) the view that improved business practices and more-productive use of information technology have played an important role in the acceleration of productivity. In addition, some of the gain in productivity is presumably associated with capital deepening.

TABLE 1-2.—*Labor Productivity Growth by Industry, Selected Periods, 1989–99*
 [Value added per full-time equivalent employee; average annual percent change]

Item	1989 to 1995	1995 to 1999	Change ¹
Private industries ²	0.88	2.31	1.43
Agriculture, forestry, and fisheries .....	.34	1.18	.84
Mining	4.56	4.06	-.50
Construction.....	-.10	-.89	-.79
Manufacturing	3.18	4.34	1.16
Durable goods	4.34	6.84	2.51
Nondurable goods.....	1.65	1.07	-.59
Transportation	2.48	1.72	-.76
Trucking and warehousing	2.09	-.73	-2.82
Transportation by air.....	4.52	4.52	.00
Other transportation.....	1.51	2.14	.63
Communications	5.07	2.66	-2.41
Electric, gas, and sanitary services	2.51	2.42	-.09
Wholesale trade	2.84	7.84	4.99
Retail trade.....	.68	4.93	4.25
Finance, insurance, and real estate	1.70	2.67	.97
Finance	3.18	6.76	3.58
Insurance.....	-.28	.44	.72
Real estate	1.38	2.87	1.49
Services.....	-1.12	-.19	.93
Personal services.....	-1.47	1.09	2.55
Business services	-.16	1.69	1.85
Health services	-2.31	-1.06	1.26
Other services.....	-.72	-.71	.01
<i>Addenda:</i>			
Intense information technology users	2.43	4.18	1.75
Less intense information technology users	-.10	1.05	1.15

¹ Percentage points.

² Not directly comparable with the private nonfarm business sector results shown in Table 1-1, because the income-side data used here include agriculture and because data in Table 1-1 are based on the average of income- and product-side measures of output per hour worked.

Source: Council of Economic Advisers, based on data from Department of Commerce (Bureau of Economic Analysis).

Some difficulties in the data, however, both help explain certain puzzles or anomalies in Table 1-2 and suggest that these results should not be taken as definitive. First, consistent data on output and labor input by industry are available only for 1987–99. The cyclical peak year of 1989 is taken as the starting point here, further shortening the span of the data. The brevity of the time periods before and after 1995 mean that observed growth rates may not reflect actual industry trends. Second, output in the private sector (or in nonfarm business) is computed initially at the aggregate level and then broken down by industry. Because this process is inexact, productivity growth can be overestimated in one industry and underestimated in another.

Third, difficulties in constructing price deflators for industries such as business services, insurance, and health care add errors and uncertainties to estimates of productivity in these industries and in every industry that purchases inputs from these hard-to-measure industries. The negative productivity growth reported for health care, for example, seems inconsistent with the rapid pace of technological innovation in that industry (see Chapter 5).

Despite these data problems, the industry results are important. Some prior analyses based on earlier data appeared to conflict with the view that productivity growth was increasing in computer-using industries. This new evidence, however, broadly supports the view that the new technologies are yielding economic benefits.

Learning from the New Productivity Trends

The breakdown of the sources of accelerated productivity and the analysis of industry data suggest three important lessons:

- *The information technology sector itself has provided a direct boost to productivity growth.* Part of the recent surge in productivity is the direct result of productivity growth within this sector.
- *The spread of information technology throughout the economy has been a major factor in the acceleration of productivity through capital deepening.* Increasingly, companies have been eager and able to buy powerful computers at relatively low prices. The rapid advances in computer technology, together with favorable economic conditions, have fueled a computer and software investment boom.
- *Outside the information technology sector, organizational innovations and better ways of applying information technology are boosting the productivity of skilled workers.* A variety of changes that go beyond the direct application of new computer technology, including structural changes in private businesses and more effective use of worker skills, have further boosted productivity.

What accounts for the changes revealed in this productivity analysis? Answering this question requires moving behind the aggregate and industry numbers to consider three sets of complementary developments: changes within the information technology sector, changes in other sectors, and changes in economic policy.

Innovations in the Information Technology Sector

Dramatic developments occurred within the information technology sector in the 1990s, particularly in the second half of the decade, when the pace of innovation accelerated. The top left panel of Chart 1-5 shows the surge in private research and development (R&D) spending on information technology, and the top right panel shows the increase in the pace of innovation (as measured by the number of information technology patents granted annually). The bottom left panel depicts the surge in the production of computers, semiconductors, and communications equipment: between 1992 and 2000, real output in this sector increased more than 13-fold. The bottom right panel shows the rapid increase in employment in the industries providing computer, data processing, and communications services.

The process by which new information technologies are created in the United States has undergone a number of major changes that have transformed the ways in which such innovation occurs. In much of the postwar period, defense spending was a major driver of innovation, and the Federal budget was a more important source of R&D funding than it is today. Innovation, however, was undertaken predominantly by large manufacturers, and the U.S. economy was less integrated with the international economy than it is today. That situation has changed considerably, as Chapter 3 describes in detail. Four developments in particular deserve mention: changes in the competitive environment, changes in organizational structures, changes in compensation and finance, and innovations in complementary technologies.

