

Labor productivity trends since 2000, by sector and industry

Unlike the late 1990s, when rapid output gains led to increased productivity growth, reductions in labor hours were an important contributor to productivity increases from 2000 to 2005

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U.S. productivity (as measured by output per hour) surged during the latter half of the 1990s, led by rapid output growth in industries that produced, sold, or intensively used information technology (IT) products. This surge was the focus of a great deal of attention by economists and policymakers. Recent interest has focused on productivity growth since 2000. After slowing and, in some sectors, declining during the recession that occurred in 2001, productivity growth rebounded, resulting in robust increases over the period from 2000 through 2005.¹

This article focuses on labor productivity trends from 2000 through 2005 in some of the sectors and industries that make up the non-farm business sector. These measures provide information on shifts in industrial efficiency and competitiveness in the component industries and sectors underlying the aggregate productivity statistics. The data used in this analysis are from the Bureau of Labor Statistics (BLS) industry productivity program, which produces data on productivity and related measures for selected sectors and industries of the U.S. economy.²

Productivity shifts among sectors and industries reflect recent events and economic conditions, as well as long-term structural shifts taking place in the American economy. Notable among the latter category are the declining importance of goods-producing sectors vis-

à-vis the service-providing sectors, the rapid growth of IT, and the increased use of outsourcing and offshoring. While productivity continued to advance after 2000, the components of this growth differed from those that led to the productivity surge of the latter half of the 1990s.

Labor productivity is an indicator of productive efficiency that measures the relationship between an industry's output and the labor hours used in producing that output. Industry output is measured as sectoral output, the total value, in real terms, of goods and services produced for sale outside the industry.³ For most industries, real output is estimated by deflating revenues or value of production to remove the effects of price changes. In a few industries, output is measured using physical quantities produced. Industry labor input generally represents the number of hours paid in an industry. For manufacturing and mining industries, labor input includes hours of wage and salary workers. In service-providing industries, where self-employed and unpaid family workers are a significant share of the workforce, labor hours also include the hours of self-employed and unpaid family workers.

Sector- and industry-level productivity measures may reveal trends that are not apparent when examining measures for the larger economy. BLS publishes productivity measures for detailed industries and sector-level measures for the

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mining, manufacturing, wholesale trade, and retail trade sectors.⁴ The BLS productivity series essentially cover all of the industries and employment in these four sectors.⁵ For this article, measures were also developed for four additional sectors where the industry coverage is substantial but not complete: utilities; information; accommodation and food services; and other services, except public administration.⁶ In each of these sectors, labor productivity measures cover more than 70 percent of employment in the sector. Productivity growth in these four sectors is derived from trends in the component industries for which BLS maintains measures. Growth rates for these sectors are presented here for illustrative purposes, with the caveat that they may not be representative of the industries in each sector that are not included. It is not possible to gauge the extent to which these rates accurately represent the rates of change for each sector as a whole. For the sectors not examined in this article, BLS industry coverage varies widely but accounts for less than 70 percent of total sector employment.⁷

The sources of the productivity acceleration during the second half of the 1990s are well documented.⁸ Output growth in industries involved in the production or distribution of IT products, and those that had invested heavily in IT, accelerated from the already rapid pace seen during the first half of the decade.⁹ Growth in labor hours was moderate, at best, during the period, and the result was an acceleration in productivity growth to very rapid rates. These developments were most pronounced in IT and closely related industries, but were not limited to those industries.¹⁰ Output growth accelerated during the latter half of the decade in more than half of the industries studied and, in nearly 30 percent of them, output growth rates more than doubled relative to the 1990–95 period. Productivity trends followed a similar pattern.

The recession of 2001 marked the end of the long business expansion that had begun in 1991. The recession lasted only three quarters, but was associated with declines in output and labor input in a number of industries. In addition, the terrorist attacks of September 11, 2001, negatively affected business activity during the 2000–05 period. *Air transportation* and related industries such as *traveler accommodation* were particularly affected in the aftermath of the attacks, as were industries in the finance and insurance sector. In most industries, the downturn in production or sales was relatively short-lived and output growth recovered quickly. Consequently, more than 60 percent of the industries studied recorded increases in output over the 2000–05 period as a whole. In contrast, the downturn in labor hours was more prolonged. Labor

hours declined over the period in about 80 percent of the industries studied. In many cases, this was due to employment that, by 2005, had not yet returned to pre-recession levels.

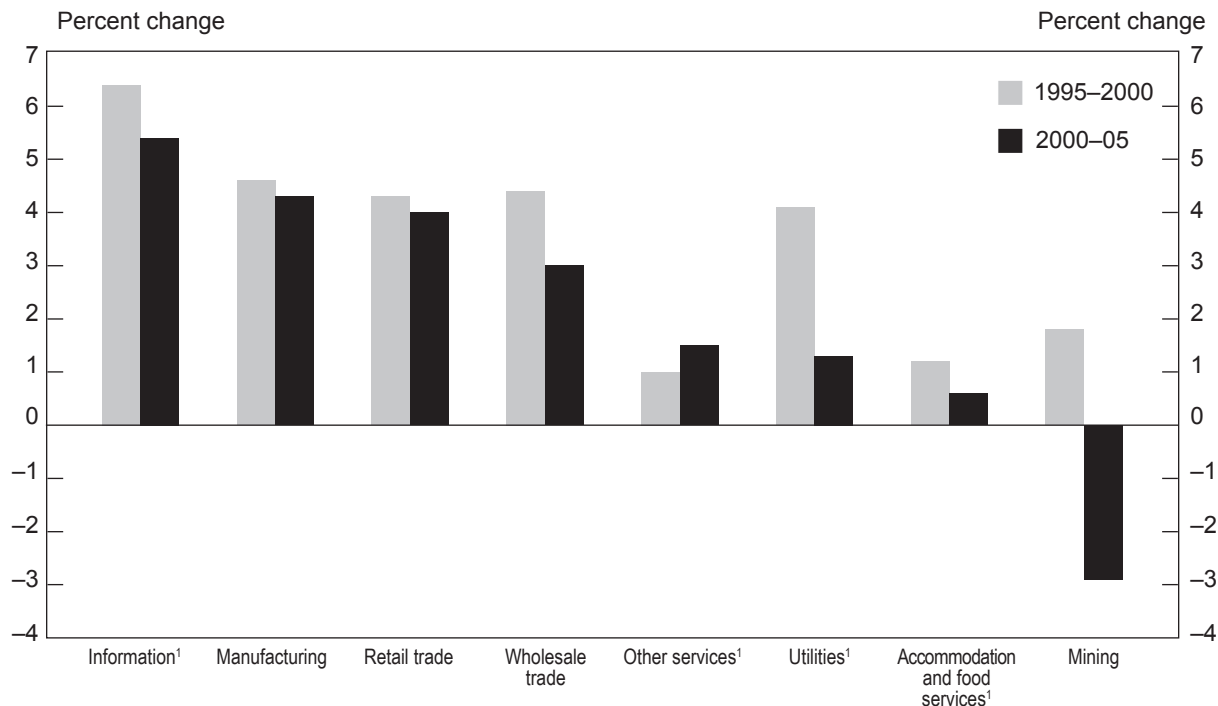
Productivity growth was slower from 2000 to 2005 than from 1995 to 2000 in seven of the eight sectors examined in this article. Still, during the recent 5-year period, productivity continued to grow fastest in those sectors where it had grown fastest from 1995 to 2000 and, with a few exceptions, slowest in the sectors where it had grown slowest during the early period. (See chart 1.) Productivity growth was strongest in the information sector in each period, followed by manufacturing. The retail trade sector also performed well during both periods. Productivity growth was slowest in other services and in accommodation and food services between 1995 and 2000, and these sectors had among the lowest productivity increases during the recent period as well. Productivity performance differed in the 2000–05 period relative to the second half of the 1990s in three sectors. Productivity growth slowed considerably in the wholesale trade and utilities sectors from 2000 to 2005 and fell sharply in mining after the sector had enjoyed moderate productivity growth during the 1995–2000 period. In contrast, the other services sector, which includes industries providing personal services such as *automotive repair and maintenance*, was the only sector to record an acceleration in productivity growth from the earlier period to the later period.

While the pattern of productivity growth in most sectors was similar in the latter half of the 1990s and the first 5 years of the current decade, the components of productivity growth differed during the two periods. (See chart 2.) Strong output growth occurred in most sectors between 1995 and 2000 and was the main contributor to productivity growth during that period. In contrast, during the 2000–05 period, output growth was lower in all sectors and reductions in labor input played an important role in contributing to the productivity increases in several sectors.

Sectors with strong productivity growth

Information. The information sector had the fastest productivity growth among the sectors studied from 1995 to 2000 as well as from 2000 to 2005. (See chart 1.) Productivity remained strong in the latter period, growing at an average annual rate of 5.4 percent, compared with an average rate of 6.4 percent in the 1995 to 2000 period. The source of the productivity growth, however, shifted between the two periods. During the second half of the

Chart 1. Average annual percent change in output per hour by sector, 1995–2000 and 2000–05



¹ Industry productivity measures cover less than 100 percent of sector employment. Rates of change shown for these sectors are not necessarily representative of industries not included.

1990s, productivity grew rapidly as output grew much faster than labor hours. As output growth slowed considerably in the more recent period, a drop in hours was mainly responsible for the increase in information sector productivity from 2000 through 2005. (See chart 2.) The BLS labor productivity measures, however, do not cover all the industries in the information sector. The measures for the sector are based on trends in the component industries for which BLS maintains measures, which cover approximately 72 percent of employment in the sector.

