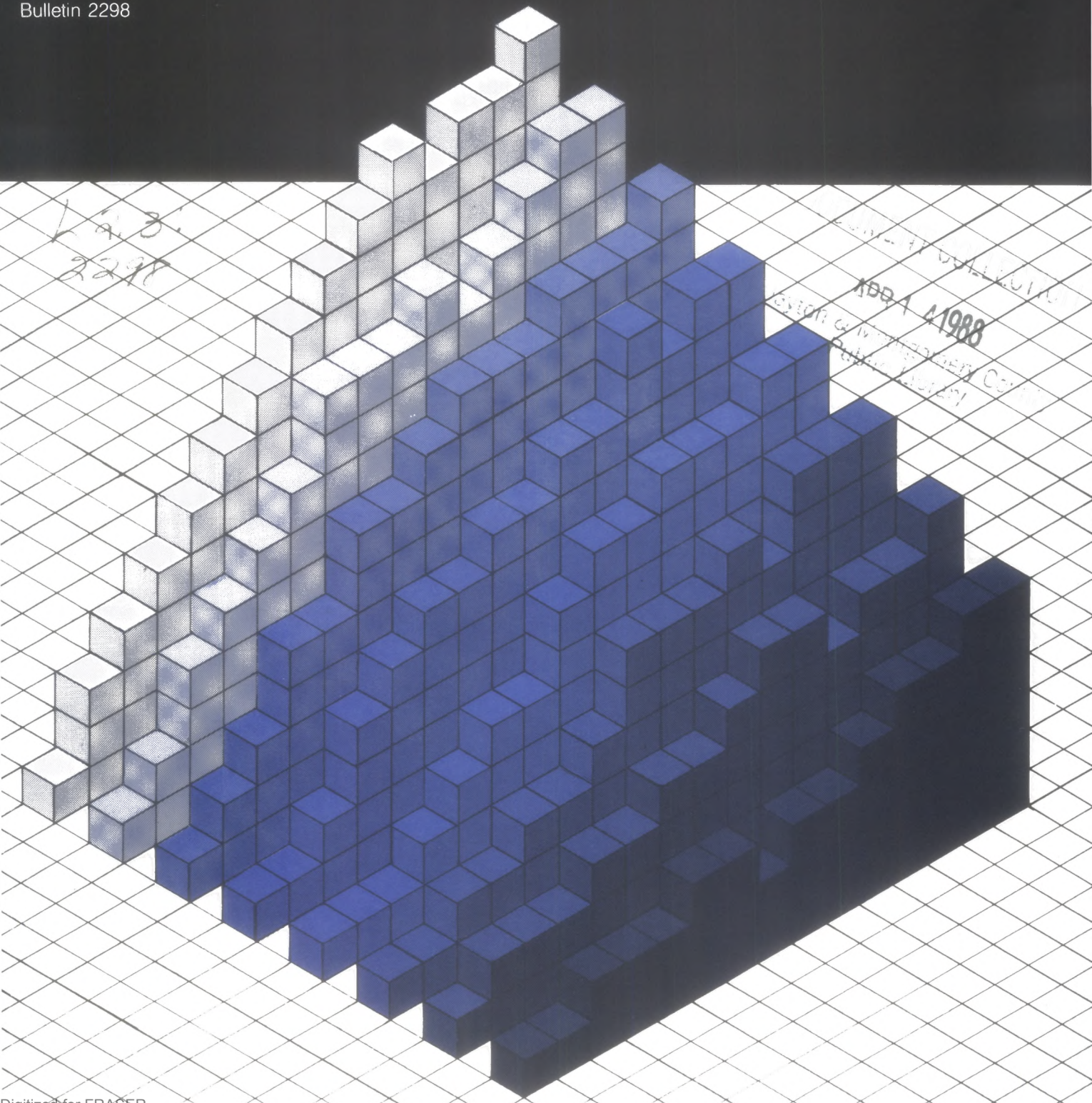
Productivity and the Economy: A Chartbook

U.S. Department of Labor
Bureau of Labor Statistics
March 1988

Bulletin 2298



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March 1988

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Preface

Productivity plays a role in most issues of economic policy. Consequently, there is a continuous need for information about productivity although the focus and level of attention vary with the economic climate. Thus, the relation between productivity and employment has been an especial concern in times of economic slowdown. During periods of rising prices, on the other hand, attention centers on the relationships among productivity, wages, and costs. Furthermore, the link between productivity and economic growth is constantly being studied.

This chartbook is designed to show what has been happening to productivity and how it interacts with other aspects of the economy. The presentation is divided into two parts. The first part shows how productivity has changed over time. It presents charts, explanatory text, and data relating to trends in the traditional measures of labor productivity, and also in the more recently developed BLS measures of multifactor productivity. The second part examines the influence of productivity on changes in costs, prices, and other variables. It also includes charts tracing trends in capital formation and research and development. Wherever possible, international comparisons are presented so as to add perspective to a subject that is often treated solely within a national framework.

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Productivity and How It Is Measured

Productivity is a concept that expresses the relationship between the quantity of goods and services produced—output—and the quantity of labor, capital, land, energy, and other resources that produced it—input. It can be measured in two ways. One relates the output of an enterprise, industry, or economic sector to a single input such as labor or capital. The other relates output to a composite of inputs, combined so as to account for their relative importance. The choice of a particular productivity measure depends on the purpose for which it is to be used.

The best known measure of productivity relates output to the input of labor time—output per hour, or its reciprocal, unit labor requirements. This kind of measure is used widely because labor productivity is relevant to most economic analyses, and because labor is the most easily measured input. Relating output to labor input provides a tool not only for analyzing productivity but also for examining labor costs, real income, and employment trends.

Labor productivity can be measured at several levels of aggregation: The business economy, its component sectors, industries, or plants. Many of the productivity measures used in this chartbook are measures of output per hour. Depending on the components of the measure used and the context, labor productivity will be called output per hour of all persons engaged in the productive process, output per employee hour, or just output per hour.

Movements of labor productivity indexes reflect the change in labor input to produce goods and services. This does not imply that labor is solely or primarily responsible for productivity growth. Many factors affect the use of labor in generating output, including technological innovations, changes in capital stock per-worker, capacity utilization, the scale of production, materials flow, management skills, as well as changes in labor skills and efforts.

Multifactor productivity measures consist of output per unit of combined inputs of labor, capital, and intermediate materials (such as energy). They are also included in this chartbook and cover total private business, nonfarm business, manufacturing and its industry sectors, and a number of manufacturing industries. Movements in these measures differ from those of traditional labor productivity measures because they exclude the effects of changes in the substitution of capital and other inputs for labor.

The output side of the productivity ratio refers to the finished product or the amount of real value added in various enterprises or industries. Few plants or industries produce a single homogeneous commodity whose output can be measured by simply counting the number of units produced. Consequently, for the purpose of measurement, the various product lines of a plant's or an industry's output are combined on some common basis—either their unit labor requirements or their dollar value in a base period. When information on the amount of units produced is not available, as is often the case, output is expressed in terms of the dollar value of production, adjusted for price changes.

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Part I

What has been happening to productivity

The first set of charts in this part of the chartbook shows the longer term trend in output per hour in the business economy, its major sectors, and in selected industries. The next set examines trends in multifactor productivity, again detailing the different patterns that mark the private business economy[1], manufacturing and its industry sectors, and some individual industries. In addition, there are charts which trace developments in output per employee year in major parts of the Federal Government and charts which provide international comparisons of productivity trends.

[1]The private business economy excludes government enterprise while the total business economy includes it. Both definitions exclude such entities as nonprofit enterprises, as well as government agencies other than government enterprise (such as the Post Office).

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Productivity has advanced over the past eight decades. . .

Official U.S. measures of productivity begin with the year 1909. In general, productivity has moved upward. In 1987, productivity in the business economy was 4½ times higher than in 1909.

Period	Output per hour of all persons in the business economy (average annual percent change)
1909-1987	2.3
1909-29[1]	1.5
1929-47[1]	2.9
1947-73	2.9
1973-79	1.0
1979-87	1.4

[1]Total private economy until 1946.

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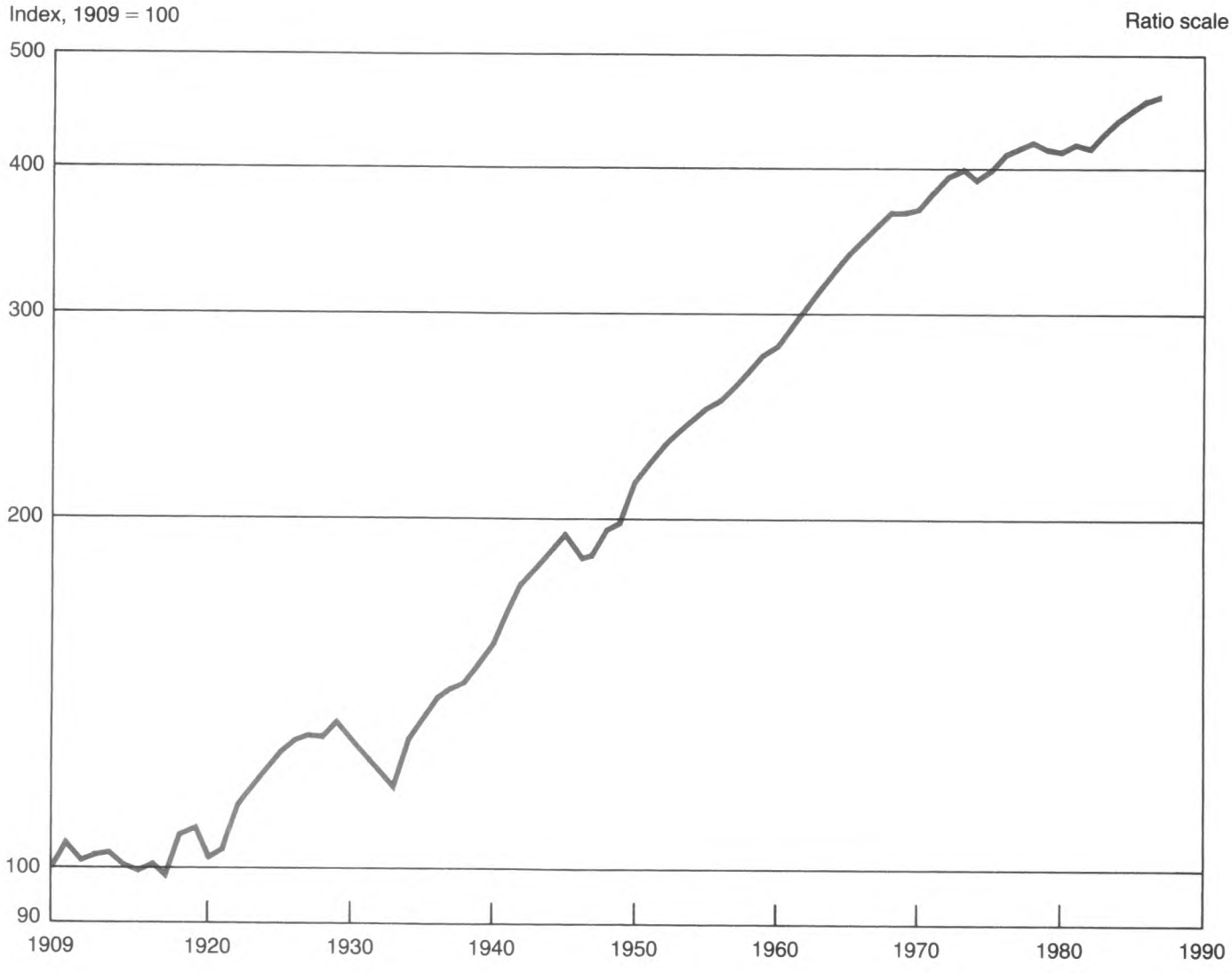
Chart 1.
Output per hour of all persons in the business economy, 1909-87



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. . .but the advance has slowed during the last decade and a half

Rates of growth in the productivity of the total business economy and the nonfarm business economy slowed after 1973. No simple explanation for the decline exists, nor is there general agreement on the quantitative effect of the various factors. Explanations for the slowdown have included the effects of change in the composition of the labor force as the proportion of younger and less experienced workers has increased; a slower rise in the capital-labor ratio, resulting from lessened investment in equipment and structures at the same time that employment and hours were rising strongly; a leveling off in research and development expenditures; diversion of investment funds to pollution abatement; the maturation of some industries with little new technology; and changes in attitudes toward work.

The slowdown in productivity growth was most pronounced during the 1970's. A partial recovery of the growth rate occurred over the 1979-87 span, largely owing to strong advances in goods-producing industries. In many of these industries, hours rose much more slowly than earlier compared with output.

Period	Output per hour of all persons (average annual percent change)	
	Business economy	Nonfarm business economy
1960-87	1.8	1.6
1960-73	2.7	2.4
1973-79	.6	.5
1979-87	1.3	1.1

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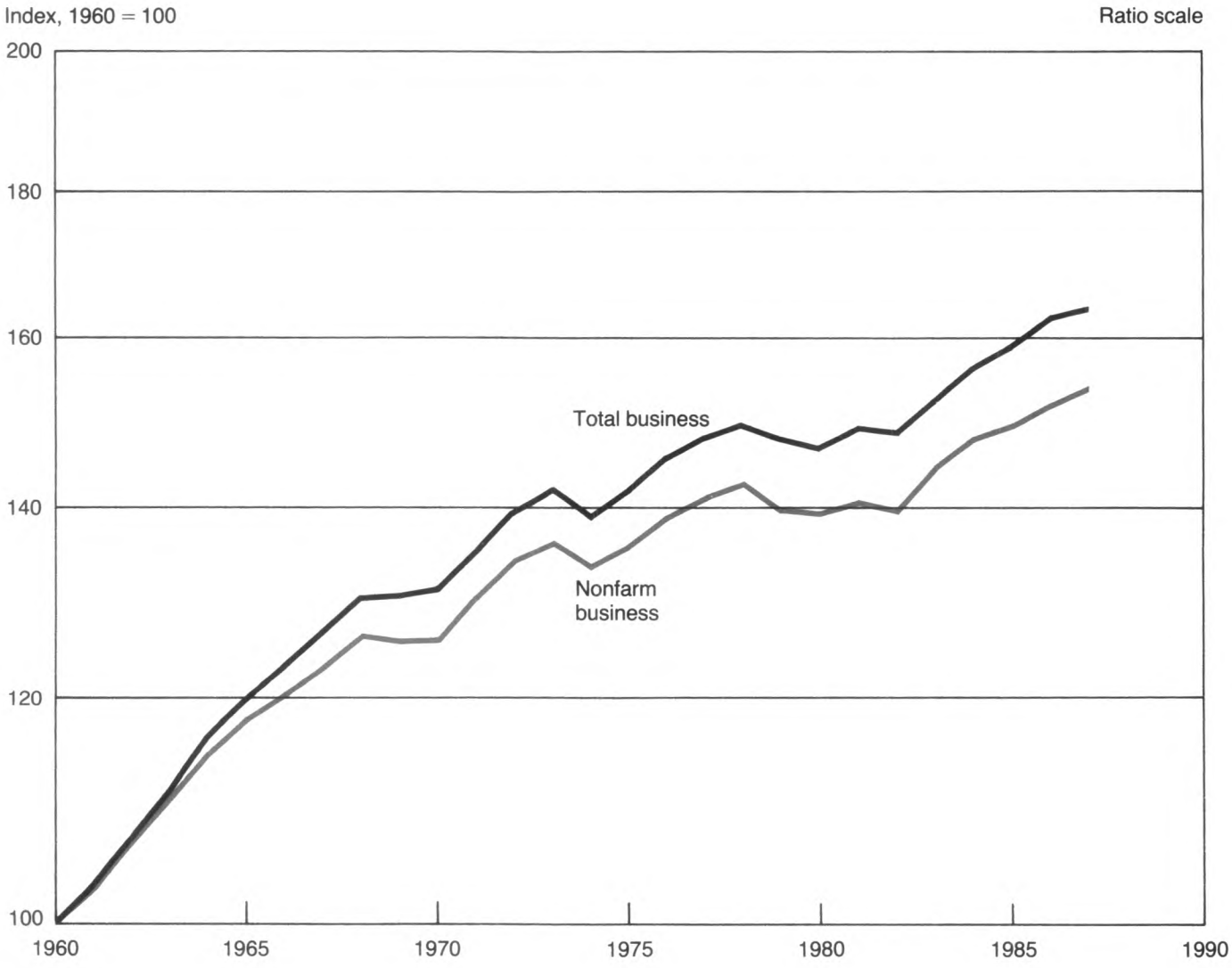
Chart 2.
Output per hour of all persons in the total business and nonfarm business economy, 1960-87



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Productivity growth varies among sectors of the economy. . .