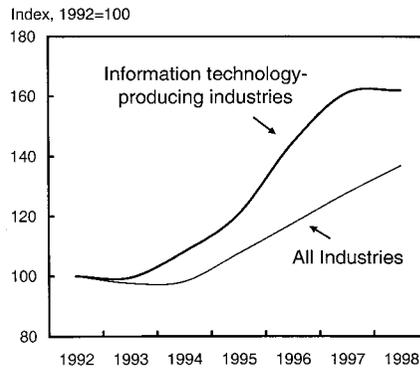
Growing Competition

The information technology sector is being driven by heightened competition in an increasingly deregulated economy in which international trade plays an ever-growing role. These pressures foster the creation and adoption of new technologies, especially in the private sector, which has begun to play a greater role in innovation since the end of the Cold War. When businesses bring innovations to market, their rivals are given strong incentives to innovate as well. In the area of information technology, the firm that is the first to gain market acceptance for a new type of product often gets to set the standard for that product, and therefore is most likely to capture the lion's share of the market. The innovating firm can then exploit its early success, to develop the next generation of technology and products. The prospect of second-generation success thus raises the premium on rapid innovation.

A host of measures show a surge in information technology activity since the early 1990s.

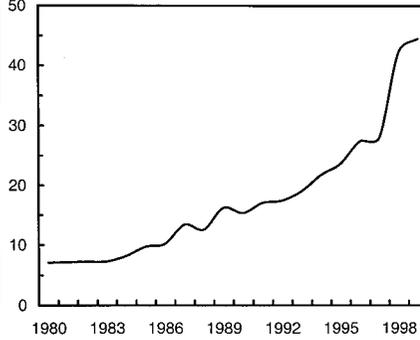
Chart 1-5 Indicators of Growth in Information Technology Activity

Real Company-Funded R&D Spending



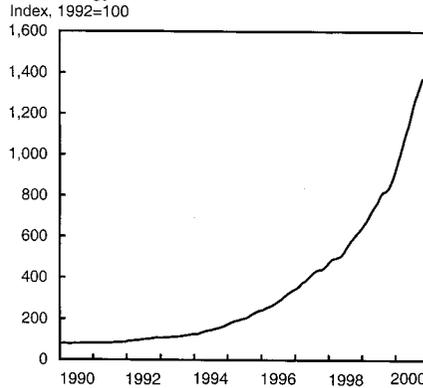
Source: National Science Foundation.

Patents Granted for Information Technology Applications



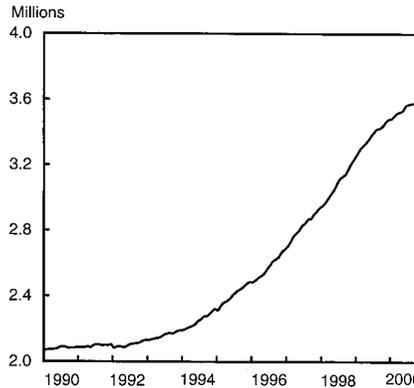
Source: Council of Economic Advisers, based on data from Department of Commerce (Patent and Trademark Office).

Industrial Production of Information Technology Goods



Note: Information technology goods comprise computers, semiconductors, and communications equipment.
Source: Board of Governors of the Federal Reserve System.

Employment in Information Technology Services Industries



Note: Information technology services industries comprise computer and data processing services and communications services.
Source: Department of Labor (Bureau of Labor Statistics).

For firms to have strong financial incentives to innovate, there must be strong demand for such innovation from other firms in other industries. Almost 70 percent of all information technology products are purchased by the wholesale and retail trade, finance, and telecommunications industries. Competition in these industries (often on a global level) encourages them to seek out new technologies to improve their own productivity. Unlike in some other countries, in which barriers to entry, pricing restrictions, and other business restrictions restrain competition, in the United States competitive pressures are generally strong. Deregulation in finance and telecommunications has helped create an increasingly competitive environment.

The number of new firms in the information technology sector is a measure of the incentives and opportunity to innovate—and the figures paint a dramatic picture. Between 1990 and 1997 the number of information technology firms more than doubled (Chart 1-6). Many innovations have come from talented individuals in small startup companies that are willing to take risks.

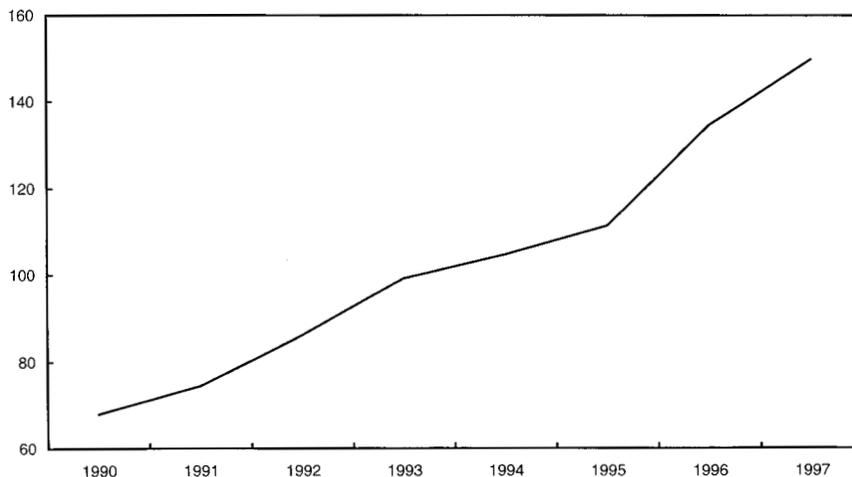
Organizational Changes

Competitive pressures have increased the importance of introducing new products and processes quickly. Yet the know-how required to create these products has become more complex and more dispersed. Today it is rarely

The number of firms in the information technology sector more than doubled in the 1990s.