Productivity gains in the information sector during the 1990s were marked by large investments in IT and related products. In contrast, the 2000–05 period saw establishments in industries affected by the economic downturn struggling to increase efficiency in order to remain competitive. Offshoring of jobs, particularly those involving routine computer programming, played a role in the labor hour declines and reduced hours growth that occurred in certain industries in this sector.¹¹

Productivity in the *wireless telecommunications carriers (except satellite)* industry increased almost 21 percent an-

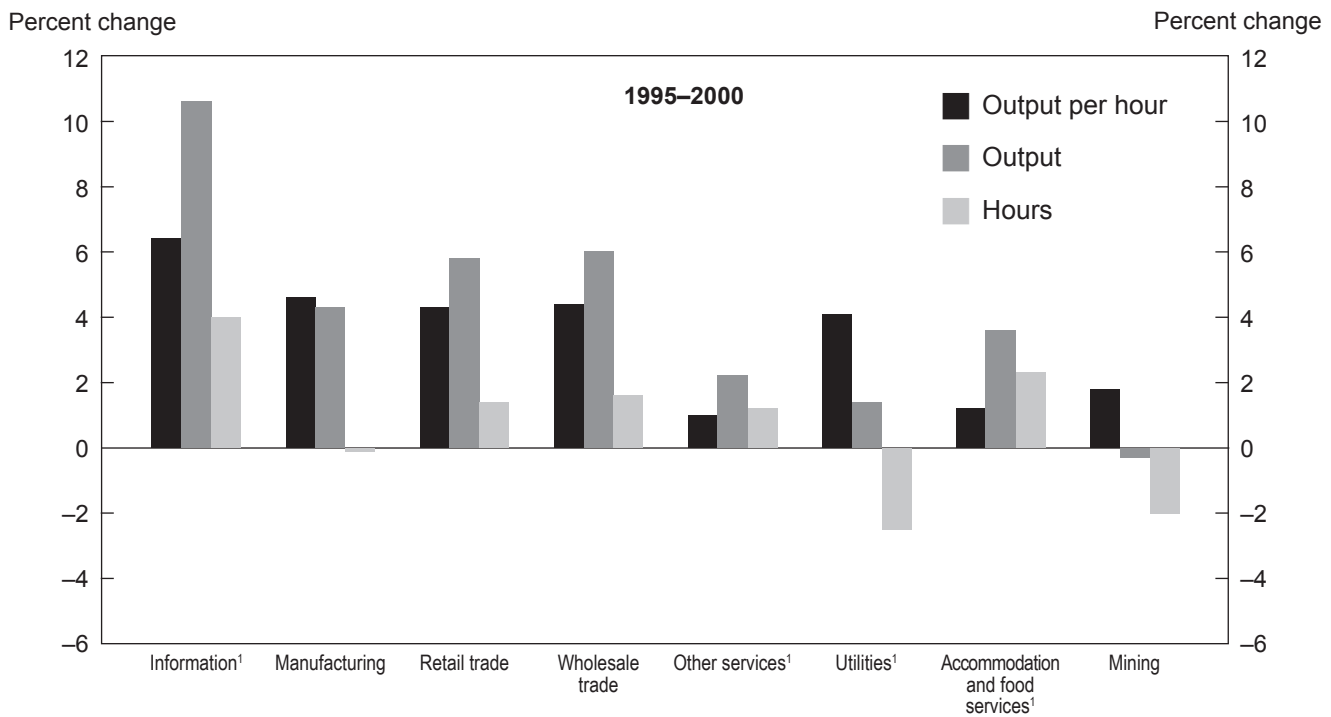
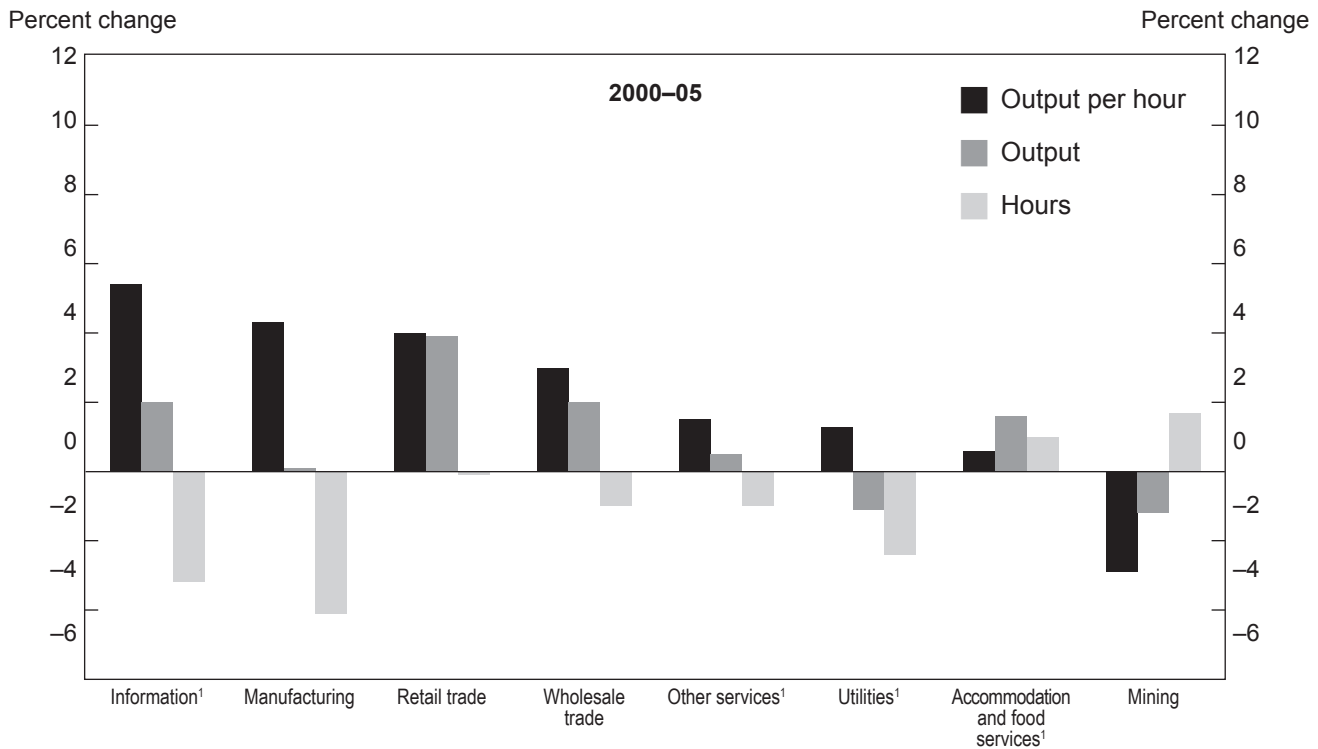
nually between 2000 and 2005, the most rapid productivity increase during this period among the industries studied. (See table 1.) Output grew more than 21 percent per year, reflecting continued strong demand for cellular telephones and other wireless handheld devices, while labor hours increased only slightly.

Productivity in the *software publishing* industry grew an average 7.5 percent annually from 2000 to 2005, down somewhat from its 10.2-percent rate of increase during the preceding 5-year period. (See appendix table A-1.) As in other IT industries, output growth slowed sharply from 23.6 percent per year during the latter half of the 1990s to 3.2 percent in the more recent 5-year period. Labor hours decreased substantially, 4 percent per year, from 2000 to 2005. Both employment and average hours fell, as offshoring of routine programming tasks became more commonplace in the industry.¹²

Among other information sector industries studied, two stand out. *Cable and other subscription programming* and *cable and other program distribution* both recorded relatively strong output growth and moderate growth in

Chart 2.

Average annual percent change in output per hour, output, and hours, by sector, 1995–2000 and 2000–05



¹ Industry productivity measures cover less than 100 percent of sector employment. Rates of change shown for these sectors are not necessarily representative of industries not included.

Table 1. Average annual percent change in productivity, output, and hours, 1990–95, 1995–2000, and 2000–05, in industries with the largest productivity increases and decreases in 2000–05