There are wide variations in the rates of productivity change of the various sectors of the economy. All sectors experienced significant slowdowns in their average annual rates of productivity growth between 1973 and 1979. Most have experienced faster growth in recent years.

Sector[1]	Output per hour (average annual percent change)			
	1960-86	1960-73	1973-79	1979-86
Farm	5.0	4.3	3.1	7.9
Communications	4.5	4.9	4.2	4.0
Manufacturing	2.8	3.2	1.4	3.5
Electric, gas, and sanitary services	2.7	4.6	.1	1.3
Trade	2.3	3.1	.8	2.0
Transportation	1.6	3.2	1.1	-0.6
Mining	.4	3.4	-7.1	1.6

[1]Adequate productivity data are not available for services; construction; and finance, insurance, and real estate.

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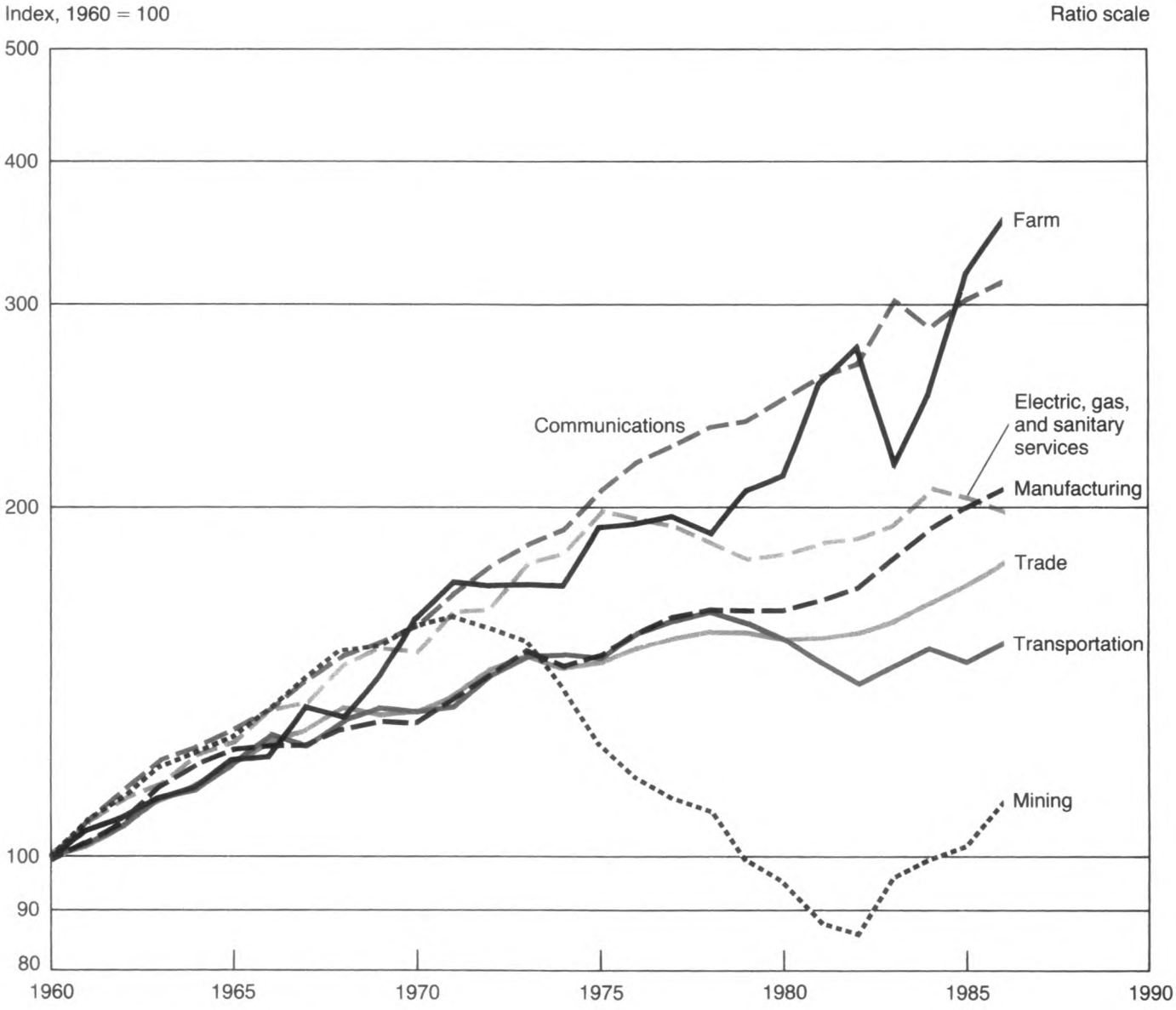
Chart 3.
Output per hour of all persons by major sector, 1960-86



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. . .and it varies even more among individual industries

Productivity trends in individual industries are widely dispersed. Some industries, such as hosiery, together with synthetic fibers and malt beverages, had average annual increases of around 6 percent. These large increases reflected many factors. Among them were new technologies, advanced production methods and increased output with economies of scale. Other industries, such as footwear, coal mining, and metal stampings, experienced relatively small gains or even declines. The lack of productivity gains in footwear, for example, has been linked to difficulties in adopting mass production methods; and the weak productivity in coal mining has been partly related to strong employment increases during the first half of the 1970's.

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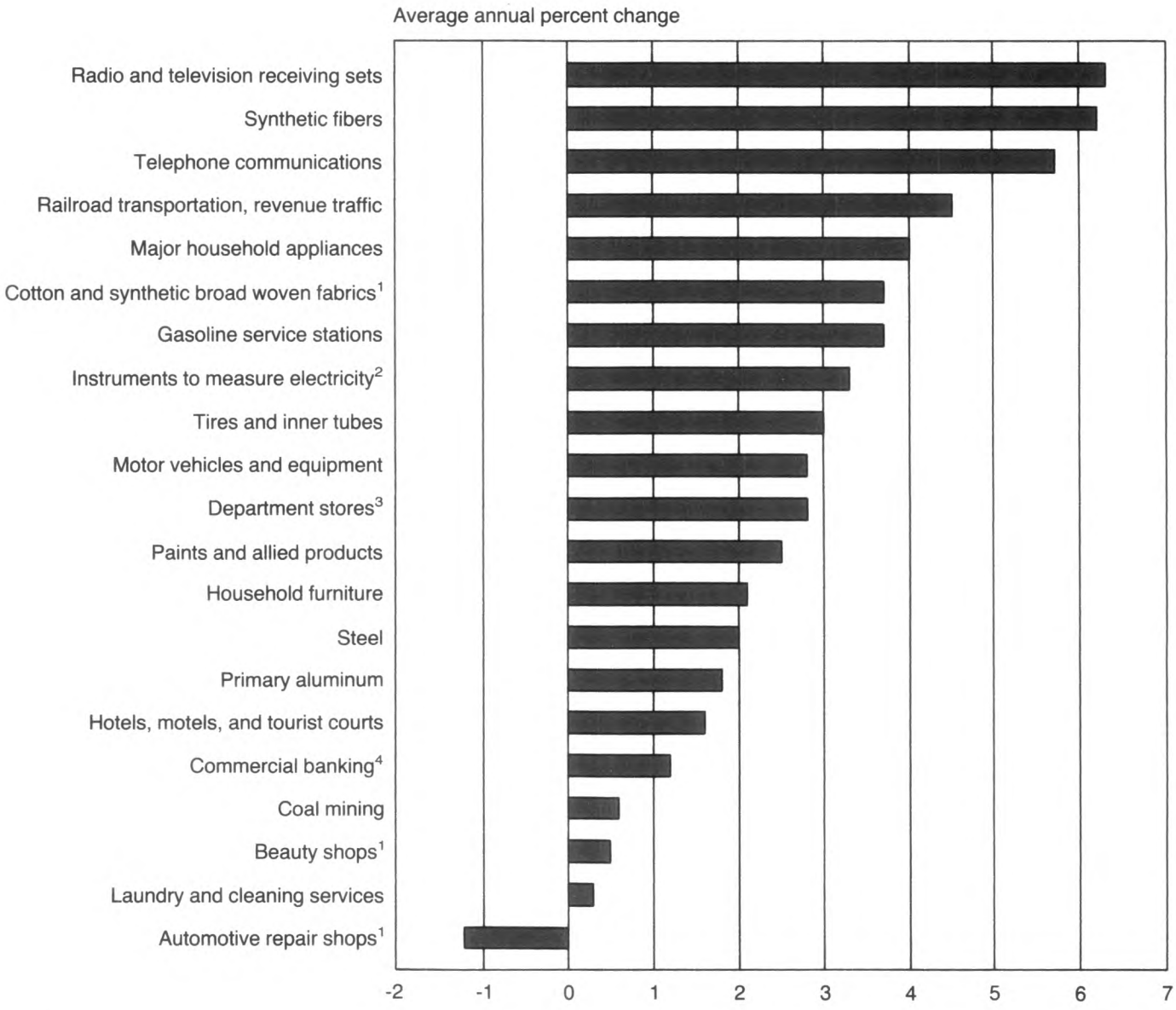
Chart 4.
Output per employee hour in selected industries, 1960-86



[1]1972-86
[2]1972-85
[3]1967-86
[4]1967-85

Source: Bureau of Labor Statistics

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Productivity growth among industries has accelerated somewhat in the 1980's

More than half of the industries for which productivity measures have been developed recorded faster productivity advances during the 1980's than from 1973 to 1979.

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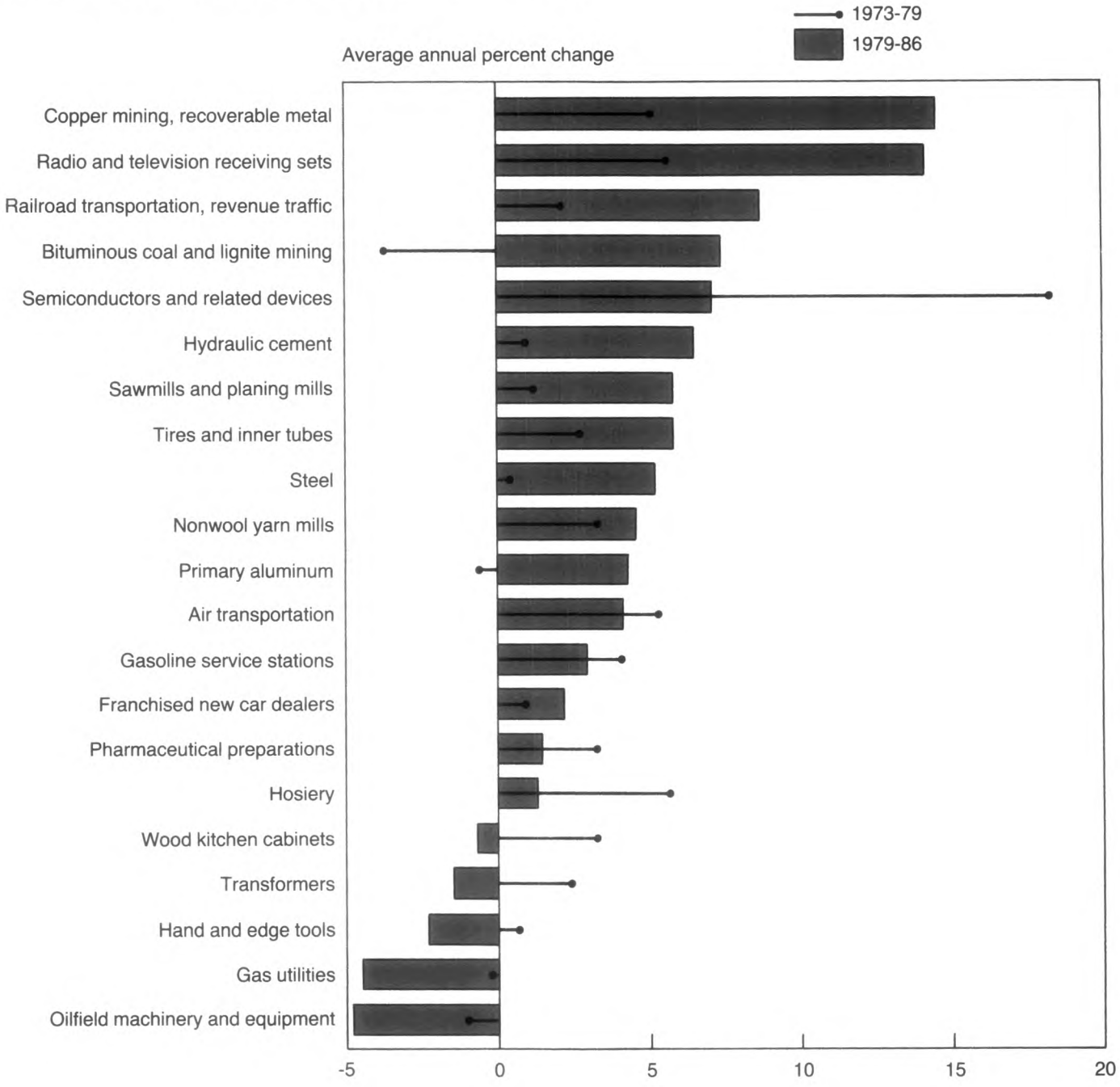
Chart 5.
Productivity rates in selected industries, 1973-79 and 1979-86



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Multifactor productivity growth slowed down during the 1970's

Multifactor productivity—as measured by output per unit of labor and capital input—rose 1.1 percent per year between 1960 and 1986. Within this period, however, the rate of growth fell after 1973.

The multifactor productivity measure differs from the familiar BLS measure of output per hour of all persons (or employees) in that it adjusts for the effects of changes in the capital-labor ratio. Comparing the two productivity series indicates how much the growth or falloff in the traditional measure was due to changes in capital per hour, and how much arose from a combination of such other factors as changes in technology, shifts in the composition of the labor force, capacity utilization, and so on.