Chart 1-6 Information Technology Firms

Thousands



Source: Council of Economic Advisers, based on data from Department of Commerce (*Digital Economy 2000*) and Small Business Administration.

cost-effective for a single firm to control an entire innovation process. As a result, businesses have altered the organizational structures within which innovation takes place.

A smaller fraction of R&D now takes place within large, integrated companies. Small firms are responsible for an increasing share of the Nation's industrial research. Collaboration between innovating firms has become commonplace, as the dramatic growth in interfirm technology alliances in the 1990s demonstrates. Furthermore, today's innovations increasingly draw upon scientific knowledge, much of which is developed by universities and national laboratories. To take advantage of this science base, private firms are now performing more basic research than ever before. And because proximity to these universities and national laboratories matters—by improving a firm's chances of capturing spillovers and of hiring high-quality researchers—innovation today is often characterized by geographic concentration into high-technology clusters such as Silicon Valley, California. In these clusters and elsewhere, many new firms, free of the constraints often imposed in large, established corporations, continually enter the market with new technologies and innovative business ideas.

Innovations in Compensation and Finance

New methods of financing have evolved to address the needs of new entrants and of R&D in the information technology sector. Traditionally, firms have used their physical plant and equipment as collateral for financing. But the unique challenges of promoting innovation in sectors where much of the know-how is based on intangible capital, plus the considerable risks involved in financing high-technology companies, have generated new institutional arrangements. Venture capital, in particular, has played a crucial role, supplying funds and providing management know-how and connections for entrepreneurs. Initial public offerings (IPOs) have also been instrumental. The information technology sector has made extensive use of new compensation mechanisms that provide incentives to talented workers and managers. For example, stock options enable firms to attract and retain talent while passing some risk on to workers. The vibrant stock market has also been important, allowing venture capitalists to cash out more easily through IPOs and enabling workers holding stock options to boost their earnings. In an important sense, success has generated success, as venture capitalists score big and then use their augmented capital to seek out new profit opportunities.

The excitement over the technology revolution drove technology stocks to extraordinary heights in the spring of 2000, although they have retreated since then. The volatility in technology equity markets can be disruptive to companies seeking new funding, but investors' willingness to take risks and

the availability of financial resources for successful entrepreneurs continue to make U.S. financial markets important contributors to the New Economy. Even after the recent decline in the technology sector, price-earnings ratios remain high. This indicates that investors are still willing to take a chance on companies with low current earnings but the potential for rapid future growth.

New Complementarities

The changes in the information technology sector have been both cumulative and complementary. Innovations in one area have created demands in another. Breakthroughs in communications and data compression techniques, for instance, generate demand for improved software and for more powerful computers. Complementarities operate on both the supply and the demand sides. In particular, the falling costs associated with the use of computers have made certain types of research feasible for the first time—the mapping of the human genome, for instance, was made feasible by computers. Information technology is becoming increasingly important in the development of new treatment options, and the Food and Drug Administration uses computers to streamline the analysis and approval of new drugs. Demand is particularly powerful when it generates positive feedback through network effects. E-mail, for example, becomes increasingly useful as more people use it.

The evidence suggests, then, that a number of factors have combined to create a uniquely favorable climate for entrepreneurs. These factors include a growing demand for new and improved technologies (spurred by intense domestic and global competition and technological complementarities), the improved capacity of reorganized firms and networks to supply the new technologies, and innovations in thriving financial markets.

Innovation Throughout the Economy

Simply buying and installing new technology does not automatically increase productivity, profitability, or job creation. Yet some views of the New Economy reveal a kind of naïve technological determinism that ignores the vital role of complementary changes in production and business practices. Companies throughout the U.S. economy have been radically transformed by new technologies that enable entire product networks to become more efficient, effective, and integrated. These transformations are detailed in Chapter 3, but a few of the most important changes are noted here, including changes in production, inventory and supply management, customer relations, and corporate structure.

New Production Methods

Innovations in information technology have generated many changes in manufacturing processes. New technologies permit workers to analyze data and make detailed adjustments to production lines on the plant floor, boosting productivity, improving quality, and lowering costs. The availability of data, often on a real-time basis, allows for continuous performance evaluation that can improve efficiency. Workers who have access to information technology can be empowered with more decisionmaking responsibility. In addition, the new technology allows organizations to disseminate information and coordinate their activities more easily, resulting in less hierarchical organizational structures. In turn, these new structures may reduce costs and further increase efficiency. Finally, as in the information technology sector itself, innovations in the way workers are compensated can help firms achieve greater productivity gains from new technology, spurring further innovation in compensation and finance. Studies suggest that worker performance improves when incentives are tied more closely to performance. Stock options have become more common as a method of attracting, retaining, and rewarding employees.

Changes in Inventory and Supply Chain Management

Firms typically hold inventories as a cushion against uncertainties. Producers keep excess raw materials and other inputs on hand to prevent shortages on the production line, for example, and stores maintain inventories to meet fluctuations in demand. The need for inventories springs in part from incomplete information about demand. For this reason, technologies that improve the dissemination of information enable companies to react more promptly to market signals and to economize on inventories (by sharing point-of-sale data, for example). Indeed, aggregate inventory-to-sales ratios have fallen significantly since the early 1990s (Chart 1-7).

The new information technologies have also changed the nature of relationships between firms and their suppliers. Procurement practices have changed radically, as firms become linked to suppliers through Internet-based business-to-business marketplaces. This capability allows businesses to streamline procurement activities, lower transactions costs, improve the management of supplier relationships, and even engage in collaborative product design. “Just-in-time” delivery, facilitated by a more efficient transportation network including both surface and aviation infrastructure, has been instrumental in allowing firms to reduce inventories and lower costs while continuing to provide essential services to producers and consumers.