NAICS Code	Industry	Productivity (output per hour)			Output			Hours		
		1990–95	1995–2000	2000–05	1990–95	1995–2000	2000–05	1990–95	1995–2000	2000–05
Largest increases										
5172	Wireless telecommunications carriers (except satellite).....	5.1	11.1	20.8	28.2	27.4	21.6	22.0	14.6	0.7
3341	Computer and peripheral equipment manufacturing.....	27.6	36.3	19.7	23.3	34.4	8.7	-3.4	-1.4	-9.2
4234	Professional and commercial equipment and supplies merchant wholesalers.....	16.9	19.6	17.1	17.4	24.6	12.3	.5	4.2	-4.1
443	Electronics and appliance stores.	13.0	14.6	16.3	15.6	19.1	16.0	2.4	3.9	-2
3343	Audio and video equipment manufacturing.....	13.0	-2.3	13.6	10.4	-3.6	4.0	-2.2	-1.3	-8.5
4541	Electronic shopping and mail-order houses.....	10.8	17.2	12.2	17.7	25.0	11.2	6.2	6.7	-1.0
3344	Semiconductor and other electronic component manufacturing.....	23.8	29.5	10.7	24.6	34.0	1.4	.6	3.4	-8.4
3313	Alumina and aluminum production and processing.....	1.1	.1	9.7	-5	.4	2.6	-1.6	.3	-6.5
56151	Travel agencies.....	-3	5.1	9.5	2.4	4.9	.9	2.7	-2	-7.9
81292	Photofinishing.....	.0	-7.3	8.9	-2.1	-8.0	-6.8	-2.1	-8	-14.4
Largest declines										
425	Wholesale electronic markets and agents and brokers.....	5.1	4.7	-6.2	6.1	6.8	-5	.9	2.0	6.0
3161	Leather and hide tanning and finishing.....	4.3	7.6	-4.7	3.7	2.0	-13.8	-6	-5.3	-9.6
3159	Apparel accessories and other apparel manufacturing.....	2.0	-2.6	-3.6	3.0	-6.6	-11.8	.9	-4.1	-8.4
541921	Photography studios, portrait.....	2.3	.3	-3.0	3.3	1.9	1.5	1.0	1.6	4.6
3162	Footwear manufacturing.....	4.3	4.8	-2.5	-2.9	-6.5	-12.4	-7.0	-10.9	-10.1
3342	Communications equipment manufacturing.....	9.0	17.1	-2.5	9.8	17.7	-11.4	.8	.5	-9.1
211	Oil and gas extraction.....	4.7	4.6	-2.0	-7	-6	-1.7	-5.2	-5.0	.3
2121	Coal mining.....	5.3	5.6	-1.4	-1.2	-4	.2	-6.2	-5.7	1.7
48421	Used household and office goods moving.....	-2.1	-1.3	-1.4	.7	1.4	-2.1	2.8	2.8	-7
3332	Industrial machinery manufacturing.....	3.6	6.0	-1.3	6.1	5.6	-6.6	2.4	-4	-5.4
3312	Steel product manufacturing from purchased steel.....	3.6	-9	-1.3	4.0	.3	-5.6	.4	1.2	-4.4

labor hours between 2000 and 2005. For both industries, output and labor hours growth were down during the most recent period relative to the latter half of the 1990s. However, with output growth in the range of 6 percent annually and moderate increases in labor hours, these industries recorded productivity gains of about 3 percent to 4 percent per year.

While *wired telecommunications carriers* still is the largest industry covered in the information sector in terms of revenues, its share is rapidly declining. Output declined an average 4.6 percent per year between 2000 and 2005, reflecting shrinking demand. Firms in the industry responded to increased competition and price pressure from wireless carriers and internet services by reducing

employment. Labor hours dropped more than 7 percent per year, on average, during the period and the industry managed to increase productivity at an average rate of 2.7 percent per year.

Manufacturing. The manufacturing sector had the second-highest productivity growth among the sectors studied, behind only the information sector, in both the 1995–2000 and 2000–05 periods. Manufacturing productivity growth in the 2000–05 period was down only slightly from the boom years of the late 1990s. Among industries within the sector, productivity growth in 2000–05 was widespread and substantial, occurring in 90 percent of manufacturing industries and averaging 4 percent or more per year in 40 percent of the industries. In contrast to the sector’s performance from 1995 to 2000, however, manufacturing productivity growth from 2000 to 2005 was attributable to reductions in labor hours rather than to gains in output, as manufacturing output was flat over the period.¹³ Whereas output increased in 79 percent of manufacturing industries from 1995 to 2000, it increased in slightly more than half the industries during the 2000–05 period. At the same time, labor hours declined in 95 percent of manufacturing industries between 2000 and 2005, up from 57 percent in the 1995–2000 period.¹⁴

IT manufacturing industries—*computers and peripheral equipment, semiconductors and other electronic components, and communications equipment*—were at the center of the productivity growth resurgence of the late 1990s, and contributed substantially to the performance of the manufacturing sector and the economy as a whole during that period. Output and productivity grew much more slowly in all three IT manufacturing industries from 2000 to 2005 relative to their performance between 1995 and 2000. The *computer and peripheral equipment manufacturing* industry, which had the fastest productivity growth among all the measured industries in the 1995–2000 period, also fared best among the manufacturing industries in the latter period by matching relatively strong output growth with substantial cuts in labor hours. In contrast, output growth in *semiconductor and other electronic components manufacturing* slowed dramatically in the 2000–05 period compared with the 1995–2000 period, from 34 percent per year to 1.4 percent per year, respectively. This reflects a significant downturn in the industry in 2001 and 2002, years in which production and inventories were sharply reduced. Despite the slowdown in output growth in semiconductor manufacturing, however, sizeable reductions in labor hours resulted in continued productivity growth over the 2000–05 period.

Communications equipment manufacturing had the largest reversal in productivity performance between the 1995–2000 and 2000–05 periods. After recording the third fastest increase in output and productivity from 1995 to 2000 among the manufacturing industries studied, output dropped sharply between 2000 and 2005. Even when combined with large cuts in labor hours, productivity in *communications equipment manufacturing* declined over the period. Conversely, *audio and video equipment manufacturing* saw productivity decline between 1995 and 2000, but recorded the second highest productivity growth in the manufacturing sector from 2000 to 2005.

Manufacturing employment has declined for more than two decades as production has grown more efficient, productive activity has shifted toward services, and the use of outsourcing and offshoring has grown. Manufacturing employment fell slightly during the early 1990s, was essentially flat from 1995 through 2000, and fell more rapidly after 2000 as the recession took hold. The manufacturing sector was the most harshly affected by the recession, in terms of jobs lost.¹⁵ Although the recession was neither deep nor prolonged by historical standards, employment levels remained depressed for an unusually long period. For the sector as a whole and in many manufacturing industries, employment in 2005 remained below pre-recession levels, and this is reflected in substantial reductions in labor hours over the period.

The housing and residential construction boom that began in the years following the 2001 recession benefited a number of manufacturing industries, including *wood products manufacturing, cement and concrete manufacturing, architectural and structural metals manufacturing, and construction machinery manufacturing* (part of the *agriculture, construction, and mining machinery manufacturing* industry examined here).¹⁶ While the boom was cut short by the housing and construction slump that began in mid-2005, that reversal occurred too late in the period studied to have had much affect on the productivity trends examined in this article.

An examination of the performance of productivity in manufacturing industries during the 1995–2000 and 2000–05 periods shows that in the earlier period, productivity growth was spurred mainly by increases in output; in the latter period, the primary contributor to manufacturing productivity growth was declining labor hours.

Retail trade. Productivity growth in the retail trade sector between 2000 and 2005 was nearly unchanged from the 1995–2000 period. Growth slowed in both output and hours in the latter period, with hours declining slightly.

This resulted in very similar productivity growth in both periods. Although retail trade output grew more slowly than it had during the latter half of the 1990s, the sector had the most rapid output growth from 2000 to 2005 among the sectors studied. Output in the retail trade sector grew nearly twice as fast as it did in the wholesale trade and information sectors. Because labor hours were basically unchanged between 2000 and 2005, all of the increase in output was reflected in productivity growth.

In most retail trade industries, productivity growth from 2000 to 2005 resulted from a combination of increases in output and declines in hours. Output grew between 2000 and 2005 in almost all the retail trade industries studied, but at a slower pace than during the latter half of the 1990s. Output grew 4 percent or higher per year in only a third of the industries, compared with two-thirds of the industries during the 1995–2000 period. At the same time, nearly 60 percent of the retail trade industries had declines in labor hours between 2000 and 2005, up from only 11 percent in the 1995–2000 period.

Electronics and appliance stores and *electronic shopping and mail-order houses* experienced the fastest productivity growth in the retail trade sector during both the first half and the second half of the 1990s, and did so again between 2000 and 2005. Both of these industries are associated with IT products, involving their distribution in the first case, and relying heavily on their use in the second. To achieve such strong productivity growth, these industries combined rapid output growth with flat or declining labor hours. *Other general merchandise stores*, which includes *warehouse clubs and supercenters*, had the third fastest productivity growth in the sector during both halves of the 1990s, but saw its productivity growth surpassed by an increased number of retail trade industries in the 2000–05 period. Although output continued to grow very rapidly in the latest period, *other general merchandise stores* was among the few industries to record strong increases in employment and labor hours, resulting in a drop-off in productivity growth.

The expansion of e-commerce and online shopping reflects changes in consumer shopping habits that adversely affected *department stores*. Growth in *warehouse clubs and supercenters* has also contributed to a more competitive climate for *department stores* and exerted downward pressure on department store sales. As output grew rapidly in *electronic shopping and mail order houses* and in *warehouse clubs and supercenters*, growth in output of *department stores* slowed in each successive 5-year period examined, ending with a slight decline between 2000 and 2005. Labor productivity growth in the industry followed a similar pat-

tern. Within the *department stores* industry, *discount department stores* enjoyed substantial gains in market share at the expense of *department stores (except discount department stores)* during the first half of the 1990s. *Discount department stores* continued to surpass the latter industry with respect to output growth from 1995 to 2000 and maintained slightly more favorable output performance between 2000 and 2005. The stiff competition from various sides led to a wave of consolidations and closures in the *department stores (except discount department stores)* industry that appears to have paid off in terms of improved efficiency. While output in this industry declined between 2000 and 2005, labor productivity jumped as a result of sharp reductions in labor hours.

The housing boom also had a positive impact on industries in the retail trade sector. *Furniture stores* as well as industries in the *building material and garden equipment and supplies dealers* subsector benefited the most.