Multifactor productivity in the private economy, selected periods

Period	Average annual rates of growth (in percent)
1960-86	1.1
1960-73	1.8
1973-79	.1
1979-86	.5

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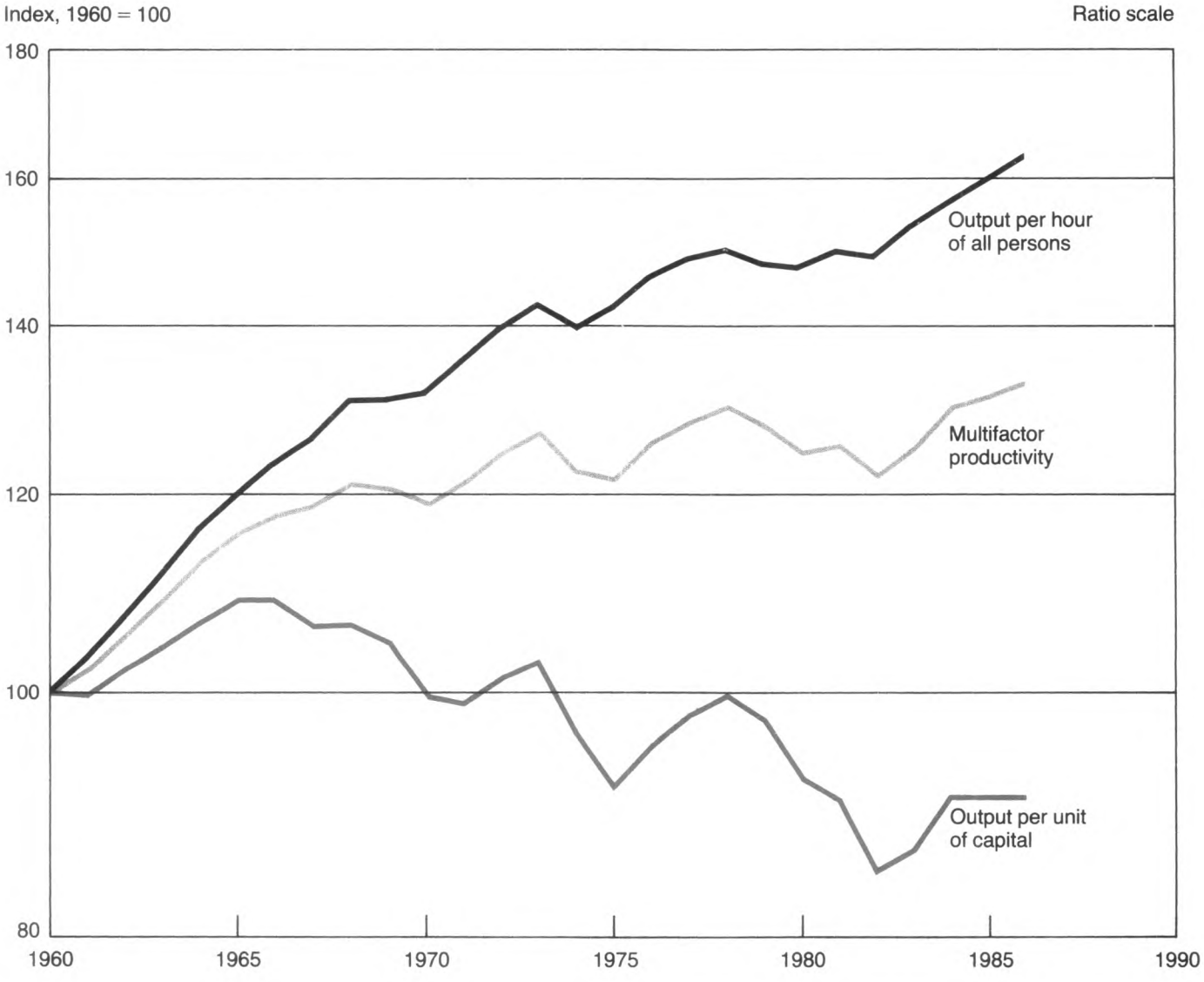
Chart 6.
Output per hour of all persons, output per unit of capital, and multifactor productivity, private business, 1960-86



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Multifactor productivity has grown significantly less than labor productivity

The difference between the growth in the traditional BLS productivity measure—output per hour—and the multifactor productivity series shows the contribution of changes in the substitution of capital for labor. Almost all of the growth in labor productivity in the 1970's resulted from the growth of capital substitution. During the 1980's, both multifactor productivity and the substitution of capital for labor accelerated.

Average annual rates of change in output per hour of all persons, the contribution of capital services per hour, and multifactor productivity, private economy, 1960-86

Measures	1960-73 (1)	1973-79 (2)	1979-86 (3)
Private business[1]			
Output per hour of all persons	2.7	0.6	1.4
Minus: Contribution of capital services per hour[2]	.9	.5	.9
Equals: Multifactor productivity[3]	1.8	.1	.5

[1]Excludes government enterprises.

[2]Change in capital per unit of labor weighted by capital's share of total output.

[3]Output per unit of combined labor and capital input.

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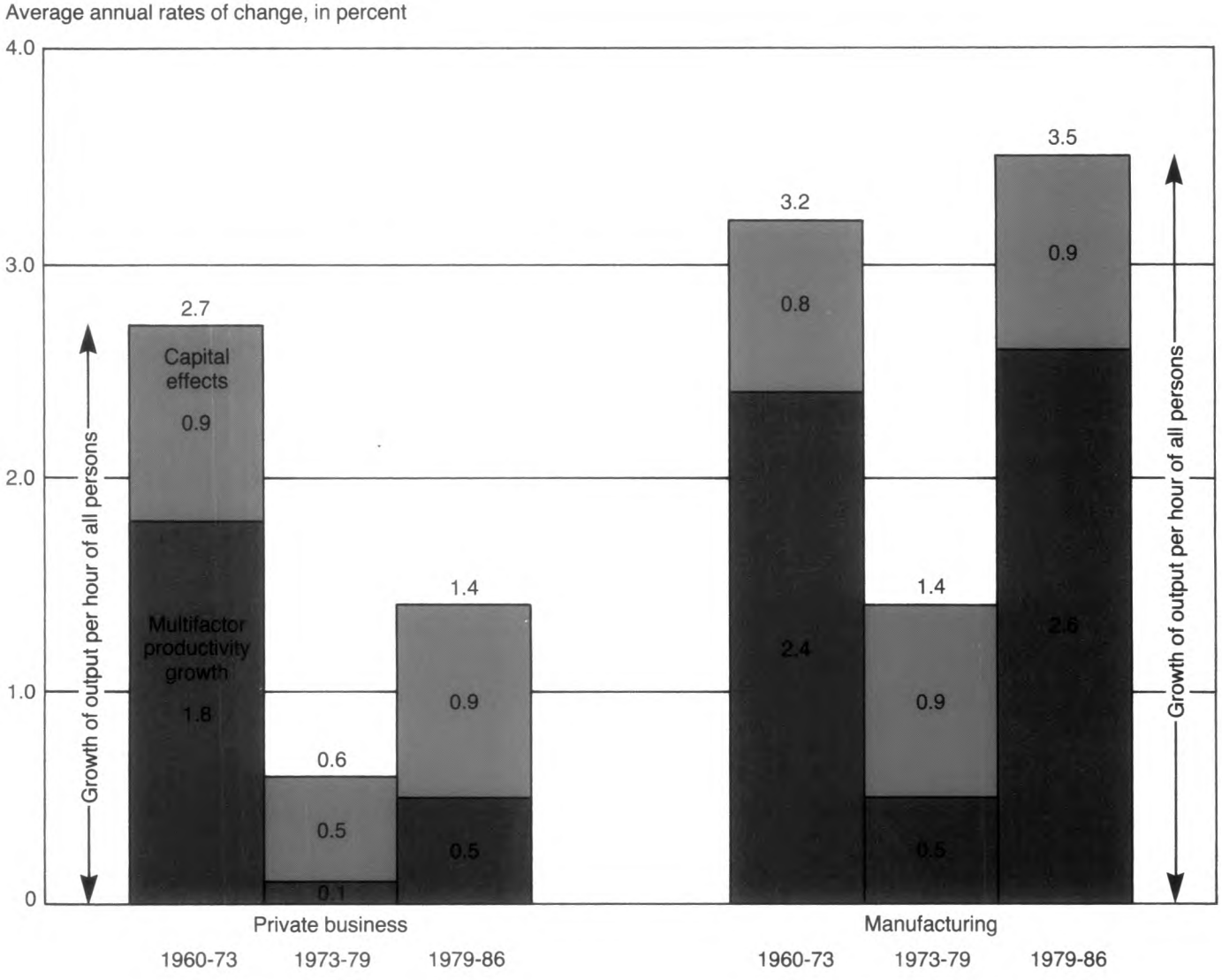
Chart 7.
Output per hour of all persons, capital effects, and multifactor productivity, private economy, selected periods, 1960-86



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Manufacturing industry sector multifactor productivity rates slowed during the 1973-83 decade

BLS recently developed measures of multifactor productivity for 20 manufacturing industry sectors to supplement the traditional output-per-hour measures. All but 3 of the 20 industry sectors experienced a decline in both output-per-hour and multifactor productivity growth during the 1973-83 span compared with 1960-73. In the majority of industry sectors, the decline in output-per-hour growth was associated with a decline in the rate of capital substitution.

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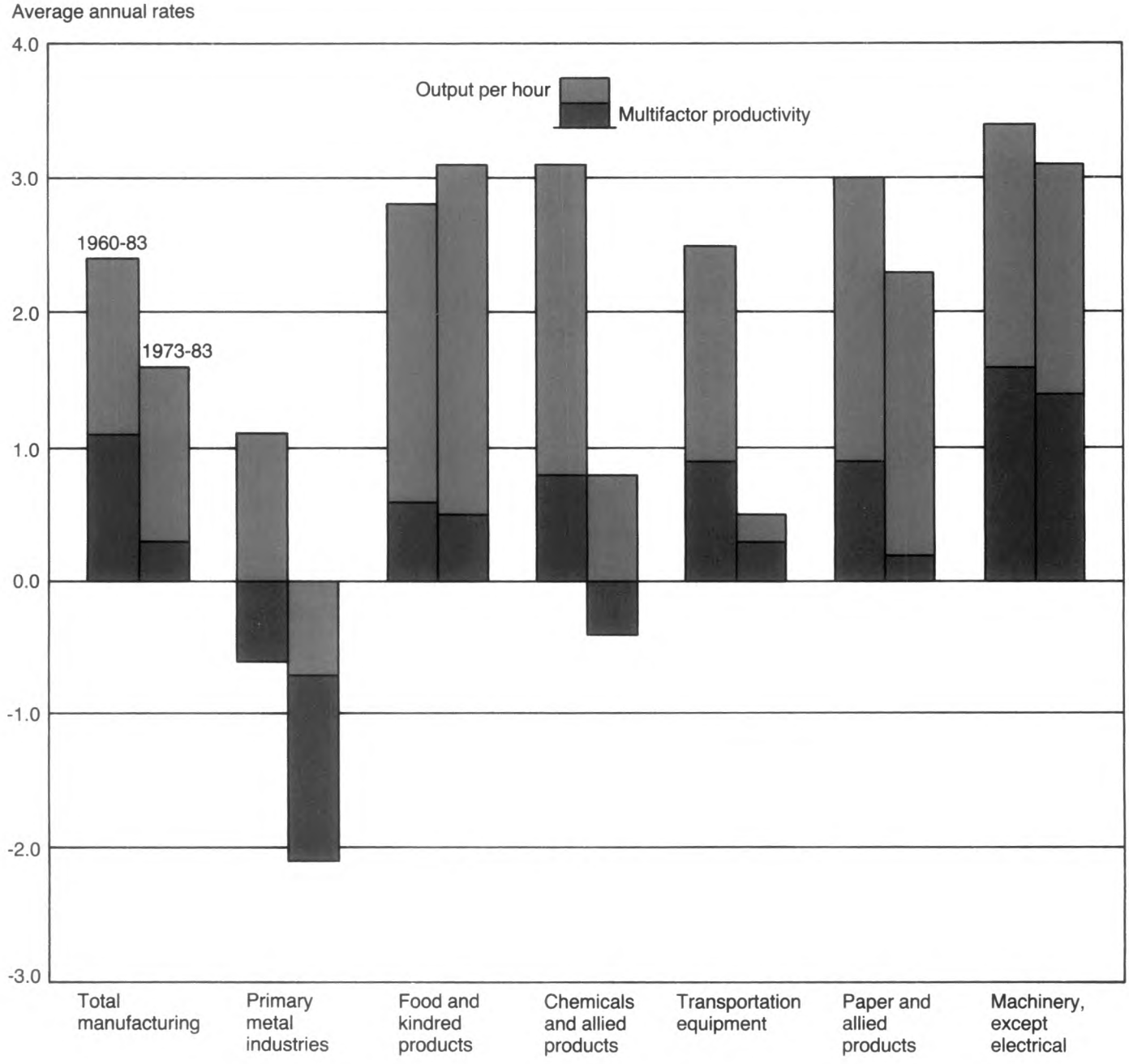
Chart 8.
Output per hour and multifactor productivity in selected manufacturing industry sectors, 1960-83 and 1973-83



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Some industries showed substantial productivity gains in the 1980's

In steel, motor vehicles, and tires and inner tubes, annual rates for both output per hour and multifactor productivity rose significantly in the 1980's compared to the 1970's. Most returned to or exceeded the high rates of the 1960's. In the footwear industry, output per hour also rose, but the multifactor productivity rate dropped.

Output per hour and multifactor productivity in four industries, selected periods
Average annual rates (in percent)

Industry and measure	1960-73	1973-79	1979-85
Steel			
Output per hour	2.5	0.2	4.8
Multifactor productivity[1]	.8	-0.2	3.4
Motor vehicles			
Output per hour	3.2	3.2	4.8
Multifactor productivity[1]	1.2	1.6	1.8
Tires and tubes			
Output per hour	3.5	2.9	6.7
Multifactor productivity[1]	.8	2.9	4.4
Footwear			
Output per hour	.5	1.2	1.4
Multifactor productivity[1]	-1.5	1.0	-1.6

[1]Output per unit of labor, capital, and intermediate purchases, combined by appropriate weights.

Note: Output per hour may differ from the data underlying other charts in this chartbook because of differences in the sources used and in the weighting techniques for aggregating product lines.