Supply chain management has reduced inventories.

Chart 1-7 Inventory-to-Sales Ratio in Manufacturing and Trade
Months of supply



Source: Department of Commerce (Bureau of the Census).

New Relationships with Customers

Information technologies give firms the ability to develop richer, more targeted relationships with their customers. Firms are able to tailor marketing and product design more precisely to customer needs. Customers, in turn, are able to find and compare the products that most closely match their preferences. Scanner data from retail stores allow companies to monitor which items are selling and which are not. This information can be transmitted back to manufacturers, who can then adjust their production schedules. This avoids stockouts and surplus inventory. The information from scanners can also be used for marketing. Customers who have purchased outdoor adventure products, for example, can be sent information on related gear or travel opportunities that they may wish to purchase.

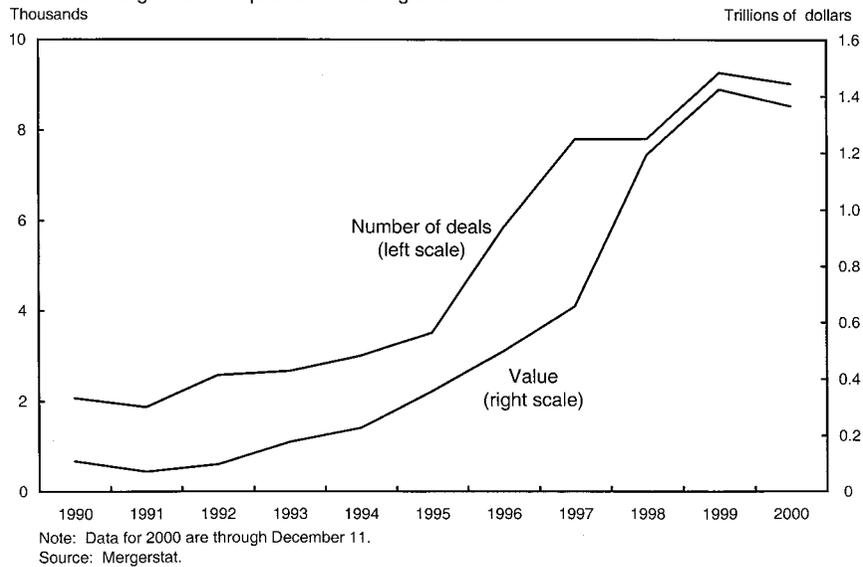
Shifting Corporate Boundaries

Markets allocate resources efficiently by setting prices, expanding choices, and encouraging competition. But in situations where pricing and writing contracts is costly and difficult, where uncertainty is high, and where information is difficult to come by, some activities may be more efficiently undertaken within the firm than in the marketplace. Transactions costs thus affect the make-or-buy decision, which determines where the firm's boundaries end and the market begins. Information technologies can radically change where these boundaries should be drawn, and this sets in motion

both centrifugal and centripetal forces. An example of the latter is the large number of recent mergers, some motivated by the belief on the part of some firms that new technology allows the span of organization to be extended. As Chart 1-8 shows, both the number and the value of mergers and acquisitions have moved to new heights as firms seek to capitalize on both efficiency gains and increased market power. On the other hand, many small firms may be able to benefit by specializing in a few core activities. This can lead companies to spin off parts of their operations—an example of centrifugal forces at work.

Both the number and the total value of mergers and acquisitions have exploded.

Chart 1-8 Mergers and Acquisitions Involving U.S. Firms



Behind the New Trends: The Role of Policy

The Administration's policy strategy has complemented and fostered the private sector initiatives that generated these new trends. The approach has rested on three major pillars: fiscal discipline, investing in people and technologies, and opening markets at home and abroad. Each of these policy emphases has contributed to the economic environment in which the New Economy has thrived. They have promoted the emergence of an economy in which innovative new businesses are stimulated by relatively low interest rates, an abundant supply of risk capital, world-class educational and research institutions, a well-educated and well-trained work force, competitive product and labor markets, and the development and diffusion of the

Internet. In addition, the Administration has pursued new social policies to ensure that the American people have the opportunities to share in the gains of the New Economy.

Fiscal Discipline

The Omnibus Budget and Reconciliation Act of 1993 was the right policy package at the right time. The Federal funds rate had been moved to a low 3 percent in 1992 in an attempt to stimulate the economy and create jobs. But long-term interest rates remained stubbornly high. The 10-year Treasury bond rate averaged 7.0 percent in 1992—unusually high for a weak economy. Bond yields were being predictably affected by the forces of supply and demand: the Federal Government was set to run a deficit of almost \$300 billion, adding a massive new increment to the already swollen stock of outstanding debt. With an oversupply of government bonds and the prospect of even more to come, bond and stock prices were depressed, and yields were correspondingly high.