Sectors with moderate or weak productivity

Wholesale trade. In contrast to the retail trade sector, wholesale trade had significantly lower productivity growth from 2000 to 2005 relative to the 1995–2000 period. Output grew much more slowly in the latter period and labor hours fell, but not enough to offset the drop in output growth. Output grew 4 percent or more in only half as many industries from 2000 to 2005 as during the 1995–2000 period, and the share of wholesale trade industries with declines in labor hours rose from about one-quarter to about three-quarters. A mix of declining hours and increasing output resulted in increases in productivity in most wholesale trade industries between 2000 and 2005.

Wholesalers had been quick to adapt IT products to their needs and incorporate them into production processes, all made possible by the earlier development and widespread use of universal product codes (UPCs), or bar codes. Wholesalers' swift adoption of the new technologies contributed to the sector's strong productivity growth during the 1990s.¹⁷ Nevertheless, the industries with the best productivity performance during the 1990s were those involved in distributing the IT products themselves. *Professional and commercial equipment wholesalers*, which includes the wholesaling of computers, computer peripheral equipment, and software, and *electrical and electronic goods wholesalers*, which includes the wholesaling of semiconductors, had the most rapid productivity growth in the sector. As output growth accelerated, productivity in these industries grew at double-digit rates throughout the

1990s. From 2000 to 2005, output growth dropped sharply in both industries. In *professional and commercial equipment wholesaling*, output expanded at a relatively strong 12.3 percent per year, about half as rapid as its growth during the late 1990s. Aided by a substantial drop in labor hours, productivity growth in the industry remained in the double-digit range. Output growth in *electrical and electronic goods wholesaling*, however, dropped to below 2 percent per year in the 2000–05 period. Productivity in this industry grew 6 percent per year between 2000 and 2005, mainly as a result of declining labor hours.

Among the wholesale trade industries with moderate to strong output and productivity growth are those with substantial e-commerce sales. Wholesaling of *drugs and druggists' sundries; motor vehicles and motor vehicle parts and supplies*; and *professional and commercial equipment and supplies* all have large e-commerce markets accounting for a significant portion of sales. These electronic transactions helped to bolster output and productivity growth even as labor input was flat or declining. Another wholesale trade industry with strong output and productivity growth during the 2000–05 period was *lumber and other construction materials merchant wholesalers*. This industry benefited from the housing construction boom that occurred during the period. It had the second highest output growth in the sector and was among the few wholesale trade industries to record increases in labor hours over the period.

Other services (except public administration). Productivity rose 1.5 percent per year on average in the other services sector from 2000 to 2005, faster than during the 1995–2000 period. Productivity rose in all but one of the measured industries in this sector, *funeral homes and funeral services*. Other industries covered in the sector include: *automotive repair and maintenance; hair, nail and skin care services; dry cleaning and laundry services; and photofinishing*. Together, these industries account for about 73 percent of total employment in the sector.

Among the covered industries in the sector, productivity grew most rapidly, by far—8.9 percent per year—in *photofinishing*. This represented a reversal of the industry's productivity performance during the 1990s. *Photofinishing* productivity was flat from 1990 to 1995, as output and labor hours each dropped an average of 2.1 percent per year. From 1995 to 2000, establishments in this industry struggled to adjust to changing market conditions and the advent of new technologies such as digital cameras, online photo sharing, and at-home printing. During this period, productivity fell an average 7.3 percent per year, as output declined 8.0 percent per year and hours fell less

than 1 percent per year. During the 2000–05 period, the industry recorded average annual productivity growth of 8.9 percent despite increased competition from home-use products. While output fell 6.8 percent per year, hours declined more rapidly than in any other measured industry, 14.4 percent per year, as establishments in the industry increased their use of IT products.

Just two industries in the other services sector, *automotive repair and maintenance* and *hair, nail and skin care services*, experienced output growth from 2000 to 2005. Although output growth was slight in *automotive repair and maintenance*, it contributed to a small productivity increase. Moderate output growth was responsible for the productivity increase in *hair, nail and skin care services*.

More industries in other services experienced declining hours in the 2000–05 period than in the 1995–2000 period. In addition to *photofinishing*, a decrease in hours fueled productivity growth in *dry cleaning and laundry services* between 2000 and 2005. *Hair, nail and skin care services* was the only industry in the sector in which hours edged up slightly.

Utilities. Labor productivity in the utilities sector rose 1.3 percent per year, on average, from 2000 to 2005, a drop-off from the 4.1-percent productivity growth that occurred from 1995 to 2000. Demand for both electric power and natural gas has increased, but supplies are limited. Declining domestic production of natural gas resulting from the depletion of some domestic oil and natural gas fields and weather- and transportation-related supply disruptions may have played a role in restricting output growth in the utilities sector between 2000 and 2005. Despite a drop in output, utilities productivity growth remained positive during the period because the industries in the sector, *electric power generation and supply* and *natural gas distribution*, reduced labor hours substantially. The BLS measures for utilities industries cover approximately 92 percent of total employment in the sector.

Accommodation and food services. Productivity in the sector increased modestly at an annual rate of 0.6 percent from 2000 to 2005, a reduction from the 1.2-percent rate of productivity growth recorded in the previous 5-year period. Growth in both output and hours slowed in the recent period relative to the previous one, as the economic slowdown and travel fears related to the terrorist attacks in 2001 hampered growth in the *traveler accommodation* industry. While establishments in both the *traveler accommodation* industry and *the food services and drinking places* subsector increased their adoption of IT capital and IT-

based processes for booking reservations, billing, and inventory control, they remain labor-intensive industries. In contrast to a number of other sectors, labor hours continued to increase and output growth, however modest, was responsible for the small productivity increase that the sector recorded during the 2000–05 period. BLS measures cover most of the industries in this sector, accounting for more than 99 percent of the sector's employment.

In the *food services and drinking places* industry, output and hours both grew more slowly from 2000 to 2005 than in the previous 5-year period, while in *traveler accommodation*, output and hours declined. Productivity grew modestly in both industries from 2000 to 2005, which represented a significant slowdown for the *traveler accommodation* industry and a small increase for the *food services and drinking places* industry.

Sector with declining productivity

Mining. The mining sector was the only sector studied where productivity declined between 2000 and 2005. After increasing in both halves of the 1990's, productivity in the mining sector declined at an average rate of nearly 3 percent per year between 2000 and 2005. A sharp drop in output as well as a rise in labor hours were responsible for the reversal in productivity growth.

Demand and supply factors, including strong domestic demand for energy supplies, international competition for energy resources, uncertainties surrounding foreign oil production, declining domestic oil production, and supply disruptions related to weather and transportation problems each contributed to a rise in prices of energy-related products from 2000 to 2005. In response, labor input began to climb in 2004 and 2005 as producers attempted to increase production to meet strong demand. While *coal mining* output increased slightly, labor hours grew faster. In the *oil and gas extraction* industry, labor hours edged up, but output continued to fall as production from onshore conventional fields declined and producers relied more heavily on unconventional and remote sources.¹⁸ Consequently, productivity declined in both the *coal mining* and *oil and gas extraction* industries over the period.

Nonmetallic mineral mining and quarrying experienced moderate output growth from 2000 to 2005, possibly as a result of heightened demand for building materials in connection with increased construction activity. In combination with declining hours, this output growth spurred a healthy productivity increase in the industry. Output fell in the *metal ore mining* industry, but hours fell even more, leading to a modest increase in productivity. The strong

productivity growth in the nonenergy-related mining industries, however, did not fully offset the declines in the larger energy-related industries which set the tone for the sector as a whole.

Additional industries

BLS publishes productivity measures for a number of service-providing industries that are not included in the sectors discussed above. These additional industries are in the transportation and warehousing; finance and insurance; real estate and rental and leasing; professional, scientific, and technical services; administrative and support and waste management and remediation services; health care and social assistance; and arts, entertainment, and recreation sectors. This section discusses notable productivity trends in several of these industries.

Travel agencies adjusted well to the increasing prevalence of IT, with productivity growing at a rate of 9.5 percent from 2000 through 2005. Travel information and booking services have become more accessible to the public through the internet, and travel agents have shifted their focus from the basic services available on the internet to travel packages and group trips. Industry output growth slowed considerably between the 1995–2000 and 2000–05 periods, but labor hours fell rapidly, resulting in an increase in productivity growth over the 2000–05 period.

Output in the *air transportation* industry dipped in the first half of the 2000–05 period, falling 3.8 percent per year between 2000 and 2002 due to travel fears related to the September 11th terrorist attacks combined with the effects of the economic recession. Output surged after 2002, however, growing an average 2.5 percent per year over the 2000–05 period. Price pressures and increased competition helped foment a great deal of industry restructuring during this period, leading to a decline in labor hours of 3.9 percent per year. As a result, productivity grew a strong 6.7 percent per year between 2000 and 2005.

Productivity growth in the *commercial banking* industry ratcheted down from the first half of the 1990s to the second half and then dropped further in the 2000–05 period, growing at an average rate of only 1.1 percent per year. While output growth rebounded during the latest period, labor hours reversed the declines recorded during the 1990s and began to increase at an average rate of 0.9 percent per year.

Deregulation and the intensive use of IT transformed *commercial banking* over the past quarter-century.¹⁹ The increased competition that deregulation generated led banks to rely heavily on technology to reduce costs and to

offer many new products and services. For example, the rapid growth in the number of ATMs and the increased number of services offered through them allowed banks to exploit technology and improve service to the public while reducing staff and operating costs. The highly competitive climate in banking also led to a number of mergers during the 1990s, as banks consolidated and streamlined their operations.²⁰ However, the data indicate that the greatest productivity gains in *commercial banking* may have been realized in the early 1990s, when the largest reductions in *commercial banking* employment occurred. Between 1990 and 1995, for example, productivity grew 3.4 percent per year, on average. Between 1995 and 2000, productivity rose a modest 1.4 percent per year, as output grew and employment and hours declined more gradually than in the previous period. From 2000 through 2005, *commercial banking* employment rose steadily and labor hours increased nearly 1 percent per year. Although output growth revived during this period, the increase in labor hours resulted in a further drop in productivity growth to a rate of 1.1 percent per year.