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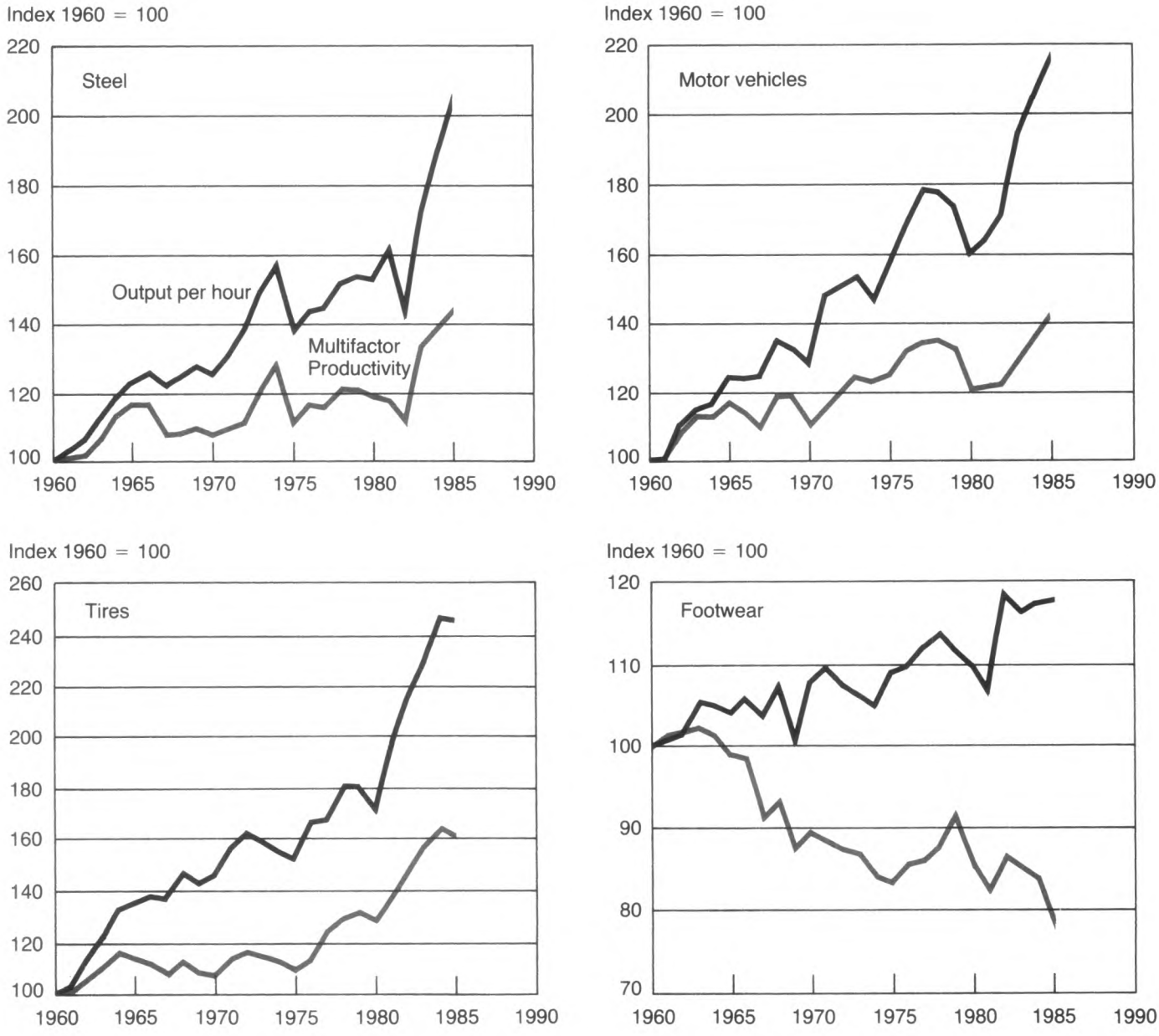
Chart 9.
Output per hour and multifactor productivity in four industries, 1960-85



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Significant productivity advances have occurred in the Federal Government

BLS has developed and refined productivity measures for a substantial portion of the Federal Government. Currently, these measures cover about two-thirds of Federal civilian employment. In the measured sample, productivity increased at a rate of 1.5 percent a year between 1967 and 1986, reflecting a 1.5-percent average annual increase in output and no change, on balance, in the level of employment.

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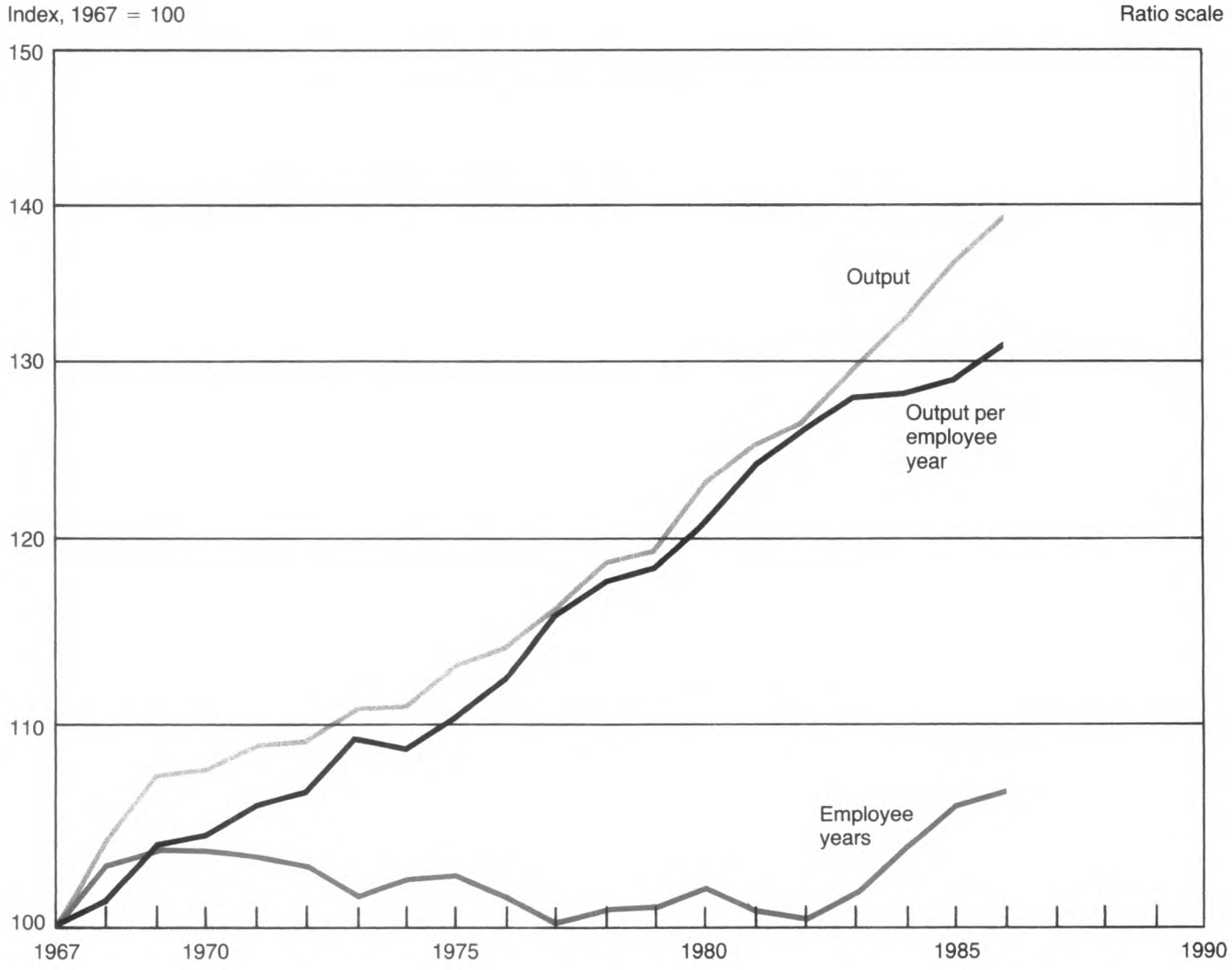
Chart 10.
Output per employee year and related measures, Federal Government, measured sample, fiscal years 1967-86



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Productivity gains varied substantially among Federal Government organizations

Federal Government organizations are grouped into 28 functional classifications. Productivity trends for the functions have varied substantially, ranging from a long-term increase of 10.9 percent per year for communications to a decrease of 2.9 percent for electric power production and distribution. Eighteen of the categories exceeded the rate for the overall sample or equalled it, while 9 fell below.

The largest gains in productivity were due to technological improvements in equipment and the introduction of computerized systems. Thus, the increase in productivity in the communications function between 1973 and 1986 was associated with a sharp growth in output and a declining work force. Through equipment upgrading, technological improvements, and increased use of automated facilities, the Federal telecommunications system was able to service an expanding volume of calls with lower labor inputs.

Noteworthy productivity advances also occurred in library services. The application of automated systems to data retrieval systems, cataloging, circulation, distribution, and inventory control contributed to productivity advances.

Among functional areas with very small productivity advances were legal and judicial activities and printing and duplication services. The drop in electric power production and distribution reflects a considerable excess in input growth over the output growth rate, owing chiefly to difficulties in operating nuclear power installations at TVA power plants.

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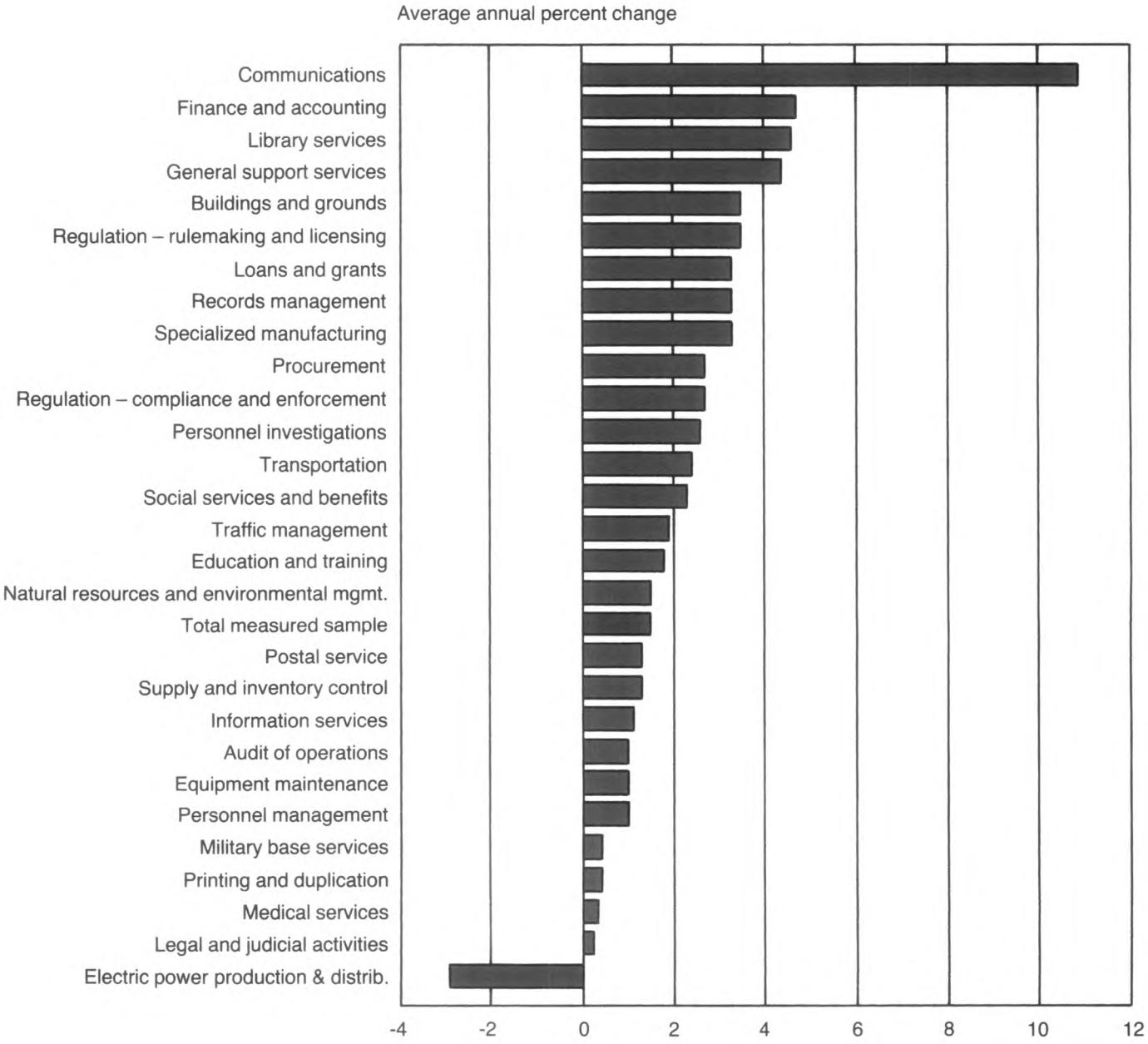
Chart 11.
Output per employee year by functional grouping, and total measured sample, Federal Government, fiscal years 1967-86



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U.S. productivity growth has trailed that of other major industrial countries

Between 1960 and 1986, real gross domestic product (GDP) per employed person increased at different rates among the seven major industrial countries compared here.

Each country experienced a slower rate of growth in real GDP per employed person after 1973 than earlier. The slowdown was most marked in Japan.

Country	Real gross domestic product per employed person (average annual percent change)			
	1960-86	1960-73	1973-79	1979-86
United States	1.2	1.9	0.0	0.8
Canada	1.9	2.6	1.3	1.0
Japan	5.5	8.2	2.9	2.8
France	3.6	4.9	2.7	1.9
Germany	3.1	4.1	2.9	1.6
Italy	3.7	5.8	1.7	1.6
United Kingdom	2.2	2.9	1.3	1.7

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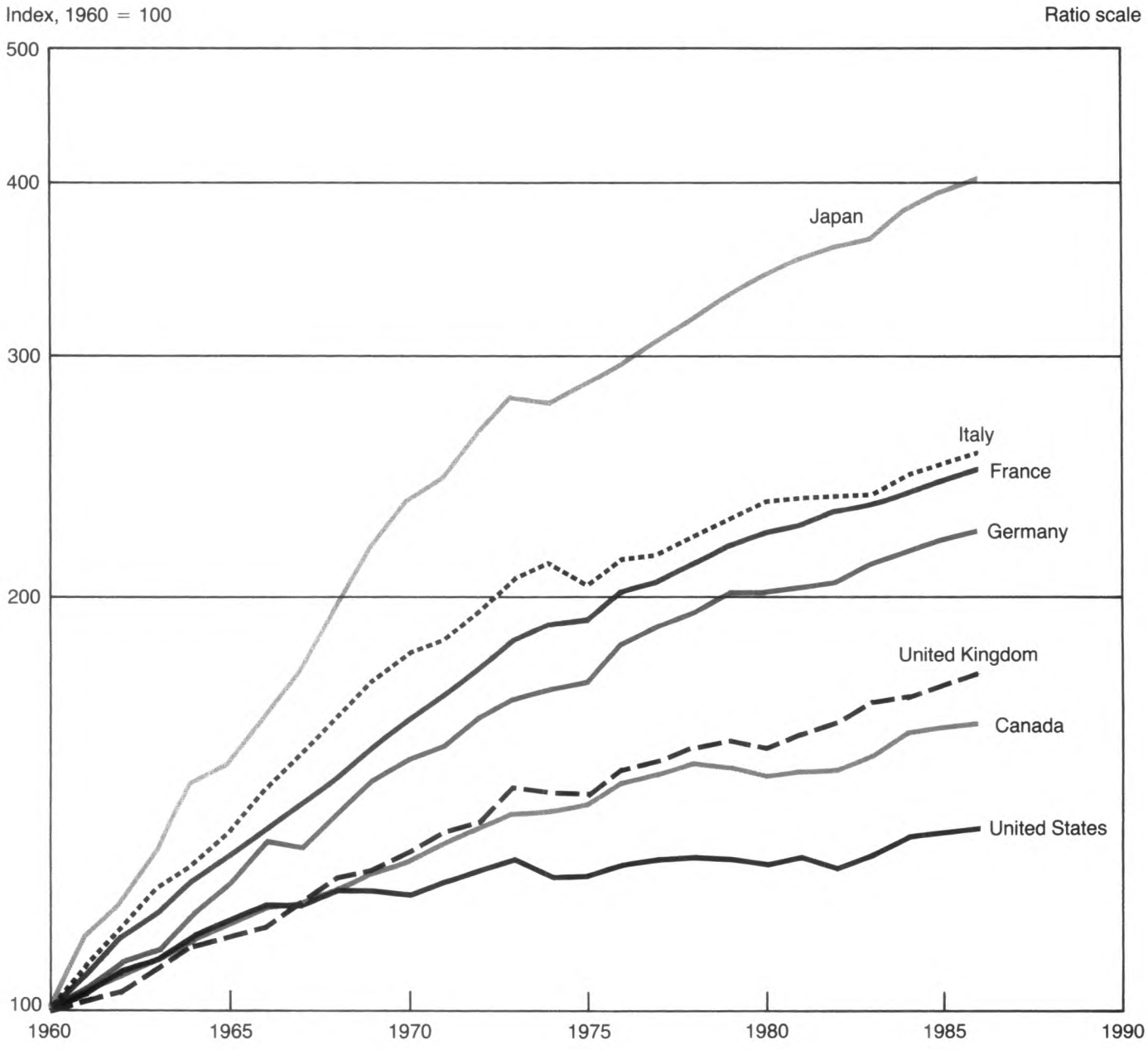
Chart 12.
Trends in real gross domestic product per employed person,
selected countries, 1960-86



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The U.S. level of output per hour, unlike its trend, is still ahead of that of other major industrial countries

Although the United States has the lowest rates of change in real domestic product per employed person among many industrialized countries, it still has the highest level of gross domestic product per employed person. The gap between the United States and the other countries has narrowed significantly since the 1960's. Japan gained the most over the period, yet its level in 1986 was still below that of the United States.