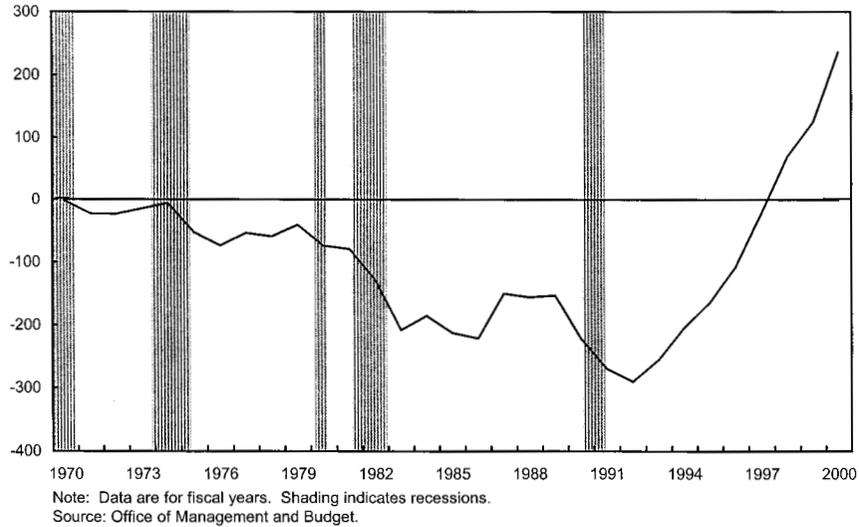
In 1992 the new Administration was elected on a promise to turn the deficits around. After a tough political battle in 1993, the Administration was able to deliver on that promise. The 1981 reductions in tax rates for those in the upper income brackets were partly rolled back, and Federal spending was restrained. The markets responded quickly to this serious effort to address the deficit by lowering expectations of future inflation, and long-term interest rates accordingly fell. The 10-year Treasury rate hit a low of 5.3 percent in October 1993. Over the next year or so, the combination of a stronger economy and the Federal Reserve's decision to boost short-term rates pushed long-term rates slightly upward again, but they remained lower than they would have been without deficit reduction.

As economic growth and further restraints on spending (including the bipartisan 1997 budget agreement) turned the huge deficits into surpluses, a new fiscal environment emerged. The 10-year Treasury rate fell below 6 percent in 1998 and 1999. And despite the extraordinarily strong economy and associated upward movement in short-term rates, that rate stood at only 5.7 percent in November 2000. With a swing in the budget balance of an impressive \$492 billion over the last 7 years, the budget surplus for fiscal 2000 came in at \$236 billion, or 2.4 percent of GDP.

Chart 1-9 shows budget deficits and surpluses in each fiscal year from 1970 to 2000. The ups and downs caused by the business cycle are clearly visible. But even clearer are the trend prior to 1993 and the subsequent sharp turnaround. The 1993 deficit reduction act and subsequent restraints on spending both fueled and capitalized on the private sector's potential for rapid growth. (See Chapter 2 for more discussion of fiscal policy and the deficit.)

The budget balance improved sharply after 1993.

Chart 1-9 Federal Budget Balance
Billions of dollars



The most direct link between improved fiscal discipline and growth is that through low interest rates, which encourage investment. As interest rates fall, financing of all kinds of activities becomes less costly. In addition, low interest rates help keep the stock market strong, allowing companies both old and new to lower their cost of capital. Ultimately, the combination of falling prices for investment goods and reduced interest costs stimulated dramatic growth in investment. Led by equipment and software purchases, investment grew 13 percent per year between the first quarter of 1993 and the third quarter of 2000. Investment is not the only engine of growth, but new technologies cannot be acquired without it. Strong investment is essential to rapid growth, and by reducing the amount of saving that must go to finance the public debt, fiscal discipline has made room for strong investment.

The result has been a virtuous cycle, in which the right policies in 1993 kicked off a chain reaction of smaller deficits, lower costs of capital, higher investment, increased technology in the workplace, and faster economic growth. As the deficit became a surplus, the virtuous cycle kept turning.

Investing in People and Technology

If fiscal discipline had been achieved through cutbacks in education, training, and technological development, it probably would have failed. At the least it would have undermined the potential for long-term growth. But

the Administration did not make this mistake; instead its budget proposals consistently pushed for increased spending for growth-oriented programs while reducing total outlays. And although not all the requests were approved in the final budgets, substantial funding increases did occur in these areas.

Investments in people have come along several fronts. The Administration has invested in children through support of kindergarten through 12th grade (K-12) education, it has helped Americans attend college, and it has worked hard to improve the training opportunities available to American workers.

Our public schools play a crucial role in determining the future productivity of American workers. The Federal Government has been an important contributor to K-12 education by helping to ensure a more equitable distribution of opportunities. Federal funds offset a good deal of the difference in educational spending between rich and poor districts. Through the E-rate program, the Administration has helped schools invest in new technologies for the classroom. The Administration has also provided leadership on initiatives to reduce class size, raise standards, and improve accountability. Programs such as the 21st Century Community Learning Centers Program help communities utilize their school buildings after school hours to provide enriching programs for children.

The New Economy has provided increasing rewards for higher education. Responding to this fundamental change in the labor market, the Administration has helped students prepare for college through the GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) and TRIO programs. These programs help students in high-poverty schools and from low-income families through academic enrichment programs and mentoring. For students who are admitted to college, Administration programs such as the HOPE Scholarship tax credit and the Lifetime Learning tax credit help students and their families afford the tuition. The Administration has also substantially increased the funds available through the Pell grant program.

Because learning continues throughout a lifetime, and skills often need to be updated, the Administration has strongly supported training programs for those already in the work force or seeking to rejoin it. The Workforce Investment Act provides job training and job search assistance, with priority given to low-income and displaced workers. In conjunction with the programs of the Workforce Investment Act, Youth Opportunity Grants help at-risk youths develop job skills. The Administration has also supported the NAFTA Transitional Adjustment Assistance program to address the needs of workers affected by economic dislocations resulting from the North American Free Trade Agreement.