Productivity in the *medical and diagnostic laboratories* industry slumped to an average 1.0 percent per year from 2000 to 2005, after growing 7.7 percent per year over the prior 5 years. During the 1990s, substantial investments in IT capital allowed for rapid output growth with only moderate growth in labor hours. The 2000–05 period saw a marked increase in hours growth. In addition, output grew more slowly, averaging 5.8 percent per year from 2000 to 2005, compared with 10.1 percent per year in the previous period.

Productivity in *portrait photography* studios declined at a relatively rapid 3 percent annually from 2000 to 2005. Output in the industry increased 1.5 percent per year, but hours increased 4.6 percent annually. Much of the productivity slowdown in this industry occurred after 2003, when labor hours grew particularly rapidly.

Summary and conclusions

Labor productivity in the total nonfarm business sector increased at a 3-percent annual rate from 2000 to 2005. This figure, however, masks structural and cyclical shifts that occurred in the economy over the period.²¹ An

analysis of productivity by sector and industry helps to reveal trends that are hidden in the aggregate data. This analysis shows, for example, that between 2000 and 2005, productivity growth in IT industries, and their contribution to aggregate productivity growth, were substantially reduced relative to the 1995–2000 period. At the same time, a number of industries were able to maintain strong productivity growth in the face of flat or declining output by reducing employment and labor hours.

The cyclical effects of the economic downturn in 2001 had a dramatic impact on productivity from 2000 to 2005. The drop in employment and hours was more protracted than the decline in output, particularly in the manufacturing and information sectors. Most growth in industry productivity during this period resulted from slower output growth than occurred in the previous 5-year period, combined with even slower growth or declines in labor hours. In addition to the effects of the recession on economic activity, other developments affected specific industries or sectors. For example, the negative supply and demand shocks from the terrorist attacks in September 2001 hurt output growth during this period in travel-related and financial industries in particular. In contrast, industries involved in producing or distributing construction materials benefited from the housing boom that accelerated in 2003 and lasted until mid-2005.

Structural shifts in the economy also affected productivity trends in many industries. Some industries saw dramatic declines in output, compared with the previous period, as customers substituted more advanced or high-tech products for traditional ones. *Wireless telecommunications carriers*, for example, benefited while *wired telecommunications carriers* were hurt as wireless technology matured and customers cut back on wired telephone services. Similarly, the growth of digital imaging technology boosted the output of digital camera manufacturers and software developers and led to increased productive efficiency in *photofinishing* establishments as employment and hours were reduced. In addition, outsourcing and offshoring may have allowed producers in some industries to decrease labor hours. From 2000 to 2005, most sectors and industries were faced with weaker output growth, yet continued to improve efficiency and maintain productivity growth. □

Notes

¹ The National Bureau of Economic Research reports that a business cycle peak occurred in the first quarter of 2001, with the trough following in the fourth quarter of that year. During a recession, productivity typically falls or grows at rates below those seen during business cycle expansions.

² Current industry productivity measures are available on the BLS Labor Productivity and Costs Web site at www.bls.gov/lpc/home.htm. Measures examined here are mainly for three- and four-digit industries, classified according to the North American Industry Classification System (NAICS).

³ Sectoral output is measured by industry revenues or, for goods-producing industries, by value of production. Value of production is derived by adjusting industry value of shipments for changes in inventories and subtracting shipments between establishments in the same industry (intra-industry transfers) and resales of finished goods.

⁴ Measures for the manufacturing sector are compiled by the BLS Division of Major Sector Productivity, as are the measures for the business and nonfarm business sectors.

⁵ All the industries in these sectors are covered at the four-digit NAICS level except the *support activities for mining* industry, NAICS 2131. Productivity measures for the mining sector exclude the output of NAICS 2131, which is all consumed within the sector, but include employment and hours of workers in NAICS 2131.

⁶ *Religious, grantmaking, civic, professional, and similar organizations* and *private households* are excluded from the BLS other services sector measures.

⁷ While the goal of the industry productivity program is to develop industry measures covering as much of the nonfarm business economy as possible, lack of reliable source data or conceptual problems in defining or measuring industry output limit the development of productivity measures for certain industries. These problems affect efforts to measure output and productivity in service industries in particular.

⁸ See, for example, Dale W. Jorgenson, Mun S. Ho, and Kevin Stiroh, "A Retrospective Look at the U.S. Productivity Growth Resurgence," Federal Reserve Bank of New York Staff Reports, Staff Report No. 277, February 2007. On the Internet at: www.newyorkfed.org/research/staff_reports/sr277.pdf.

⁹ Dale Jorgenson and other productivity researchers divide the industries of the economy into three categories: IT-producing, IT-using, and non-IT (see, for example, Dale W. Jorgenson, "Moore's Law and the Emergence of the New Economy," Semiconductor Industry Association 2005 Annual Report, pp. 17–20. On the Internet at: www.sia-online.org/downloads/SIA_AR_2005_Jorgenson.pdf). The IT-producing industries group includes three manufacturing industries and one information sector industry: *computers and peripheral equipment manufacturing, semiconductors and other electronic components manufacturing, communications equipment manufacturing, and software publishers*. In this article, we adopt this grouping of IT-producing industries and refer to them simply as IT industries.

¹⁰ Jorgenson, "Moore's Law," p. 18.

¹¹ See Robert W. Bednarzik, "Restructuring information technology: is offshoring a concern?," *Monthly Labor Review*, August 2005, pp. 11–21. In comparing the results of several studies on the topic, the author notes that "offshoring appears to have a small employment impact in the aggregate, but certain occupations and industries are hard hit."

¹² U. S. Government Accountability Office, Report to Congressional Committees, "Offshoring: U.S. Semiconductor and Software Industries Increasingly Produce in China and India," GAO-06-423, September 2006. On the Internet at: www.gao.gov/new.items/d06423.pdf. See also the following report prepared by Global Insight (USA), Inc. for the Information Technology Association of America

(ITAA), "Executive Summary: The Comprehensive Impact of Offshore Software and IT Services Outsourcing on the U.S. Economy and the IT Industry," October 2005. On the Internet at www.ita.org/itserv/docs/OffshoreITOExecutiveSummary2005FINAL.pdf.

¹³ Increased outsourcing of workers and offshoring of production can result in industry labor productivity growth because the outsourced or foreign labor used is not counted as labor input in the domestic industry whose output is being measured. See Susan Houseman, "Outsourcing, Offshoring, and Productivity Measurement in U.S. Manufacturing," Upjohn Institute Staff Working Paper No. 06-130, June 2006, revised September 2006 and April 2007. Purchases of intermediate goods and contract labor are included as purchased materials or services inputs in the BLS multifactor productivity measures.

¹⁴ Research indicates that, during the period studied, manufacturers obtained some workers from staffing firms rather than hiring them outright, and the prevalence of this practice has increased since 1990 (see Matthew Dey, Susan Houseman, and Anne Polivka, "Manufacturers' Outsourcing to Employment Services," Upjohn Institute Staff Working Paper No. 07-132, December 2006). In the employment statistics classified according to NAICS, these workers are counted in the industry group in which the staffing firms are classified, *employment services*, rather than as manufacturing employees. From 2000 to 2005, manufacturing employment fell 3.7 percent per year, while employment in the *employment services* industry fell only 1.4 percent per year.

¹⁵ See Julie Hatch Maxfield, "Jobs in 2005: How do they compare with their March 2001 counterparts?" *Monthly Labor Review*, July 2006, pp. 15–26, for a discussion of the duration of employment downturns in the most recent and previous recessions. Table 2 on page 18 shows employment changes by sector during the most recent and previous recessions.

¹⁶ See Matthew Miller, "A visual essay: post-recessionary employment growth related to the housing market," *Monthly Labor Review*, October 2006, pp. 23–34.

¹⁷ Christopher Kask, David Kiernan, and Brian Friedman, "Labor productivity growth in wholesale trade, 1990–2000," *Monthly Labor Review*, December 2002, pp. 3–14.

¹⁸ U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2007 with Projections to 2030*, February 2007. On the Internet at: www.eia.doe.gov/oiaf/aeo/.

¹⁹ Teresa L. Morisi, "Commercial banking transformed by computer technology," *Monthly Labor Review*, August 1996, pp. 30–36.

²⁰ Kevin J. Stiroh and Jennifer P. Poole, "Explaining the Rising Concentration of Banking Assets in the 1990s," *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, August 2000.

²¹ The industry and sector productivity measures discussed in this article are based on sectoral output, the total value, in real terms, of goods and services produced for sale outside the industry. In contrast, BLS productivity data for the nonfarm business sector are based on value-added output, which measures only the contribution of labor and capital to production and excludes the value of intermediates.