Canada came closest to the United States in 1986, but its real product per civilian employee still remained 5 percent below that of the United States.

Country	Gross domestic product per employed person relative to the United States, selected years and countries		
	1966	1976	1986
United States	100.0	100.0	100.0
Canada	79.5	92.2	95.0
Japan	32.0	54.4	68.9
France	52.4	73.1	84.3
Germany	54.5	71.6	80.9
Italy	53.4	74.0	82.9
United Kingdom	52.0	63.9	70.4

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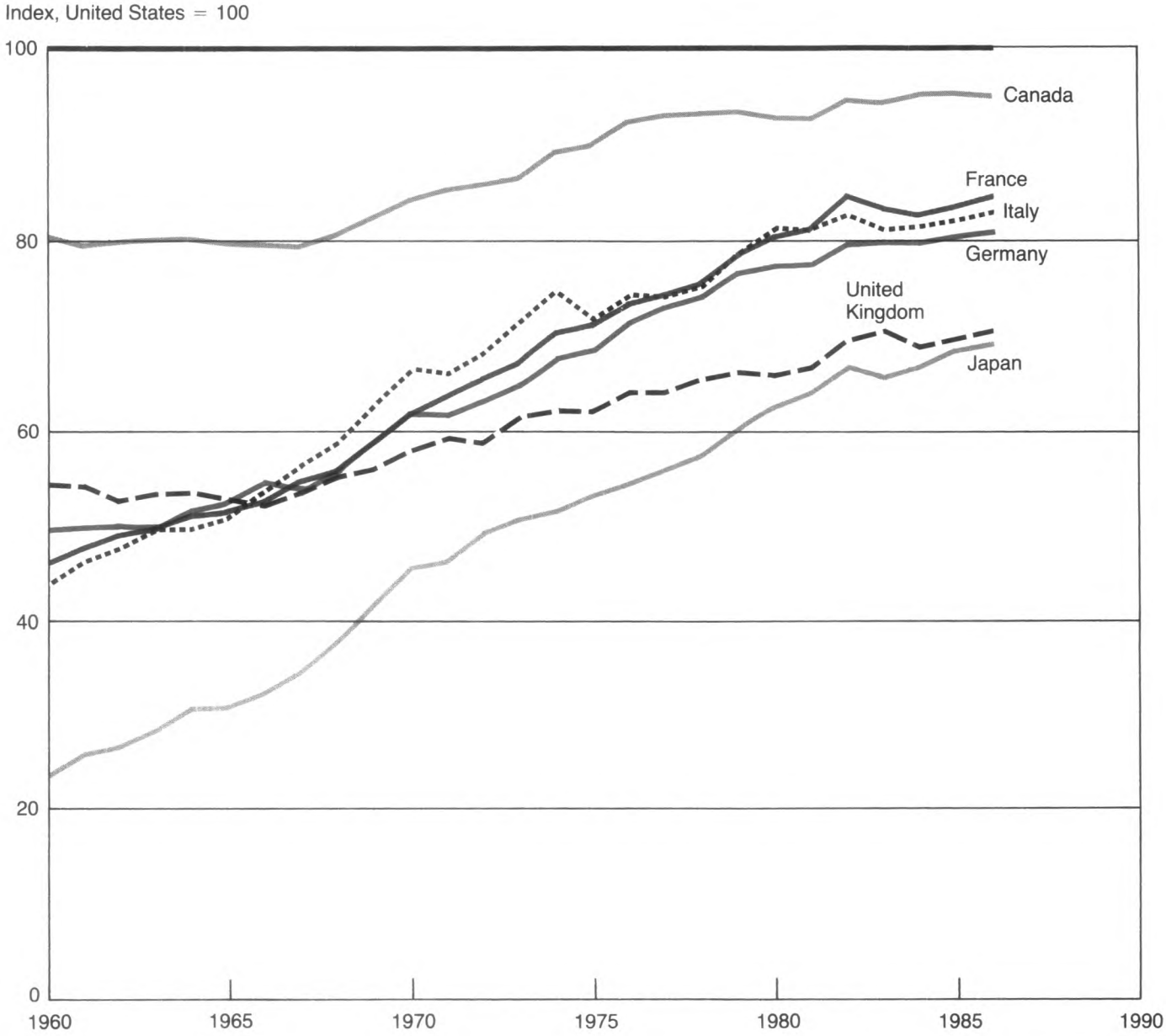
Chart 13.
Relative levels in real gross domestic product
per employed person, selected countries, 1960-86



Source: Bureau of Labor Statistics

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Long-term trends in manufacturing productivity in many industrial countries have outpaced the United States

Between 1960 and 1986, output per hour in manufacturing rose in the major industrial countries shown here. Productivity growth was lowest in the United States and highest in Japan.

Country	Manufacturing output per hour, 1960-86 (average annual percent rate)
United States	2.8
Canada	3.1
Japan	7.9
France	5.3
Germany	4.6
United Kingdom	3.6

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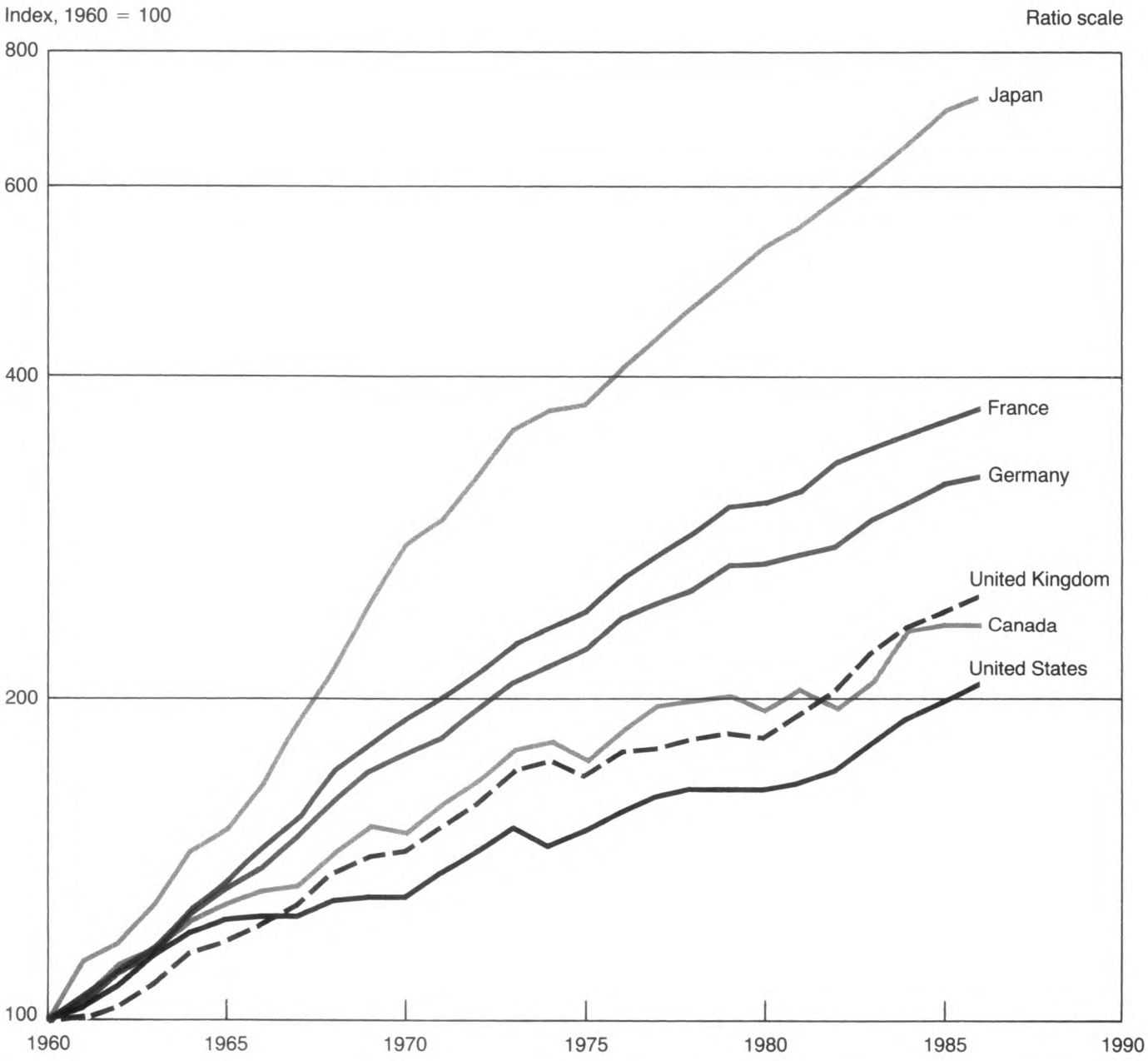
Chart 14.
Output per employee hour in manufacturing, selected countries, 1960-86



Source: Bureau of Labor Statistics

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Productivity advanced faster after 1979 than earlier in several leading countries

After 1973, manufacturing productivity grew at a slower rate than over the 1960-73 period in all the major industrial countries compared here. The slowdown was particularly marked for Japan and Italy. After 1979, however, the rate for the United States recovered and exceeded the rate for 1960-73. That also held for the United Kingdom. The rate for Germany and France failed to recover; it declined even further for Canada.

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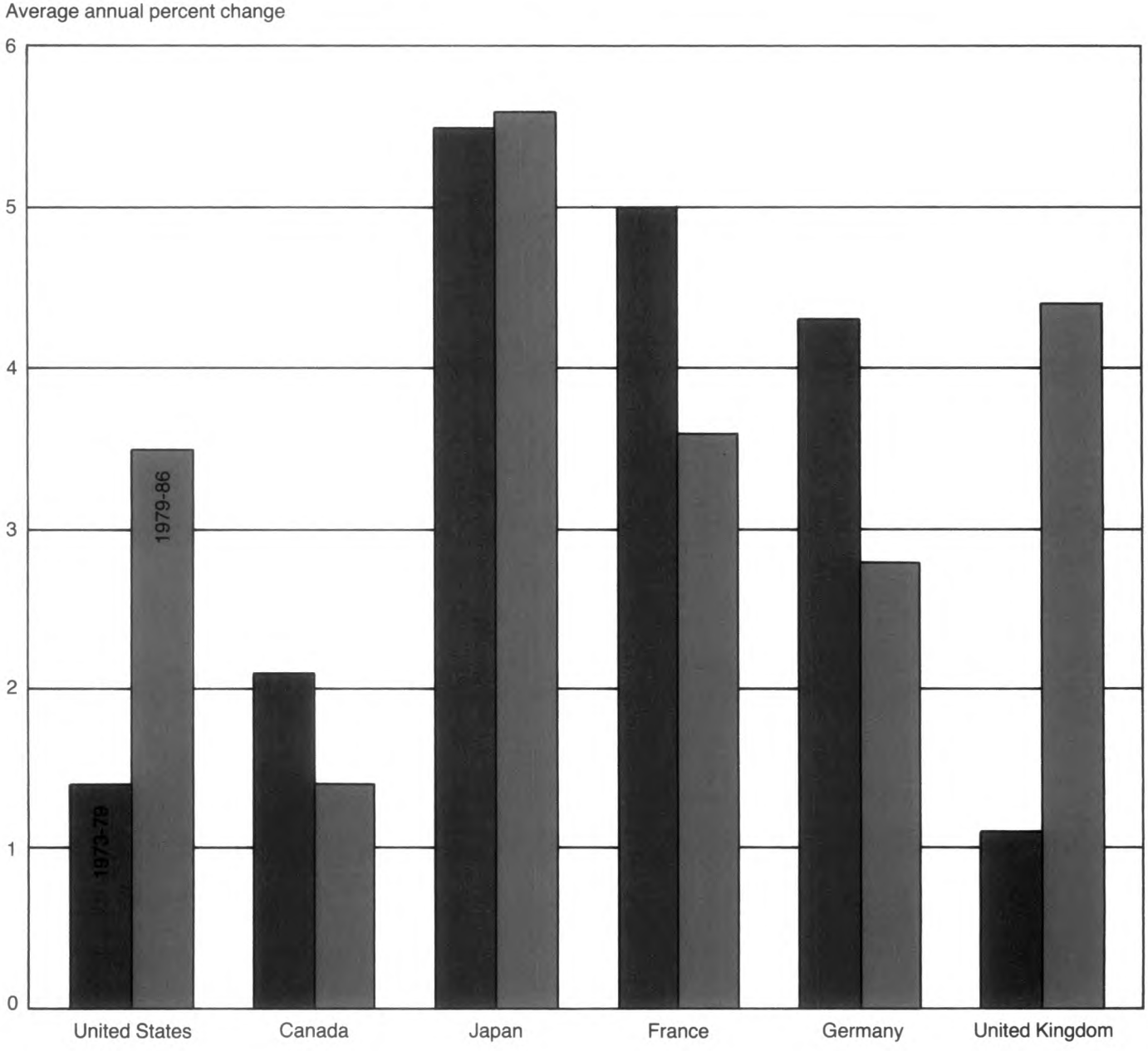
Chart 15.
Output per employee hour in manufacturing,
selected countries, 1973-79 and 1979-86



Source: Bureau of Labor Statistics

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Part II.

Productivity change in relation to changes in costs, prices, real income, and employment

33

The first charts in this section demonstrate the role of output per hour as a critical link between the cost of labor and the price of goods and services. Labor costs, which include pay and supplementary benefits, represent the largest single cost element for most industries. Movement in labor costs per unit of output is closely associated with movement of prices. Unit labor costs in turn reflect changes in hourly compensation and productivity. If the effects of an increase in hourly labor costs can be reduced by increased productivity, pressure to increase prices will lessen in a competitive economy.

Increases in unit labor costs can result from, as well as cause, price increases. If employee purchasing power drops because of higher prices, pressure will develop for higher wages. Should wage increases exceed productivity growth, unit labor costs will rise.

The next set of charts shows the movements of real hourly compensation and productivity. Differences between the movements in these two series provide some indication of changes in the relative labor and nonlabor shares of output. These charts also show how the benefits of increased productivity have been taken, either in the form of higher income or more leisure.

The relationship between productivity and employment is the subject of the next set of charts. The effects of productivity on employment depend upon the circumstances in which the productivity change occurs. In expanding industries, increasing productivity historically has been associated with rising employment; in declining industries, productivity gains have been associated with shrinking employment.

The last set of charts bears on some of the forces underlying productivity change. The effect of these forces on productivity cannot always be directly measured. The charts show changes in capital formation per employed person and in research and development expenditures, both key factors affecting productivity change over time.

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Changes in unit labor costs are inversely related to changes in productivity

Productivity is an important determinant of cost movements. This is demonstrated by the two top panels of the chart, which are almost mirror images of each other, showing that unit labor costs tend to rise when productivity growth slows, and to decline when productivity growth accelerates.