During the past 8 years, research funding at the National Science Foundation has been increased by more than 60 percent, and that for the

National Institutes of Health by more than 80 percent. Information technology has also been targeted for increased research. For fiscal 2001 the President requested more than \$2 billion in Federal support for information technology research, which will substantially increase the Federal commitment to R&D in this area. He also called for a new initiative in nanotechnology, which could someday lead to the ability to store the information equivalent of the Library of Congress in a device the size of a sugar cube, and the development of materials that are 10 times stronger than steel but a fraction of the weight.

Of equal importance has been the Administration's commitment to fostering innovation in the private sector. The Research and Experimentation tax credit has been extended through 2004. The Administration supported the Internet Tax Freedom Act, which imposed a moratorium on Internet taxes, enhancing the ability of entrepreneurs to explore new commercial applications of this medium. The White House's Framework for Global Electronic Commerce called for private sector leadership and limited government involvement: government should intervene only to support a predictable, consistent, and simple legal environment for e-commerce. The Administration has also supported reform through the Telecommunications Act of 1996, which encouraged competition in the telecommunications industry and has led to lower prices, more customer choice, and faster deployment of broadband networks to homes and businesses.

Setting the Rules for Fair and Open Competition

The United States has long had a bipartisan agenda aimed at expanding world trade and investment, and a succession of Administrations have negotiated trade agreements in various forums. Over the past 8 years, this Administration has sustained the Nation's agenda for international trade, signing and achieving ratification of a series of important international agreements. These include the North American Free Trade Agreement establishing a free-trade area throughout Canada, Mexico, and the United States; the Uruguay Round agreement of the General Agreement on Tariffs and Trade, which set up the World Trade Organization (WTO), a rules-based, member-driven organization that regulates tariffs and trade worldwide; multilateral agreements within the WTO on trade in financial services, basic telecommunications, and information technology; a moratorium on tariffs on digitally delivered goods; and an agreement with China that has paved the way for its entry into the WTO. This extraordinary record of achievement has already paid off in improved economic performance and will contribute to continued growth ahead.

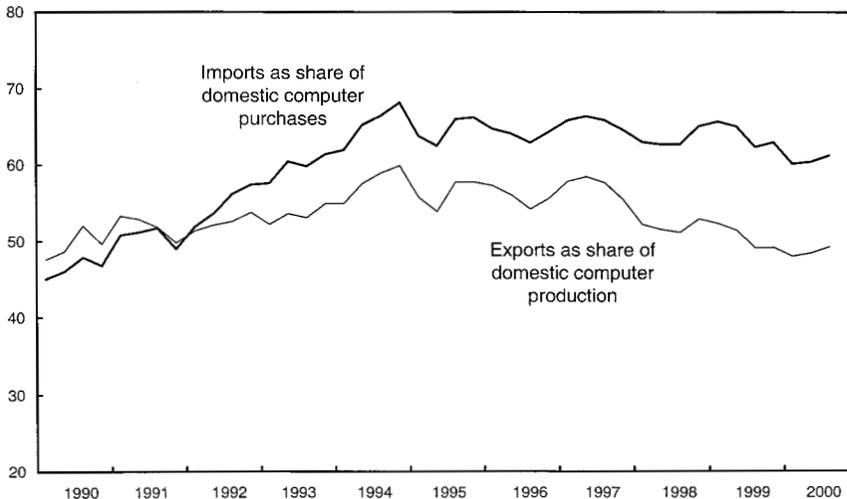
Globalization, spurred in part by these and other agreements, has been particularly important in promoting the competitive pressures that have made the U.S. economy so innovative. Foreign competition encourages U.S. firms to improve and innovate, as firms that compete against the best companies in the world are likely to adopt best practices themselves. U.S. companies have also had the opportunity to take their own best technologies and practices overseas through exports and foreign direct investment. Globalization has also increased price competition, helping to keep inflation down.

Globalization has also played a key role in enhancing domestic production and adoption of information technologies. By exporting to global markets, U.S. innovators have achieved scale economies that can increase the returns to R&D in information technology. U.S.-based producers also use components that can be produced more cheaply abroad than at home to make products that are internationally competitive. The importance of such global linkages for the computer industry is vividly indicated in Chart 1-10, which shows that, in 1999, imports accounted for fully 60 percent of U.S. domestic spending on computers, while about 50 percent of domestically produced computers were exported.

International competition has reinforced competition at home. The vast U.S. market provides a competitive environment for most industries, even without foreign trade. This large national market has been one of the great strengths of the U.S. economy over the years. But competition can be threat-

Trade is vital to the computer sector.

Chart 1-10 Computer Imports and Exports as a Share of Computer Purchases and Production Percent



Source: Department of Commerce (Bureau of Economic Analysis).

ened if a single company abuses its dominance in a market. Under this Administration, this threat has been met by the active enforcement of U.S. antitrust laws. These laws do not discourage successful companies from growing and gaining market share by creating competitive products and services. Rather, they prevent companies from seeking to gain a market position that would threaten competition in an industry. Antitrust laws limit corporate conduct that undermines competition and consequently harms consumers. Indeed, the ultimate goal of antitrust legislation is to protect consumers' interests.

Regulatory policies have also promoted competition. The regulatory reform movement has been bipartisan ever since its beginnings in the 1970s, and the 1990s have been no exception. The 1996 Telecommunications Act and auctions of portions of the electromagnetic spectrum to telecommunications providers have allowed new companies to compete against existing ones and dramatically expand the availability of wireless service. This industry has exploded with new investment and new services, and with a third generation of wireless service on the horizon, it is vital that progress not be slowed.