Appendix table A-1. Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS Code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
Mining										
21	Mining.....	3.6	1.8	-2.9	-0.3	-0.3	-1.2	-3.8	-2.0	1.7
211	Oil and gas extraction.....	4.7	4.6	-2.0	-7	-6	-1.7	-5.2	-5.0	.3
212	Mining, except oil and gas.....	3.5	2.5	1.3	.3	.1	.6	-3.1	-2.3	-7
2121	Coal mining.....	5.3	5.6	-1.4	-1.2	-4	.2	-6.2	-5.7	1.7
2122	Metal ore mining.....	4.3	4.4	1.3	2.5	-5	-3.7	-1.7	-4.7	-4.9
2123	Nonmetallic mineral mining and quarrying.....	1.1	-2	3.9	.7	1.0	2.9	-3	1.3	-1.0
Utilities										
22	Utilities.....	4.5	4.1	1.3	2.5	1.4	-1.1	-2.0	-2.5	-2.4
2211	Electric power generation and supply.....	4.5	3.9	1.3	2.3	1.5	-1.0	-2.1	-2.3	-2.3
2212	Natural gas distribution.....	4.5	4.9	1.8	2.9	1.3	-9	-1.5	-3.4	-2.6
Manufacturing										
31-33	Manufacturing.....	3.4	4.6	4.3	3.3	4.5	.1	-1	-1	-4.1
311	Food.....	1.2	1.4	2.9	2.0	1.5	1.5	.8	.1	-1.4
3111	Animal food.....	.5	3.2	8.6	1.2	1.7	3.7	.7	-1.4	-4.5
3112	Grain and oilseed milling.....	2.2	2.8	4.0	1.7	1.3	1.5	-5	-1.4	-2.4
3113	Sugar and confectionery products.....	.8	3.3	3.6	.8	2.4	-2	.0	-9	-3.7
3114	Fruit and vegetable preserving and specialty.....	2.3	2.6	3.4	2.1	1.6	.7	-2	-1.0	-2.6
3115	Dairy products.....	1.4	-4	2.7	1.1	-6	1.9	-3	-2	-7
3116	Animal slaughtering and processing.....	1.0	.7	2.7	3.3	2.5	1.3	2.3	1.8	-1.4
3117	Seafood product preparation and packaging.....	-1.6	5.0	5.8	-1.5	.4	3.1	.2	-4.3	-2.5
3118	Bakeries and tortilla manufacturing.....	1.3	1.5	1.3	2.1	1.5	.4	.8	.0	-8
3119	Other food products.....	2.4	1.6	.5	2.7	1.6	1.8	.3	.0	1.3
312	Beverages and tobacco products.....	3.2	-3.0	2.5	1.4	-9	-3	-1.8	2.1	-2.7
3121	Beverage.....	3.3	-2.5	5.6	1.9	.6	3.1	-1.4	3.2	-2.4
3122	Tobacco and tobacco products.....	4.2	-3	-6	1.0	-3.3	-5.0	-3.1	-3.0	-4.4
313	Textile mills.....	3.4	3.2	6.7	2.9	-1.1	-4.8	-5	-4.2	-10.8
3131	Fiber, yarn, and thread mills.....	4.3	2.0	8.2	3.3	-5	-1.2	-1.0	-2.4	-8.7
3132	Fabric mills.....	4.9	2.9	6.4	3.4	-2.1	-6.5	-1.4	-4.9	-12.2
3133	Textile and fabric finishing mills.....	.6	4.4	6.0	2.3	.0	-4.6	1.7	-4.1	-10.1
314	Textile product mills.....	.8	2.7	4.6	1.7	2.3	-2	.9	-4	-4.6
3141	Textile furnishings mills.....	1.0	2.5	5.3	1.2	2.9	.4	.2	.4	-4.7
3149	Other textile product mills.....	1.0	2.6	3.3	3.0	1.2	-1.4	2.0	-1.3	-4.5

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
315	Apparel.....	4.1	5.3	-0.9	1.8	-4.4	-13.0	-2.2	-9.3	-12.1
3151	Apparel knitting mills.....	4.9	-1	1.9	4.6	-8.5	-9.5	-3	-8.5	-11.2
3152	Cut and sew apparel.....	4.0	7.0	-1.1	1.1	-3.5	-13.7	-2.7	-9.8	-12.7
3159	Accessories and other apparel.....	2.0	-2.6	-3.6	3.0	-6.6	-11.8	.9	-4.1	-8.4
316	Leather and allied products.....	2.5	7.9	.0	-2.1	-8	-9.9	-4.4	-8.1	-9.9
3161	Leather and hide tanning and finishing.....	4.3	7.6	-4.7	3.7	2.0	-13.8	-6	-5.3	-9.6
3162	Footwear.....	4.3	4.8	-2.5	-2.9	-6.5	-12.4	-7.0	-10.9	-10.1
3169	Other leather products.....	-6.3	8.8	6.4	-7.5	2.8	-4.0	-1.2	-5.5	-9.8
321	Wood products.....	.0	1.0	3.7	1.6	2.4	1.1	1.6	1.4	-2.5
3211	Sawmills and wood preservation.....	2.6	3.1	3.9	1.4	2.8	1.1	-1.2	-3	-2.8
3212	Plywood and engineered wood products.....	-3	-5	2.2	2.6	2.6	1.2	2.9	3.1	-1.0
3219	Other wood products.....	-1.1	.6	4.1	1.4	2.2	1.1	2.5	1.5	-2.9
322	Paper and paper products.....	2.4	1.7	3.3	2.0	.3	-1.3	-.3	-1.3	-4.5
3221	Pulp, paper, and paperboard mills.....	3.2	3.4	5.1	1.8	-.3	-1.5	-1.4	-3.6	-6.2
3222	Converted paper products.....	1.5	.8	2.6	1.9	.7	-1.1	.3	-.1	-3.7
323	Printing and related support activities.....	.3	1.1	2.7	.8	.9	-2.0	.5	-.2	-4.6
324	Petroleum and coal products.....	3.6	4.8	1.7	1.5	1.6	.9	-2.0	-3.0	-.9
325	Chemicals.....	1.6	2.5	4.5	1.1	1.7	2.2	-.4	-.8	-2.1
3251	Basic chemicals.....	-.5	5.2	6.8	-1.4	-.1	1.6	-.9	-5.1	-4.8
3252	Resin, rubber, and artificial fibers.....	4.6	2.8	3.1	2.8	1.3	-.5	-1.7	-1.5	-3.5
3253	Agricultural chemicals.....	.9	.5	7.8	.5	-1.3	3.3	-.4	-1.8	-4.2
3254	Pharmaceuticals and medicines.....	1.0	-.1	2.4	3.0	4.1	4.2	2.0	4.1	1.8
3255	Paints, coatings, and adhesives.....	1.2	1.8	4.1	.7	1.3	.6	-.4	-.5	-3.4
3256	Soaps, cleaning compounds, and toiletries.....	2.5	1.4	8.2	1.7	1.3	5.5	-.8	-.1	-2.5
3259	Other chemical products and preparations.....	3.8	5.1	.6	2.3	2.9	-3.1	-1.4	-2.0	-3.8
326	Plastics and rubber products.....	2.1	3.2	3.8	4.6	3.8	-.1	2.4	.6	-3.7
3261	Plastics products.....	2.1	3.5	3.8	5.0	4.2	.3	2.9	.7	-3.4
3262	Rubber products.....	2.2	1.8	3.2	3.0	2.2	-1.7	.8	.4	-4.7
327	Nonmetallic mineral products.....	1.5	1.8	2.2	1.3	3.2	.6	-.2	1.4	-1.6
3271	Clay products and refractories.....	1.7	1.1	2.5	2.4	.1	-3.3	.7	-1.0	-5.6
3272	Glass and glass products.....	2.0	4.3	2.6	1.4	3.4	-2.0	-.6	-.9	-4.4