Hourly compensation rose more during the mid- and late 1970's than before or after. In addition, the rate of productivity improvement was slower. Hence, unit labor costs rose much more rapidly. Between 1973 and 1979, the rate of productivity improvement was particularly slow, while hourly compensation accelerated. Therefore, unit labor costs rose more steeply during this period than in the preceding or following periods.

Period	Average annual percent change		
	Output per hour	Unit labor costs	Compensation per hour
1960-86	1.9	4.8	6.7
1960-73	2.7	3.1	5.9
1973-79	.6	6.3	9.0
1979-86	1.4	4.9	6.3

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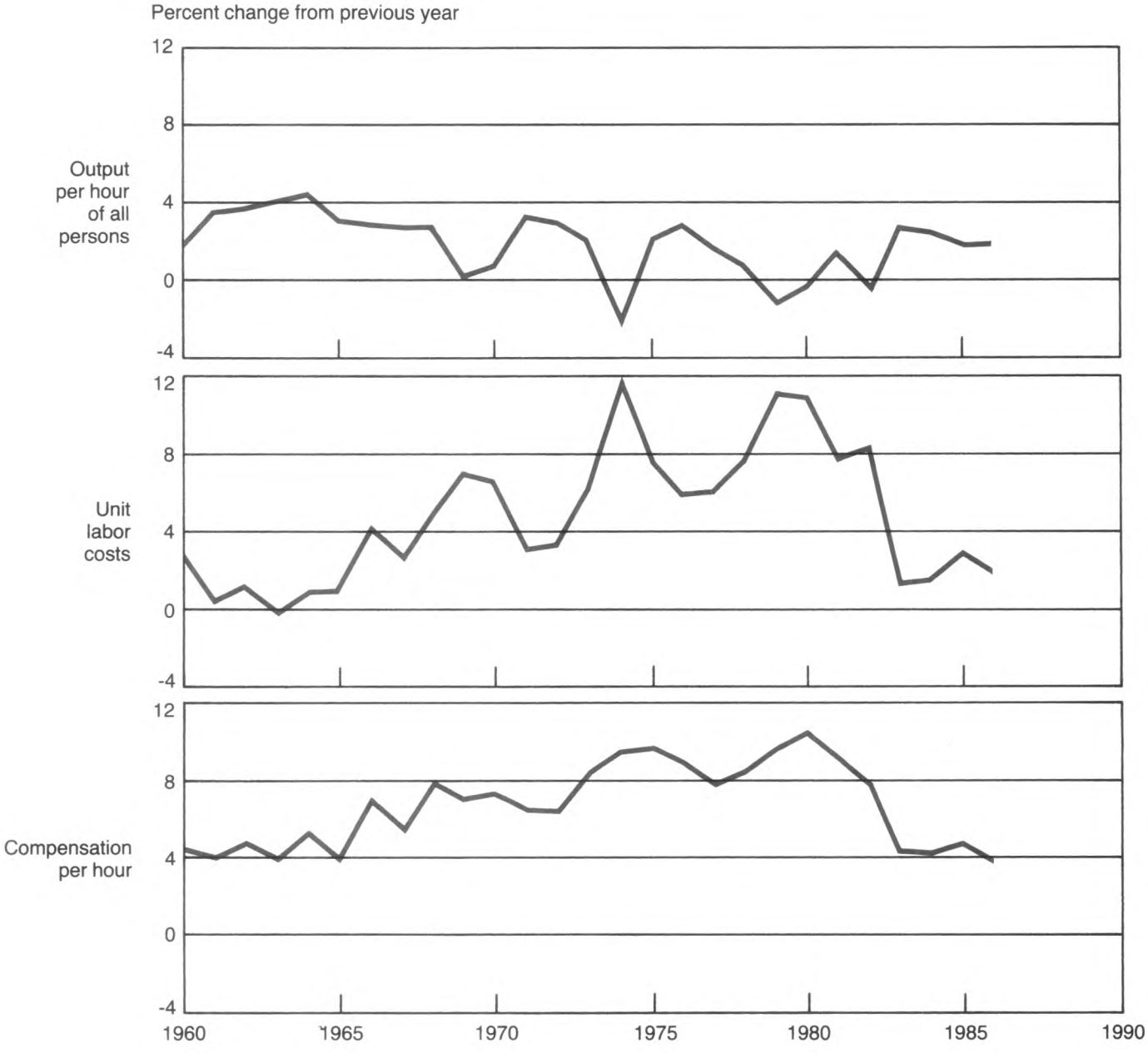
Chart 16.
Output per hour of all persons, unit labor costs,
and compensation per hour in the business economy, 1960-86



Source: Bureau of Labor Statistics

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Changes in prices are closely associated with changes in unit labor costs

Changes in unit labor costs generally are by far the most important component of price changes, as the chart shows. Thus, if productivity growth mitigates increases in unit labor costs, this will in turn mitigate increases in prices.

During most of the 1960's and after 1982, unit labor costs rose little—mainly because productivity increases kept pace with the growth in hourly compensation. Prices reflected the small increases in unit labor costs. During the 1970's, hourly compensation increased at a faster rate while productivity growth slowed, resulting in increasing unit labor costs and prices. This pattern persisted until 1981, after which productivity once again advanced at higher rates, reducing the rate of increase of unit labor costs and of prices.

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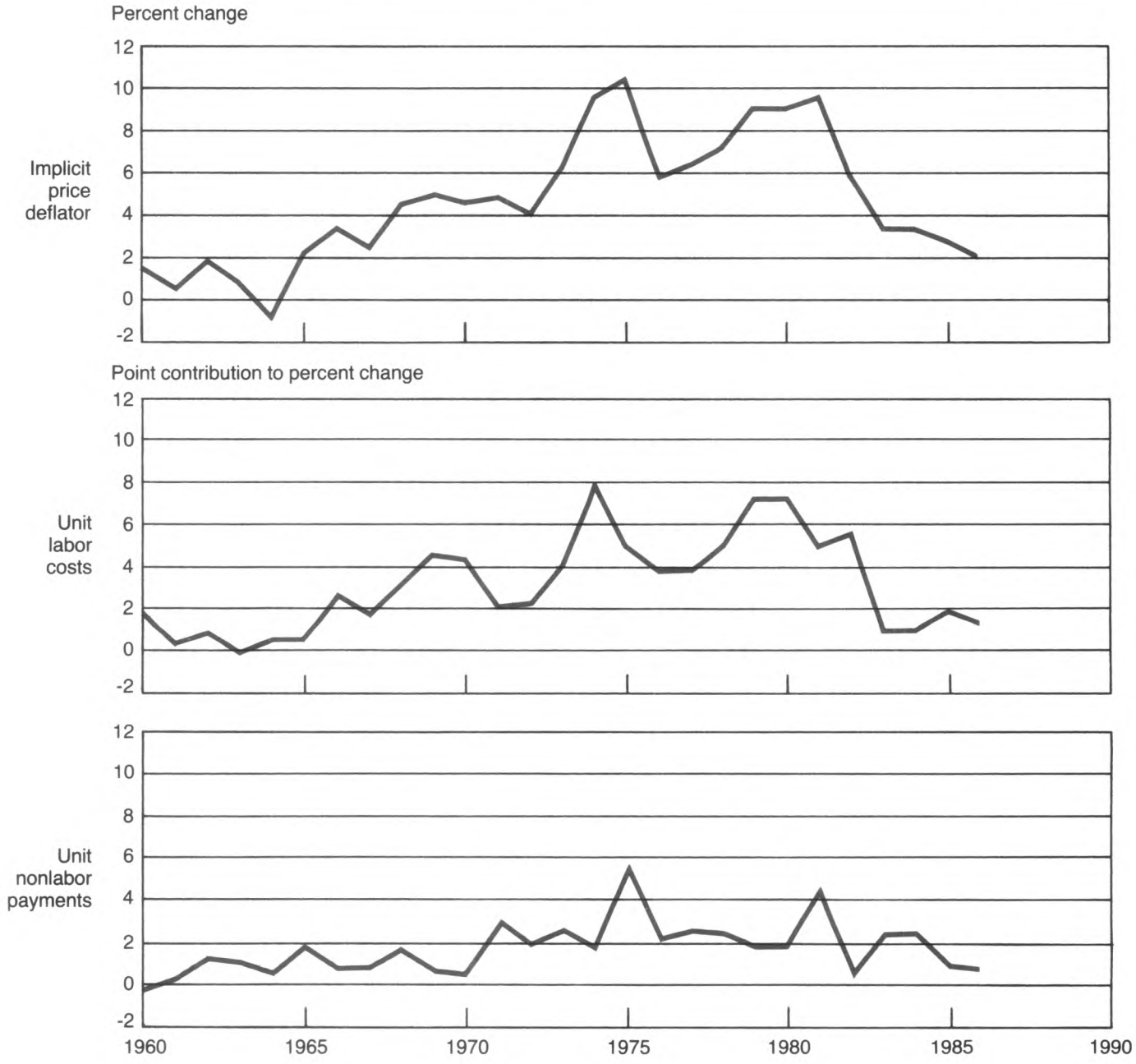
Chart 17.
Composition of price change, business economy, 1960-86



Source: Bureau of Labor Statistics

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Rapid advances in productivity usually moderate increases in unit labor costs and prices

The rate of productivity advance in a sector is generally reflected in the cost and price trends of the sector's output. Unit labor costs and prices usually rise more in sectors where productivity grows slowly than in sectors where it is growing rapidly.

In the 1980's (from 1979 to 1986), productivity in manufacturing increased at an average annual rate of 3.5 percent. This in large measure offset a 6.4-percent advance in compensation per hour and resulted in the comparatively low unit labor cost increase of 2.8 percent a year and a rate of price increase of 3.3 percent. The farm sector showed a similar, if more pronounced pattern. So did the communications sector, although here price trends did not fully reflect favorable unit cost trends.

By contrast, the transportation, utilities, and mining sectors illustrate how large increases in unit labor costs result when productivity gains do not offset strong increases in hourly compensation. Strong price increases also occurred in these sectors.

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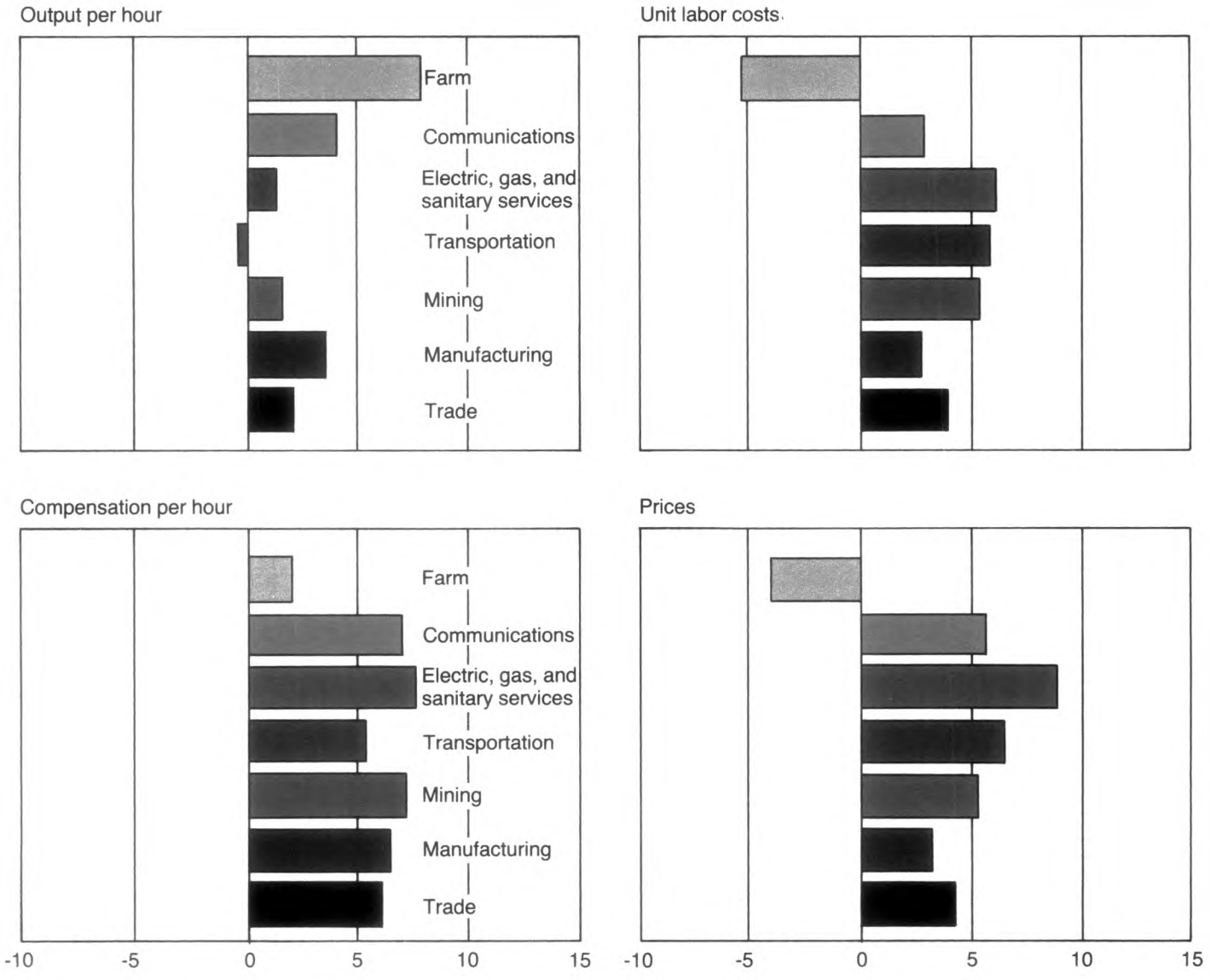
Chart 18.
Output per hour of all persons, compensation per hour, unit labor costs, and prices in major sectors, 1979-86

Average annual percent change



Source: Bureau of Labor Statistics

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Changes in hourly compensation and in productivity are not closely related

In contrast to prices, the factors influencing changes in hourly compensation in individual industries appear to be independent of the factors influencing changes in productivity in these industries. This is shown in the chart by the high degree of uniformity in the increases in compensation per hour, compared with the changes in output per employee hour. Hourly compensation increased about as much between 1972 and 1985 in industries with declines in productivity growth, such as machine tools and millwork, as in industries with relatively high rates of productivity growth, such as soft drinks and tires and inner tubes.