In financial services, the Glass-Steagall provisions instituted in the 1930s prevented banks from joining with stockbrokers and insurance companies to create financial monopolies. Restrictions on interstate banking prevented bankers from straying too far from the geographic areas they knew well. Given the massive financial instability of the 1930s, narrowing the range of banks' activities was arguably important for that day and age. But those rules are not needed today, and the easing of interstate banking rules, along with the passage of the Financial Services Modernization Act of 1999, have removed them, while maintaining appropriate safeguards. These steps allow consolidation in the financial sector that will result in efficiency gains and provide new services for consumers.

Social Policies

As shown earlier, the stunning economic performance over the past 8 years has generated sharp reductions in poverty and across-the-board improvements in income. The expansion has created a high-employment economy that has provided economic opportunities for disadvantaged workers and those who have not yet acquired marketable skills. Faster growth in labor hours made an important contribution to the acceleration in output that occurred in the second half of the 1990s. In a tight labor market, employers hire and train workers they might previously have passed over. During the 1990s employers hired and trained young people and older workers, who typically comprise an untapped pool of potential. But specific policies have also expanded opportunities.

The Earned Income Tax Credit increases the payoff from work for low-income families, especially those with children. Since 1993 the benefits and coverage of this credit have been expanded. In 1999 beneficiaries received a total of nearly \$31 billion (compared with \$15.5 billion in 1993), and the number of families receiving assistance increased by one-third, from 15 million to nearly 20 million. The minimum wage operates in tandem with the Earned Income Tax Credit to raise the incomes of working families. The Administration proposed an additional \$1 increase in the minimum wage in 2000. Even without this change, when combined with the maximum 40 percent subsidy from the Earned Income Tax Credit, the effective minimum wage is \$7.21 per hour of work. The cost to employers, however, is much lower. Meanwhile welfare reform has encouraged families to become self-sufficient and has supported them as they make the transition to work. The Administration is reaching out to communities left behind by economic growth with its New Markets Initiative, passed with bipartisan support.

Some have suggested that all government programs designed to help the disadvantaged reduce incentives and discourage economic growth. This argument maintains that only a *laissez-faire* policy is compatible with the labor market flexibility necessary to achieve strong economic performance. But the Earned Income Tax Credit, welfare reform, assistance with the transition from welfare to work, and support for lifelong learning all indicate that government intervention can both improve incentives to work and reduce economic inequality.

Challenges for the Future

Economic performance in the last 8 years has been so strong and so qualitatively different from that of the previous two decades that it may seem obvious that a New Economy has emerged. When productivity growth and GDP growth both accelerate sharply, when unemployment and inflation fall to their lowest levels in 30 years, when poverty starts to fall again after years of worsening, and when incomes accelerate across the board, clearly a significant change has occurred.

In addition, the economic transformations described in this Report point to a truly *New* Economy. Information technology has become a pervasive part of economic life, changing the way nearly all Americans work—from farmers using the Internet to check a satellite report on soil moisture, to software designers using the latest technology to create a new learning program. Computers have been facilitating change in business systems for some time, but the explosive growth in the production and use of information technology that has taken place in recent years has gone much further. The

American economy has been profoundly altered. The innovations that have taken place both within the information technology sector and throughout the rest of the economy have included complementary developments in organization, business practices, and public policies.

But the New Economy label is easy to misuse. The New Economy cannot be invoked as the solution to all of America's problems. Its emergence does not mean that the lessons of economic history can be discarded or that concern for the disadvantaged and elderly can be forgotten. As we describe in the rest of the *Report*, there remain many challenges ahead. This chapter concludes with a brief summary of each of the remaining chapters and the principal challenges that they identify for policy.

Preserving Fiscal Discipline

Chapter 2 describes how changes associated with the New Economy continued to be reflected in macroeconomic performance during 2000. Although growth began to moderate in the third quarter, it was still on track to be about 4 percent over the course of the year. The remarkable combination of very low unemployment and tame inflation remained evident even as the economy proceeded through its 10th year of expansion. Investment in equipment and software remained robust, and productivity growth was very strong.

The chapter goes on to describe the challenges faced in 2000 as the economy negotiated some speed bumps, such as the cooling off of the stock market and rising oil prices. Although risks can never be eliminated, the virtuous cycle of sound budget policies and strong economic performance has left future policymakers with an economy that is well positioned to weather possible storms. The chapter also presents the Administration's forecast for the next 11 years.

For the longer term, the chapter examines the historic turnaround in the budget outlook since 1993 and the challenge of preserving the fiscal discipline that has been achieved. The aging of the population will put increased pressure on budget resources for such programs as Social Security and Medicare as the new century progresses. The chapter describes how, by taking appropriate actions now to preserve the budget surplus and make sound investments, the resources can be made available to deal with these pressures when they arise. And although the New Economy will not stop the population from aging, its continued manifestation in strong productivity growth can be a further help in dealing with this challenge.

Nurturing a Vibrant Private Sector

Chapter 3 looks at the sources of performance improvements in plants, firms, and industries. It traces these improvements to technological innovation, particularly in information technology, along with complementary organizational practices that enhance the productivity of this technology and the emergence of a more competitive business environment. The analysis attributes the recent surge of technological innovation to strong demand for new technologies, financial market innovations such as venture capital and initial public offerings, organizational changes, increases in private sector R&D (including funding for basic research), and strong legal protection for intellectual property.