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
3273	Cement and concrete products.....	0.6	0.4	0.8	0.9	4.7	1.8	0.3	4.3	1.0
3274	Lime and gypsum products.....	1.1	1.8	3.5	-3	2.9	2.1	-1.4	1.0	-1.3
3279	Other nonmetallic mineral products.....	2.8	1.1	4.1	1.6	1.8	2.4	-1.2	.7	-1.7
331	Primary metals.....	2.5	1.2	5.8	1.7	.8	-5	-7	-3	-5.9
3311	Iron and steel mills and ferroalloy production.....	5.1	3.3	8.6	1.7	1.4	1.4	-3.2	-1.8	-6.6
3312	Steel products from purchased steel.....	3.6	-9	-1.3	4.0	.3	-5.6	.4	1.2	-4.4
3313	Alumina and aluminum production.....	1.1	.1	9.7	-5	.4	2.6	-1.6	.3	-6.5
3314	Other nonferrous metal production.....	1.3	-1	3.6	.8	-1.5	-2.2	-5	-1.4	-5.6
3315	Foundries.....	1.5	2.2	4.3	2.8	2.6	-1.9	1.3	.5	-5.9
332	Fabricated metal products.....	2.2	1.5	2.1	2.9	3.1	-1.2	.6	1.5	-3.2
3321	Forging and stamping.....	1.1	5.2	3.9	3.4	4.8	-1.2	2.3	-4	-4.9
3322	Cutlery and hand tools.....	2.6	1.7	1.9	3.1	1.9	-4.8	.5	.1	-6.6
3323	Architectural and structural metals.....	1.2	1.5	1.4	1.9	5.6	-7	.6	4.0	-2.1
3324	Boilers, tanks, and shipping containers.....	1.6	-6	-1	.1	-5	-2.9	-1.4	.2	-2.8
3325	Hardware.....	2.8	3.3	3.0	2.5	1.2	-5.3	-2	-2.1	-8.0
3326	Spring and wire products.....	3.1	2.6	5.4	4.8	1.8	-1.3	1.7	-8	-6.3
3327	Machine shops and threaded products.....	4.4	1.9	1.3	6.5	3.8	-4	2.0	1.8	-1.7
3328	Coating, engraving, and heat treating metals.....	4.7	.6	5.2	6.5	3.1	.9	1.8	2.4	-4.1
3329	Other fabricated metal products.....	2.2	.7	2.4	1.0	1.3	-9	-1.1	.6	-3.3
333	Machinery.....	2.0	2.9	3.7	3.2	2.6	-1.0	1.2	-3	-4.5
3331	Agriculture, construction, and mining machinery.....	2.7	1.0	5.4	1.9	1.2	4.0	-8	.1	-1.3
3332	Industrial machinery.....	3.6	6.0	-1.3	6.1	5.6	-6.6	2.4	-4	-5.4
3333	Commercial and service industry machinery.....	1.6	-5	2.4	2.0	-6	-4.3	.4	.0	-6.5
3334	HVAC and commercial refrigeration equipment.....	1.3	2.3	5.0	4.7	3.7	.0	3.4	1.4	-4.7
3335	Metalworking machinery.....	2.8	1.4	3.6	4.1	.5	-3.1	1.3	-8	-6.4
3336	Turbine and power transmission equipment.....	1.2	4.7	2.7	2.4	3.4	.4	1.1	-1.3	-2.2
3339	Other general purpose machinery.....	1.6	3.9	3.8	3.0	3.1	-1.1	1.4	-8	-4.8
334	Computer and electronic products.....	15.4	20.8	7.4	13.3	21.7	.1	-1.8	.7	-6.8
3341	Computer and peripheral equipment.....	27.6	36.3	19.7	23.3	34.4	8.7	-3.4	-1.4	-9.2
3342	Communications equipment.....	9.0	17.1	-2.5	9.8	17.7	-11.4	.8	.5	-9.1
3343	Audio and video equipment.....	13.0	-2.3	13.6	10.4	-3.6	4.0	-2.2	-1.3	-8.5
3344	Semiconductors and electronic components.....	23.8	29.5	10.7	24.6	34.0	1.4	.6	3.4	-8.4
3345	Electronic instruments.....	4.5	3.6	3.7	-3	2.8	1.4	-4.6	-8	-2.1

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05										
NAICS code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
3346	Magnetic media manufacturing and reproduction.....	4.7	0.1	6.3	9.6	-1.1	0.4	4.7	-1.3	-5.6
335	Electrical equipment and appliances.....	4.2	3.6	3.1	3.2	3.3	-3.5	-9	-2	-6.4
3351	Electric lighting equipment.....	.8	2.1	5.6	1.7	2.5	-.7	.9	.4	-5.9
3352	Household appliances.....	3.7	5.0	7.1	4.1	3.0	1.5	.4	-1.9	-5.2
3353	Electrical equipment.....	5.9	.3	3.3	3.7	-.4	-3.7	-2.1	-.7	-6.7
3359	Other electrical equipment and components.....	3.9	5.4	.3	2.8	6.5	-6.5	-1.0	1.1	-6.8
336	Transportation equipment.....	1.9	3.2	5.1	1.0	4.0	1.7	-.9	.7	-3.3
3361	Motor vehicles.....	.7	4.4	6.0	3.7	3.5	2.1	3.0	-.8	-3.7
3362	Motor vehicle bodies and trailers.....	5.1	.3	2.9	10.2	3.2	1.7	4.8	2.9	-1.2
3363	Motor vehicle parts.....	3.9	4.0	5.2	9.0	5.3	.1	4.9	1.3	-4.8
3364	Aerospace products and parts.....	1.4	1.6	4.0	-8.2	2.2	1.2	-9.5	.7	-2.7
3365	Railroad rolling stock.....	1.1	7.7	.4	5.0	5.0	-3.5	3.9	-2.5	-3.9
3366	Ship and boat building.....	-1.3	5.5	1.8	-4.0	4.8	2.3	-2.7	-.7	.5
3369	Other transportation equipment.....	8.4	7.1	6.7	11.0	7.9	5.5	2.4	.8	-1.1
337	Furniture and related products.....	1.5	1.8	4.3	2.0	4.5	.7	.5	2.6	-3.5
3371	Household and institutional furniture.....	2.0	1.0	3.6	2.3	3.3	1.0	.3	2.3	-2.5
3372	Office furniture and fixtures.....	.6	3.4	6.4	1.6	6.3	-.5	.9	2.8	-6.5
3379	Other furniture-related products.....	1.3	1.0	4.4	2.1	5.1	2.0	.8	4.1	-2.3
339	Miscellaneous manufacturing.....	2.0	3.5	4.9	2.9	4.1	2.3	.8	.5	-2.5
3391	Medical equipment and supplies.....	3.1	3.5	5.3	3.6	5.2	4.8	.5	1.7	-.5
3399	Other miscellaneous manufacturing.....	1.2	3.4	4.1	2.3	3.1	-.1	1.1	-.3	-4.1
	Wholesale trade									
42	Wholesale trade.....	3.3	4.4	3.0	4.1	6.0	2.0	.7	1.6	-1.0
423	Durable goods.....	5.9	6.8	6.0	6.7	8.9	3.7	.7	2.0	-2.2
4231	Motor vehicle and motor vehicle parts and supplies.....	3.8	4.3	4.7	5.5	4.9	2.5	1.7	.6	-2.1
4232	Furniture and home furnishings.....	2.6	1.8	2.5	3.2	3.9	.1	.5	2.0	-2.3
4233	Lumber and other construction materials.....	-1.3	1.2	5.4	.3	4.0	7.5	1.6	2.8	2.0
4234	Professional and commercial equipment and supplies.....	16.9	19.6	17.1	17.4	24.6	12.3	.5	4.2	-4.1
4235	Metals and minerals (excluding petroleum).....	.4	-2.2	1.9	1.2	.1	-1.2	.8	2.4	-3.0
4236	Electrical and electronic goods.....	10.8	12.8	6.0	11.1	16.0	1.7	.3	2.9	-4.0
4237	Hardware, plumbing, heating equipment and supplies.....	2.4	.9	.2	3.1	3.1	.6	.7	2.2	.4
4238	Machinery, equipment and supplies.....	2.0	3.2	2.4	1.4	4.3	.6	-.6	1.0	-1.8

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
4239	Miscellaneous durable goods.....	1.9	2.9	3.1	5.0	2.2	1.7	3.1	-0.6	-1.3
424	Nondurable goods.....	-1	1.3	1.7	.7	2.0	.4	.8	.7	-1.3
4241	Paper and paper products.....	3.3	1.1	6.6	4.1	1.2	.4	.7	.1	-5.8
4242	Drugs and druggists' sundries.....	3.3	-1.9	5.5	4.5	3.7	5.4	1.2	5.7	-.1
4243	Apparel, piece goods and notions.....	-1.8	3.7	5.2	.2	3.2	2.0	2.0	-5	-3.1
4244	Grocery and related products.....	1.5	-.3	.4	2.7	.8	.2	1.1	1.1	-.2
4245	Farm product raw materials.....	1.9	3.7	.6	.4	-.4	-1.2	-1.5	-4.0	-1.8
4246	Chemicals and allied products.....	-.5	-2.3	.0	.7	-.3	-.7	1.1	2.0	-.7
4247	Petroleum and petroleum products.....	-1.7	6.5	2.0	-6.2	5.9	-3.3	-4.6	-6	-5.2
4248	Beer, wine and distilled alcoholic beverages.....	-1.6	1.3	-.7	-1.0	3.3	2.3	.6	1.9	3.0
4249	Miscellaneous nondurable goods.....	-1.7	2.9	1.6	.2	2.2	-.4	2.0	-6	-1.9
425	Electronic markets and agents and brokers.....	5.1	4.7	-6.2	6.1	6.8	-.5	.9	2.0	6.0
	Retail trade									
44-45	Retail trade.....	2.9	4.3	4.0	3.8	5.8	3.9	.8	1.4	-.1
441	Motor vehicle and parts dealers.....	2.9	3.6	2.1	4.2	6.1	2.8	1.2	2.3	.6
4411	Automobile dealers.....	2.6	3.5	1.7	4.0	6.0	2.6	1.4	2.4	.9
4412	Other motor vehicle dealers.....	4.8	5.5	3.2	5.6	11.0	8.3	.8	5.2	4.9
4413	Auto parts, accessories, and tire stores...	3.8	2.6	1.3	4.9	4.2	.1	1.0	1.5	-1.2
442	Furniture and home furnishings stores....	3.5	4.4	5.5	3.9	7.4	5.6	.4	2.9	.1
4421	Furniture stores.....	2.0	3.6	5.1	2.5	6.4	5.1	.5	2.7	.1
4422	Home furnishings stores.....	5.6	5.3	6.0	6.0	8.6	6.2	.3	3.1	.2
443	Electronics and appliance stores.....	13.0	14.6	16.3	15.6	19.1	16.0	2.4	3.9	-.2
444	Building material and garden supply stores.....	2.9	4.3	3.6	4.4	7.0	6.4	1.4	2.6	2.7
4441	Building material and supplies dealers.....	2.7	4.3	3.2	4.5	7.1	6.8	1.8	2.7	3.4
4442	Lawn and garden equipment and supplies stores.....	4.0	4.2	5.6	3.2	6.2	3.7	-.7	1.9	-1.8
445	Food and beverage stores.....	-1.0	-.2	3.2	-.5	.4	.7	.4	.6	-2.5
4451	Grocery stores.....	-.8	-.3	3.0	-.3	.2	.5	.5	.5	-2.4
4452	Specialty food stores.....	-4.1	-.9	5.3	-2.6	.6	3.2	1.6	1.5	-2.0
4453	Beer, wine and liquor stores.....	-.7	2.3	6.1	-2.4	2.7	1.9	-1.8	.4	-3.9
446	Health and personal care stores.....	.1	4.2	3.5	1.1	6.6	3.8	1.0	2.4	.3