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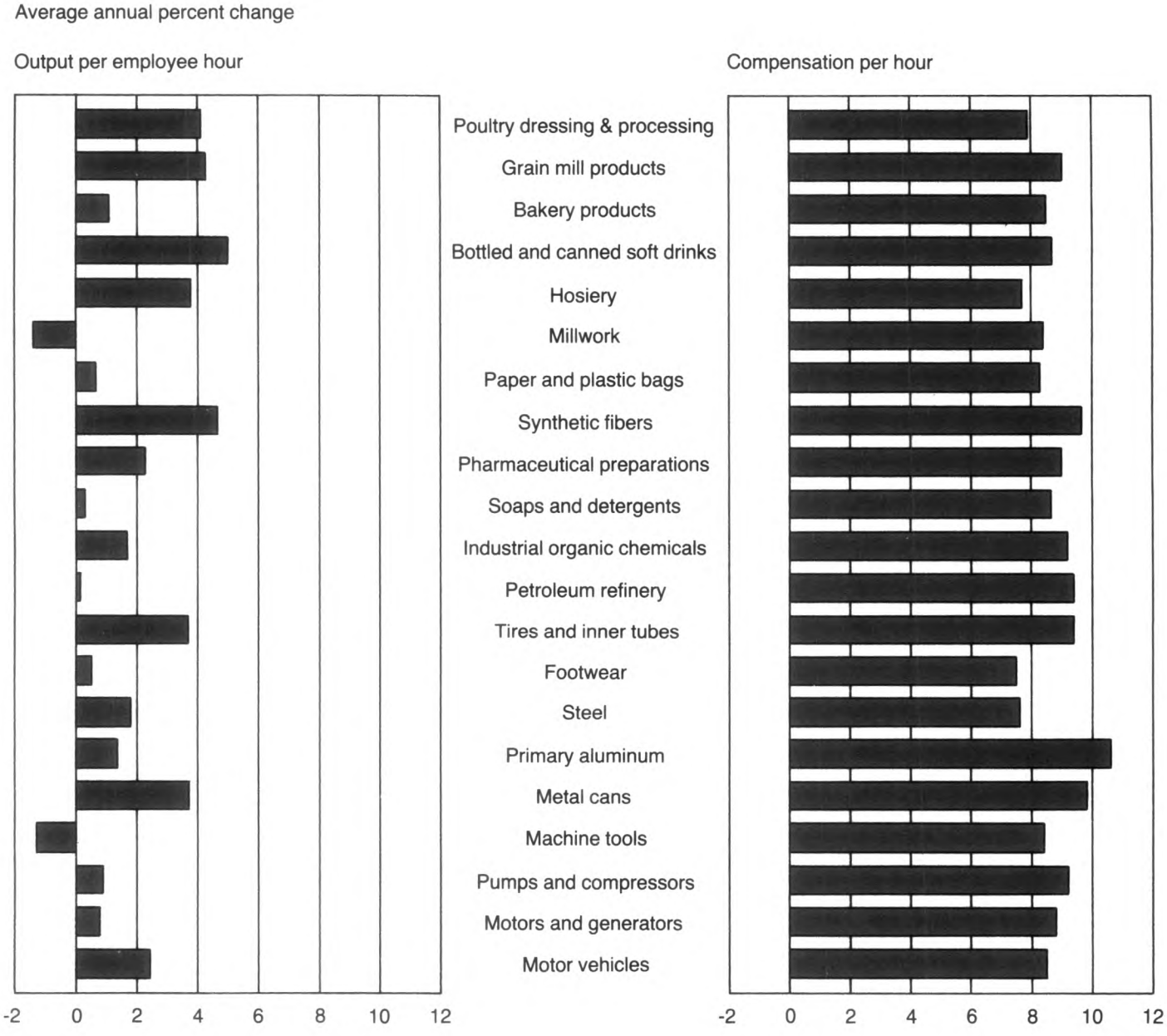
Chart 19.
Output per employee hour and compensation per employee hour, selected manufacturing industries, 1972-85



Source: Bureau of Labor Statistics

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Prices generally rise more rapidly when productivity increases slowly

A generally inverse relation prevails between industry price change and productivity change. Between 1965 and 1985, prices tended to decline or to increase slowly in such industries as telephone communications, women's ready-to-wear stores, and synthetic fibers, where productivity rose at above-average rates. In contrast, prices rose strongly in such industries as concrete products, bakery products and steel foundries, where productivity change over the period was comparatively low.

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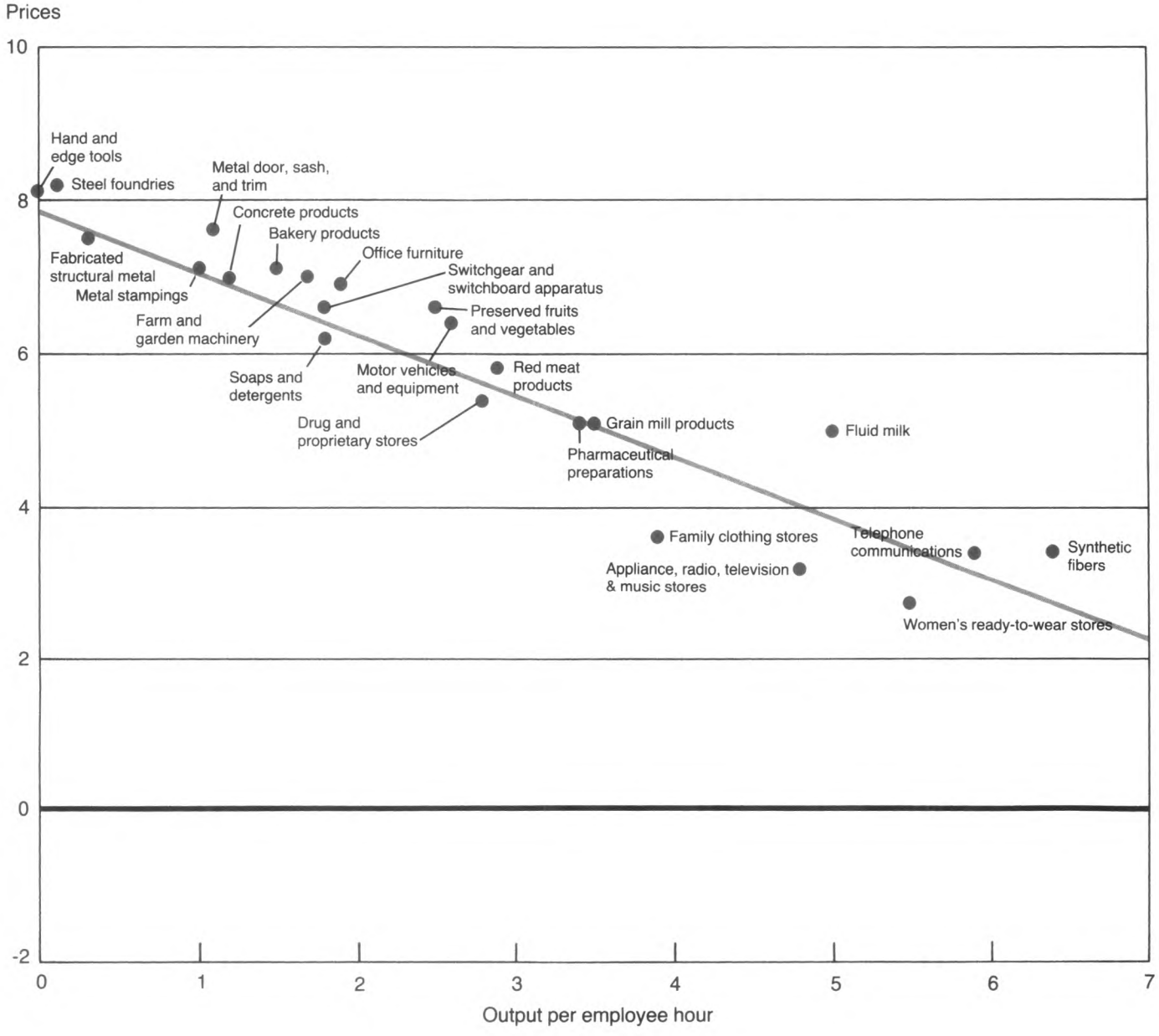
Chart 20.
Relation between output per employee hour and prices, selected industries, 1965-85



Source: Bureau of Labor Statistics

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No clear relationship exists between changes in productivity and changes in employment

Increases in productivity are often believed to be associated with decreases in employment. This is not necessarily so. Over the 1973-86 period, employment rose in a number of industries as productivity increased. Over the same period, however, employment dropped with advancing productivity in nearly three-fifths of all industries measured. Productivity gains in these industries were often traceable to cutbacks in marginally efficient capacity (as in iron and copper mining, steel, and some chemicals), as well as to technological improvements (as in fluid milk and nonwool yarn mills). Output growth was evidently not large enough to offset employment losses.

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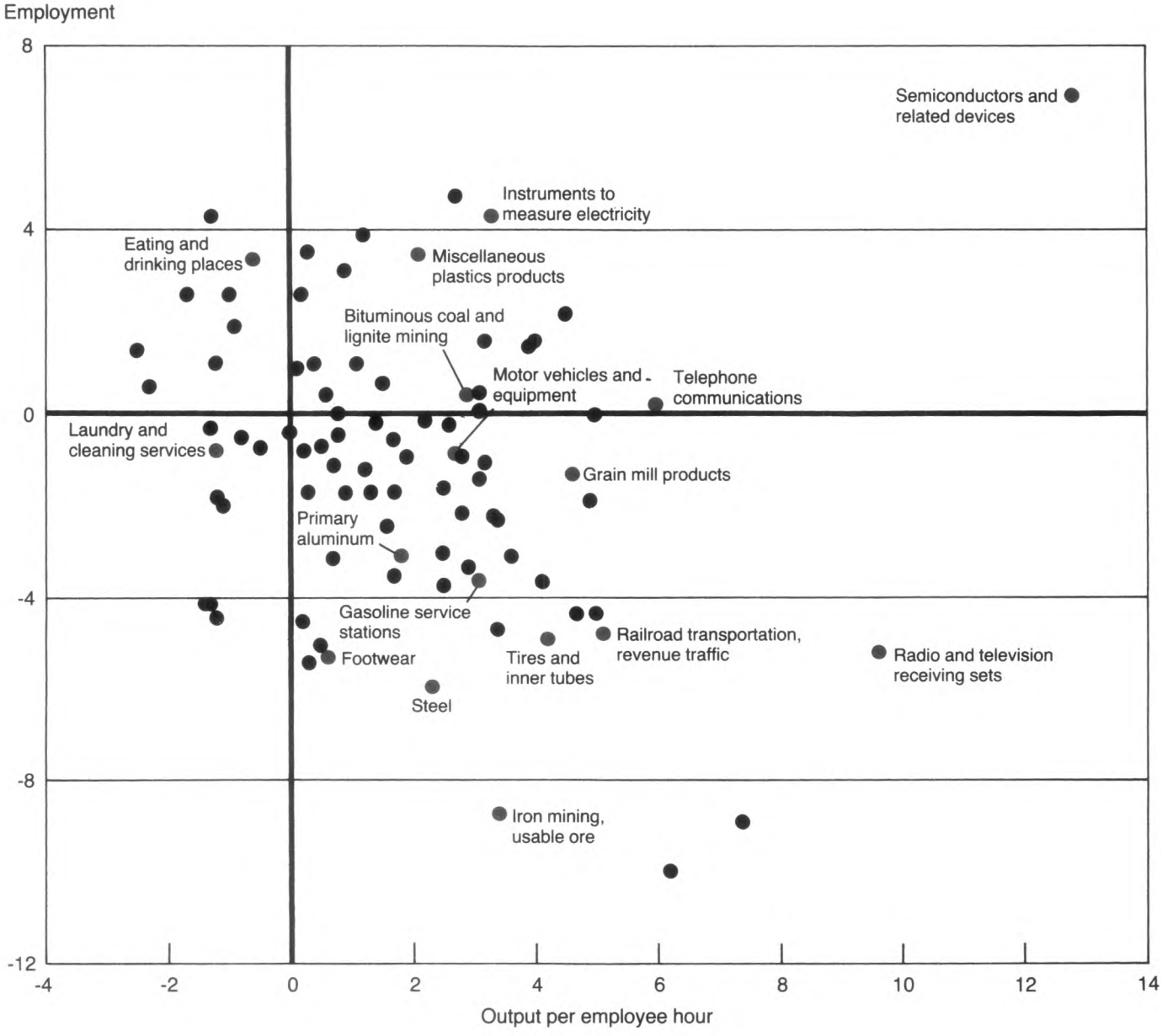
Chart 21.
Output per employee hour and employment
selected industries, 1973-86



Source: Bureau of Labor Statistics

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Similar rates of change in productivity often reflect differing rates of change in output and employment

The three industries shown have similar productivity growth rates—around 3.5 percent for the 1960-85 period. Despite the similarity, trends in employment varied, rising substantially in gas utilities, declining in the pulp and paper industry, and remaining virtually unchanged in drug and proprietary stores.

The relation between labor productivity growth and employment trends is basically determined by the climate in which output growth in a given industry occurs. Rapid output growth over the 25-year period, as in gas utilities, was accompanied by comparatively large increases in employment. Smaller gains in output, as in pulp and paper, were associated with employment declines. Where output rose at a fairly moderate rate, as in drug stores, virtually no change in employment resulted.

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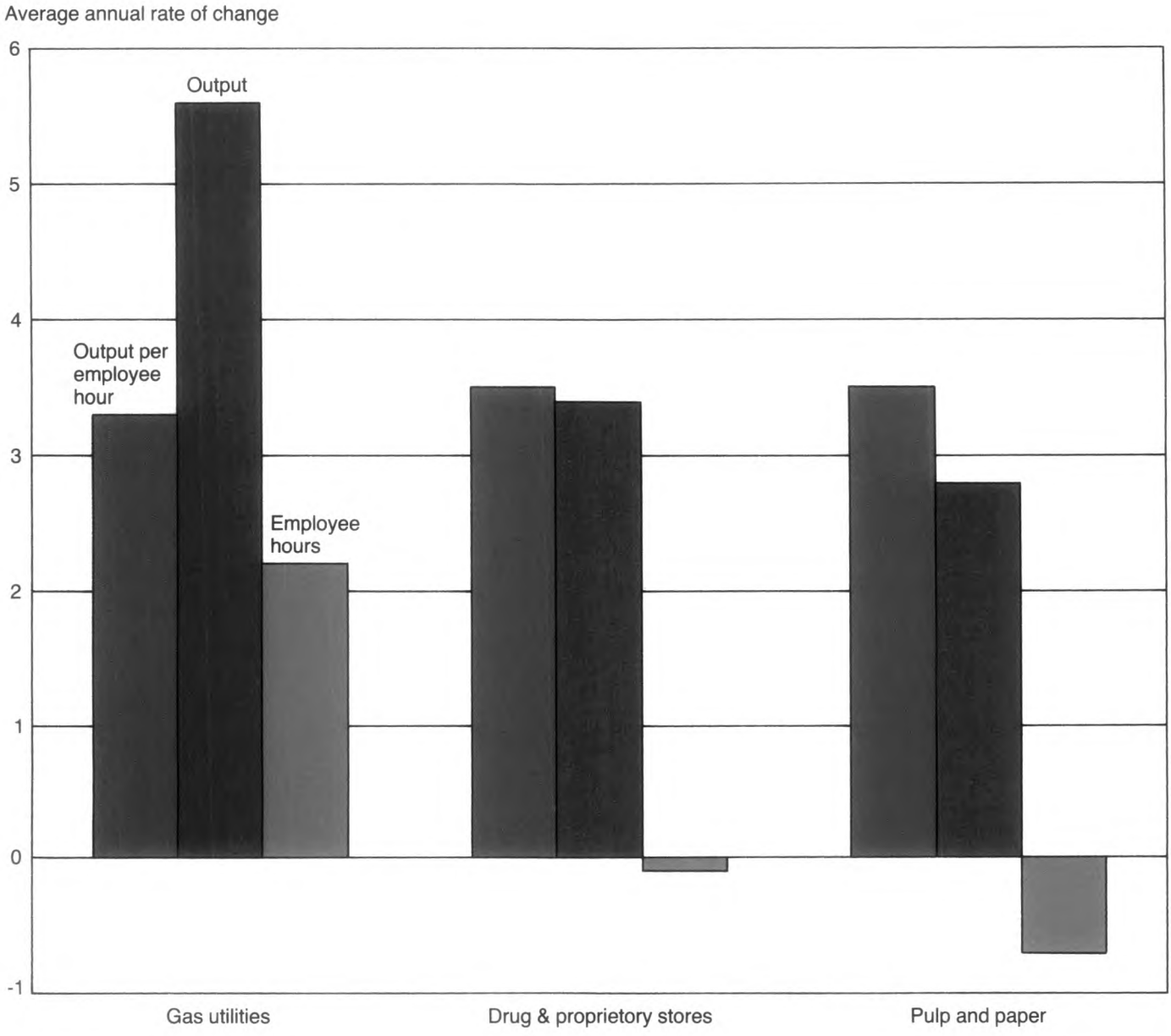
Chart 22.
Output and employment in selected industries with similar productivity growth, 1960-85



Source: Bureau of Labor Statistics

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Real hourly compensation has generally advanced in line with productivity

Labor has shared in the gains from productivity over the long run. Hourly compensation adjusted for changes in purchasing power—real hourly compensation—has risen at about the same rate as output per hour. In recent years, however, productivity increases have greatly exceeded gains in real hourly compensation.