Technological innovation has been particularly important for two reasons. First, the information technology-producing sector itself is highly productive, and the growth of this sector has led to increased performance for the economy as a whole. Second, the adoption of information technology has led to performance gains in other sectors of the economy, making other inputs more productive by changing the way firms do business. Manufacturing plants are increasingly automated, and workers are being given more flexible job assignments and stronger incentives through new compensation arrangements. Supplier relationships are becoming more closely integrated through the use of computer systems that coordinate the various aspects of production and warehousing, allowing firms to reduce inventories dramatically. Firm boundaries are also shifting rapidly, as firms outsource their noncore businesses and move toward flexible, collaborative relationships such as strategic alliances with suppliers, customers, and even rivals.

The end result is an economy that is unusually vibrant, dynamic, and entrepreneurial, with a high rate of business formation—and of business failure. It is important that this dynamic, competitive framework be retained. Although government action is often needed to lay out the rules of the competitive game, it is essential that market participants be allowed to innovate and experiment. For example, the Administration took important steps in September 2000 to ensure that adequate electromagnetic spectrum will be available for new commercial communications technologies such as third-generation wireless technology. At the same time, however, U.S. wireless carriers will be free to work with their customers and suppliers to determine exactly how these technologies should be delivered.

Ensuring That Globalization Enhances the New Economy

Chapter 4 examines two interrelated phenomena: how advances in communications and technology allow for expanded international trade and

financial flows, and how increased globalization is spurring competition and innovation. Indeed, it is no coincidence that the New Economy has emerged in the United States at the same time that U.S. participation in the global economy has reached new heights, because globalization and the recent advances in information technology are inextricably linked. On the one hand, globalization has played a crucial role in promoting the technological innovation and facilitating the organizational restructuring that has yielded a New Economy. On the other hand, improvements in information technology have spurred deeper integration between the United States and the world economy.

The economic policy of this Administration has played a vital role in fostering globalization, and thus in raising the incentives for competition and innovation. Among the accomplishments of the Administration are the historic agreements listed earlier in this chapter. At the same time, a focus of U.S. trade policy has been to ensure that these and other agreements safeguard global natural resources and respect our Nation's values, including our commitment to core labor standards.

The effects of globalization and improved communications and technology are evident in U.S. international transactions. Trade in capital goods has soared since 1996, with particularly strong growth in items central to the New Economy, such as computers, semiconductors, and telecommunications equipment. There has also been strong export growth in intellectual properties and in services that reflect the value of U.S. innovation, such as business and technical services and financial services.

Although increased globalization and technological improvements have raised U.S. economic performance and contributed to our prosperity, they have also brought new challenges. Chapter 4 focuses on several of these, including the widened U.S. current account deficit, ways to increase growth in our major trading partners, and the implication of globalization and technology for developing countries. Along with the gains, globalization and technology have required adjustments as change affects workers, industries, and communities in the United States. The chapter therefore discusses the Administration's efforts to ensure that those who have not shared in the gains are helped to acquire the tools that will allow them to do so. Finally, the chapter examines the ways in which U.S. economic policy seeks to preserve the environment and support labor standards, and discusses the challenges that technology poses for countries' legal institutions, for example through its misuse for tax evasion.

Creating an Economy That Works for All

The New Economy has brought a great many good things to our Nation. But it cannot solve all our problems. Left unassisted, it will not guarantee an

equitable distribution of opportunities or an optimal use of all resources. Chapter 5 analyzes the programs and policies designed to help those who might otherwise be left behind and to improve the quality of life for all Americans. The chapter focuses on four important topics that have a direct impact on the well-being of Americans. It examines the Nation's welfare, education, and health care programs and the best ways to manage the growing pains of our most rapidly growing communities.

Each of these areas has been characterized by important innovations during the last 8 years. Our system of providing for the least well off Americans has changed substantially. Public assistance programs now reward work, making it easier for families to leave welfare and share in the New Economy. Policies such as the Earned Income Tax Credit, child care subsidies, and extensions of health insurance coverage provide assistance to low-income working families. Innovations in health care are directly improving the quality of life for many, and new programs are bringing computers and the Internet to the classroom, helping improve teacher effectiveness, reducing class size, and narrowing the digital divide. Finally, policies that aim to reduce sprawl and encourage smart growth are being implemented by forward-looking communities nationwide.

Despite the vast improvements in the quality of life experienced by many Americans, several challenges remain. Welfare rolls have fallen sharply: the number of people receiving welfare benefits is down by 59 percent since January 1993. However, some who have left welfare are in jobs that leave them with less income than they had while on welfare, and these individuals are likely to be among the first to lose their jobs should the economy slow. There is also the challenge of what to do for those who remain on welfare. Current law sets a lifetime limit of 5 years on receipt of welfare benefits. It is not clear what will happen to those who exhaust these benefits and are unable to find jobs. More broadly, substantial disparities in economic well-being remain across racial groups and across regions; minorities and residents of the Nation's central cities and rural areas suffer disproportionately high rates of poverty and unemployment. Educational opportunities are also unevenly distributed. Wealthy school districts spend more per pupil than poor ones, and white children continue to score substantially higher on national examinations than African-American or Hispanic children. They are also more likely to go on to college. Our health care system presents numerous challenges as well. It is important to continue to control health expenditures to ensure that care is affordable to all. Issues related to managed care must be resolved in a way that appropriately aligns incentives so that health care is not overly restricted or overly prescribed. Even with these issues under control, many Americans will continue to lack health insurance coverage and will therefore be unable to take advantage of the quality of care

available to the majority. Finally, the New Economy has allowed certain geographical regions to experience enormous growth in jobs and population. This growth, where left unchecked, has led to suburban sprawl and serious environmental consequences.

The final chapter of the Report recaps the story of the New Economy: where it came from, how it is affecting our lives, and the challenges it poses for the future.