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS Code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
447	Gasoline stations.....	3.4	1.6	2.9	2.1	1.6	1.4	-1.3	.0	-1.5
448	Clothing and clothing accessories stores.....	5.8	5.9	3.7	3.6	6.7	5.5	-2.1	.7	1.8
4481	Clothing stores.....	5.5	6.4	4.1	4.0	6.8	6.4	-1.4	.4	2.1
4482	Shoe stores.....	6.4	2.7	3.8	1.4	3.5	2.7	-4.7	.8	-1.1
4483	Jewelry, luggage, and leather goods stores.....	6.7	6.7	1.3	3.8	9.2	4.0	-2.7	2.3	2.7
451	Sporting goods, hobby, book, and music stores.....	2.9	5.0	6.4	5.0	5.9	3.0	2.0	.9	-3.2
4511	Sporting goods and musical instrument stores.....	3.0	6.3	7.0	4.4	7.0	5.0	1.3	.7	-1.9
4512	Book, periodical, and music stores.....	2.7	2.4	4.8	6.2	3.9	-1.3	3.4	1.4	-5.8
452	General merchandise stores.....	4.1	5.5	3.8	6.2	6.4	5.9	2.0	.8	2.0
4521	Department stores.....	2.4	2.3	.7	5.3	3.3	-.2	2.8	.9	-.9
4529	Other general merchandise stores.....	7.3	11.1	6.3	8.2	11.8	12.2	.8	.7	5.6
453	Miscellaneous store retailers.....	5.0	5.1	4.5	6.9	6.9	1.3	1.7	1.7	-3.1
4531	Florists.....	2.4	6.9	.9	.4	5.0	-4.2	-2.0	-1.8	-5.1
4532	Office supplies, stationery and gift stores.....	6.7	6.8	8.1	8.2	9.7	2.8	1.5	2.8	-5.0
4533	Used merchandise stores.....	4.1	6.3	6.5	8.1	9.4	1.7	3.9	2.9	-4.5
4539	Other miscellaneous store retailers.....	3.4	3.3	-.2	6.9	4.5	.8	3.3	1.2	1.0
454	Nonstore retailers.....	7.8	13.8	7.5	9.4	15.1	7.3	1.4	1.1	-.2
4541	Electronic shopping and mail-order houses.....	10.8	17.2	12.2	17.7	25.0	11.2	6.2	6.7	-1.0
4542	Vending machine operators.....	-1.9	5.2	-1.1	-3.4	2.3	-3.5	-1.5	-2.7	-2.4
4543	Direct selling establishments.....	4.7	5.6	-.2	4.2	2.9	1.2	-.5	-2.6	1.3
	Transportation and warehousing									
481	Air transportation.....	4.2	.6	6.7	3.5	4.9	2.5	-.7	4.3	-3.9
482111	Line-haul railroads.....	5.7	4.4	3.9	3.3	2.0	2.1	-2.2	-2.3	-1.7
48412	General freight trucking, long-distance.....	1.4	1.2	2.0	4.9	4.0	2.3	3.4	2.7	.3
48421	Used household and office goods moving.....	-2.1	-1.3	-1.4	.7	1.4	-2.1	2.8	2.8	-.7
491	Postal service.....	.7	1.5	1.1	1.7	2.6	-1.1	1.0	1.1	-2.2
492	Couriers and messengers.....	-6.0	3.7	.4	4.1	4.2	-1.7	10.8	.5	-2.1
	Information									
51	Information.....	4.3	6.4	5.4	5.2	10.6	2.0	.9	4.0	-3.2
511	Publishing.....	4.3	7.1	3.1	5.2	10.3	-.3	.8	2.9	-3.3

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS code	Industry	Productivity (output per hour)			Output			Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
5111	Newspaper, book, and directory publishers.....	-8	3.2	0.1	-1.3	3.7	-2.9	-0.6	0.5	-3.0
5112	Software publishers.....	20.8	10.2	7.5	32.3	23.6	3.2	9.5	12.2	-4.0
51213	Motion picture and video exhibition.....	-1.9	1.4	-7	-6	4.4	-1.6	1.3	3.0	-8
515	Broadcasting, except internet.....	.9	.2	2.6	2.4	3.4	2.4	1.5	3.1	-2
5151	Radio and television broadcasting.....	1.4	-2.5	2.0	2.1	-1.0	.3	.7	1.6	-1.6
5152	Cable and other subscription programming.....	-1.5	8.7	2.8	3.6	18.0	6.2	5.2	8.5	3.3
5171	Wired telecommunications carriers.....	5.8	7.0	2.7	4.3	10.7	-4.6	-1.4	3.5	-7.1
5172	Wireless telecommunications carriers.....	5.1	11.1	20.8	28.2	27.4	21.6	22.0	14.6	.7
5175	Cable and other program distribution.....	-1.5	-.2	3.8	3.6	8.2	6.7	5.2	8.4	2.8
Finance and insurance										
52211	Commercial banking.....	3.4	1.4	1.1	2.3	.9	2.1	-1.1	-5	.9
Real estate and rental and leasing										
532111	Passenger car rental.....	2.1	2.2	-3	3.7	6.9	.7	1.5	4.6	1.0
53212	Truck, trailer and rv rental and leasing.....	5.3	6.4	3.7	3.0	8.4	3.2	-2.2	1.9	-5
53223	Video tape and disc rental.....	4.2	2.4	2.9	6.3	5.9	3.1	2.0	3.4	.2
Professional and technical services										
541213	Tax preparation services.....	3.5	2.2	1.2	5.6	5.6	5.0	2.0	3.4	3.8
54131	Architectural services.....	2.6	.2	2.9	2.1	6.9	3.6	-.5	6.7	.8
54133	Engineering services.....	-1.0	1.5	2.3	-7	5.8	3.4	.4	4.2	1.1
54181	Advertising agencies.....	-1.0	1.0	4.1	-2.1	4.3	1.0	-1.1	3.3	-3.0
541921	Photography studios, portrait.....	2.3	.3	-3.0	3.3	1.9	1.5	1.0	1.6	4.6
Administrative and support services										
56131	Employment placement agencies.....	—	.7	5.6	—	8.4	1.9	—	7.7	-3.5
56151	Travel agencies.....	-3	5.1	9.5	2.4	4.9	.9	2.7	-2	-7.9
56172	Janitorial services.....	-9	2.3	3.8	.7	4.8	4.0	1.6	2.5	.1
Health care and social assistance										
6215	Medical and diagnostic laboratories.....	—	7.7	1.0	—	10.1	5.8	—	2.2	4.7
621511	Medical laboratories.....	—	6.9	.0	—	9.3	3.9	—	2.2	3.9
621512	Diagnostic imaging centers.....	—	9.2	2.0	—	11.7	8.9	—	2.3	6.7
Arts, entertainment, and recreation										
713110	Amusement and theme parks.....	-3.1	1.9	.7	2.6	2.6	1.0	5.9	.6	.3
713950	Bowling centers.....	-4	.3	2.6	-3.1	-2.2	2.3	-2.7	-2.5	-2

Appendix table A-1. Continued—Average annual percent change in productivity, output, and hours by industry, 1990-95, 1995-2000, and 2000-05

NAICS code	Industry	Productivity (output per hour)						Hours		
		1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05	1990-95	1995-2000	2000-05
Accommodation and food services										
72	Accommodation and food services.....	0.5	1.2	0.6	2.2	3.6	1.6	1.7	2.3	1.0
7211	Traveler accommodations.....	3.6	2.7	.7	4.2	5.3	-.4	.6	2.5	-1.1
722	Food services and drinking places.....	-4	.6	.9	1.6	2.9	2.5	2.0	2.2	1.6
7221	Full-service restaurants.....	-7	1.4	.5	1.5	3.5	2.3	2.2	2.0	1.8
7222	Limited-service eating places.....	.1	-.4	1.1	2.3	1.9	3.3	2.2	2.3	2.1
7223	Special food services.....	.2	2.7	.7	.5	6.0	.6	.3	3.2	-.1
7224	Drinking places, alcoholic beverages.....	-3.2	-.8	3.8	-1.7	1.2	1.0	1.6	2.0	-2.7
Other services										
81	Other services.....	2.1	1.0	1.5	2.5	2.2	.5	.4	1.2	-1.0
8111	Automotive repair and maintenance.....	2.8	1.2	.6	3.4	2.8	.3	.6	1.6	-.2
81211	Hair, nail and skin care services.....	2.6	3.0	3.8	3.3	4.5	3.9	.6	1.4	.1
81221	Funeral homes and funeral services.....	.8	-1.5	-.4	1.2	-.5	-.6	.4	1.1	-.2
8123	Drycleaning and laundry services.....	.9	1.6	2.3	.8	2.0	-1.4	-.1	.4	-3.7
81292	Photofinishing.....	.0	-7.3	8.9	-2.1	-8.0	-6.8	-2.1	-.8	-14.4