Period	Average annual percent change	
	Output per hour of all persons	Real compensation per hour
1950-86	2.1	2.0
1950-73	2.7	2.9
1973-86	1.0	.3
1973-79	.6	.5
1979-86	1.4	.2

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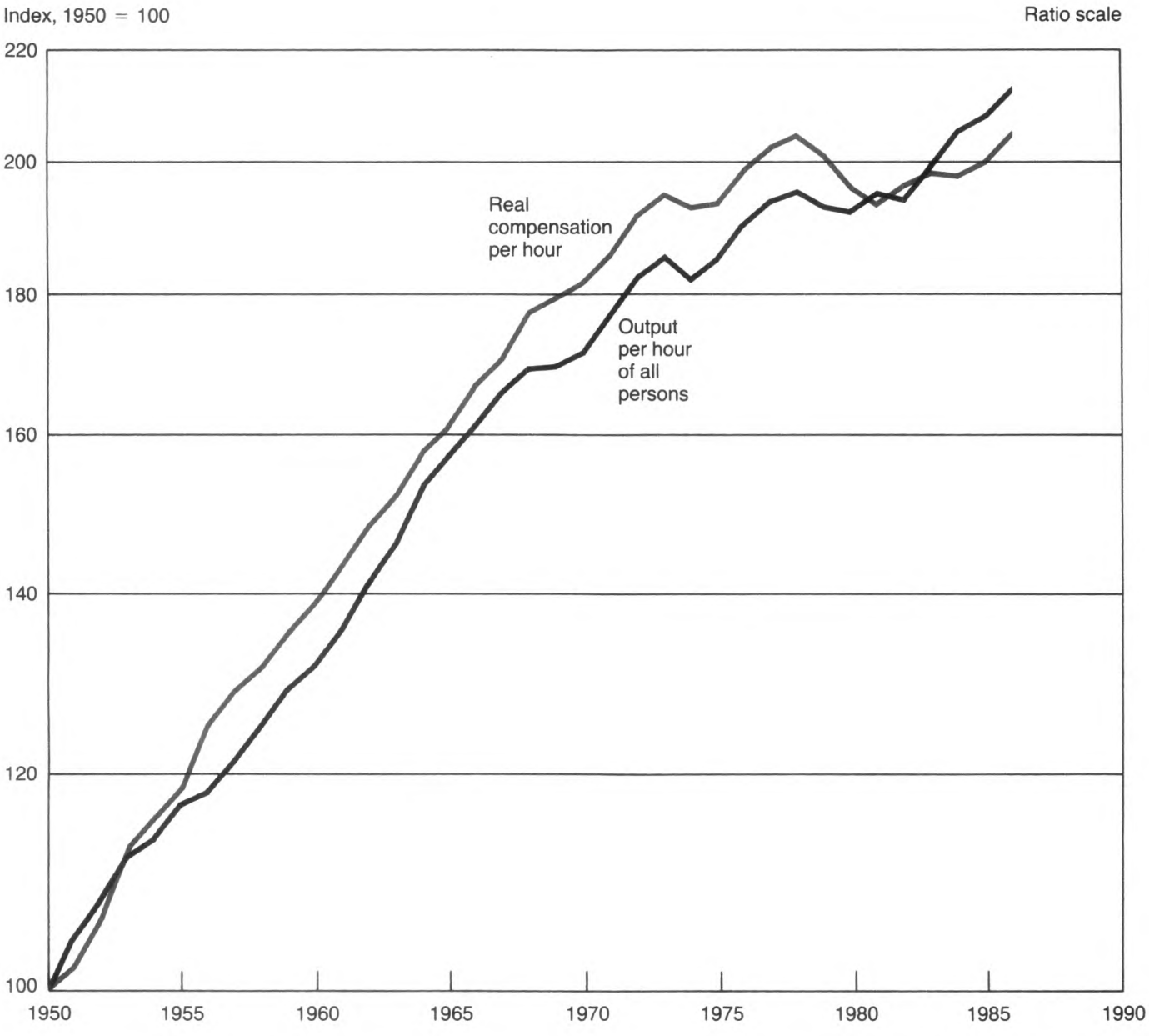
Chart 23.
Output per hour of all persons and real compensation per hour in the business economy, 1950-86



Source: Bureau of Labor Statistics

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Productivity advance has resulted primarily in higher incomes and consumption rather than in additional leisure

One of the benefits of productivity improvement is that it makes an increasing amount of goods and services available for consumption. This is shown by the steady increase in gross domestic product per person throughout the 1950-86 period. (Employment rose relative to population from the mid-1960's onward; since then, the growth in domestic product per capita has exceeded the growth in productivity.)

Some of the advance in productivity may be realized in the form of leisure (fewer hours worked). In addition to shorter work weeks, earlier retirement or later entry into the labor force may be options which are preferred over goods and services. Had all the productivity gains of the past third of a century been allocated to increasing product per capita, its growth rate would have been 2.1 percent annually over the 1950-86 period, rather than 1.7 percent. In contrast, had the productivity gains all been taken in the form of more leisure, average weekly hours would have decreased at an annual rate of 2.1 percent, instead of 0.4 percent. Clearly, increased income and, with it, increased consumption, had generally greater appeal than increased leisure.

Period	Average annual percent change	
	Gross domestic product per capita	Average weekly hours
1950-86	1.7	-0.4
1950-73	2.3	-0.4
1973-79	.1	-0.5
1979-86	1.0	-0.3

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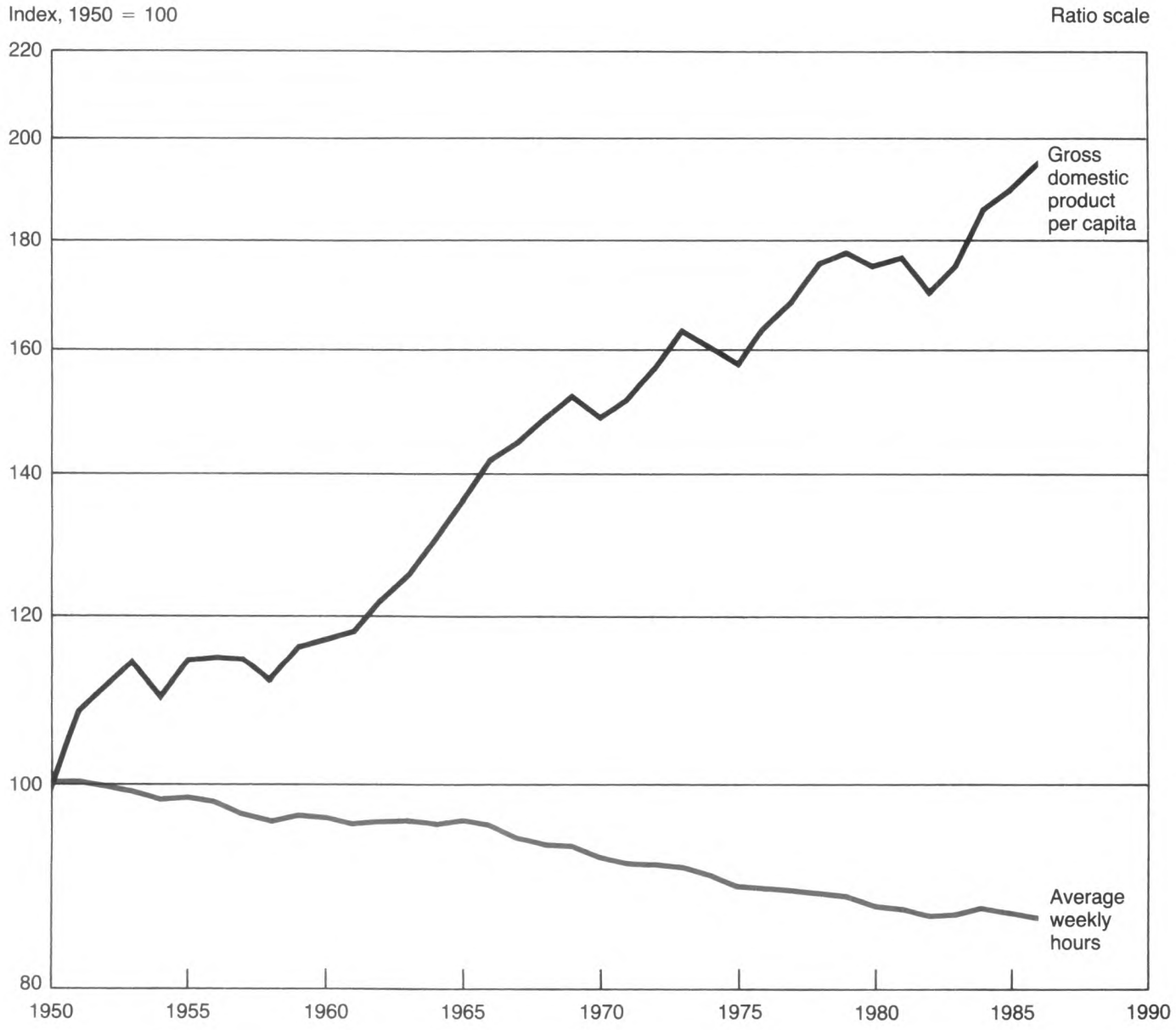
Chart 24.
Gross domestic product per capita and average weekly hours, in the business economy, 1950-86



Source: Bureau of Economic Analysis and Bureau of the Census, U.S. Department of Commerce; Bureau of Labor Statistics

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Levels of U.S. capital formation per employed person have remained above those of other industrial countries

International comparisons of the amount of real resources countries are devoting to increasing their capital stocks, and thereby to improving labor productivity, are difficult to make. The data should be considered as approximations only.

For the 1970-85 period as a whole, the United States averaged a higher level of real capital formation per employed person than any of the other countries shown, except Canada. During the period 1979-85, again only Canada's level of capital formation per employed person ran ahead of the United States.

Since these estimates of comparative real capital formation relate to the total economy, they reflect differences in industrial structure as well as in industry-specific fixed assets. For example, Canada has a much larger share of its investment in such capital-intensive activities as waterworks and electric, gas, and steam utilities than the other countries.

Per employed person, the United States had higher levels of investment in producers' durable equipment than all the other countries shown; however, U.S. investment in nonresidential building was lower than in Canada and Japan.

Comparative levels of capital formation, 1979-85

Country	Producers' durable equipment per employed person	Nonresidential building per employed person
United States	100.0	100.0
Canada	73.2	158.7
Japan	72.9	121.9
France	95.0	75.4
Germany	94.1	86.6
Italy	58.6	69.1
United Kingdom	66.1	49.7

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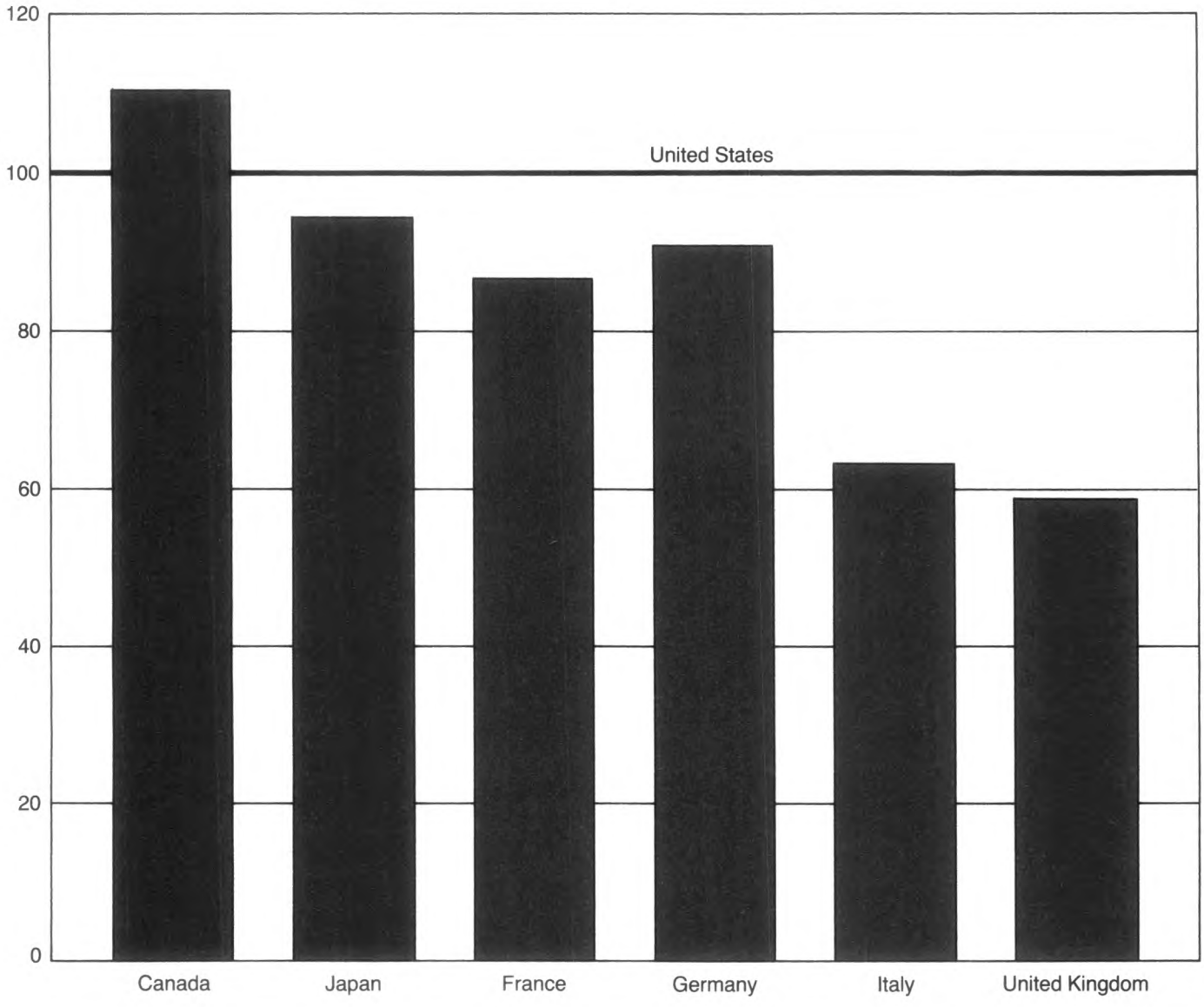
Chart 25.
Comparative levels of nonresidential capital formation per employed person, selected countries, 1979-85

Averages for periods

Index, United States = 100



Source: Irving Kravis et al., *A System for International Comparisons of Real Product and Purchasing Power,* and Bureau of Labor Statistics

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The growth in U.S. gross fixed capital formation per employed person has lagged behind that of other major industrial countries

While the level of capital formation per employed person in the United States remains above that of other major industrial countries (except Canada), its growth rate has remained lower than that of Japan and the United Kingdom. Compared with 1970-79, however, the rate for 1979-85 improved significantly for the United States (as also for the United Kingdom) while it receded for Japan, France, and Germany.

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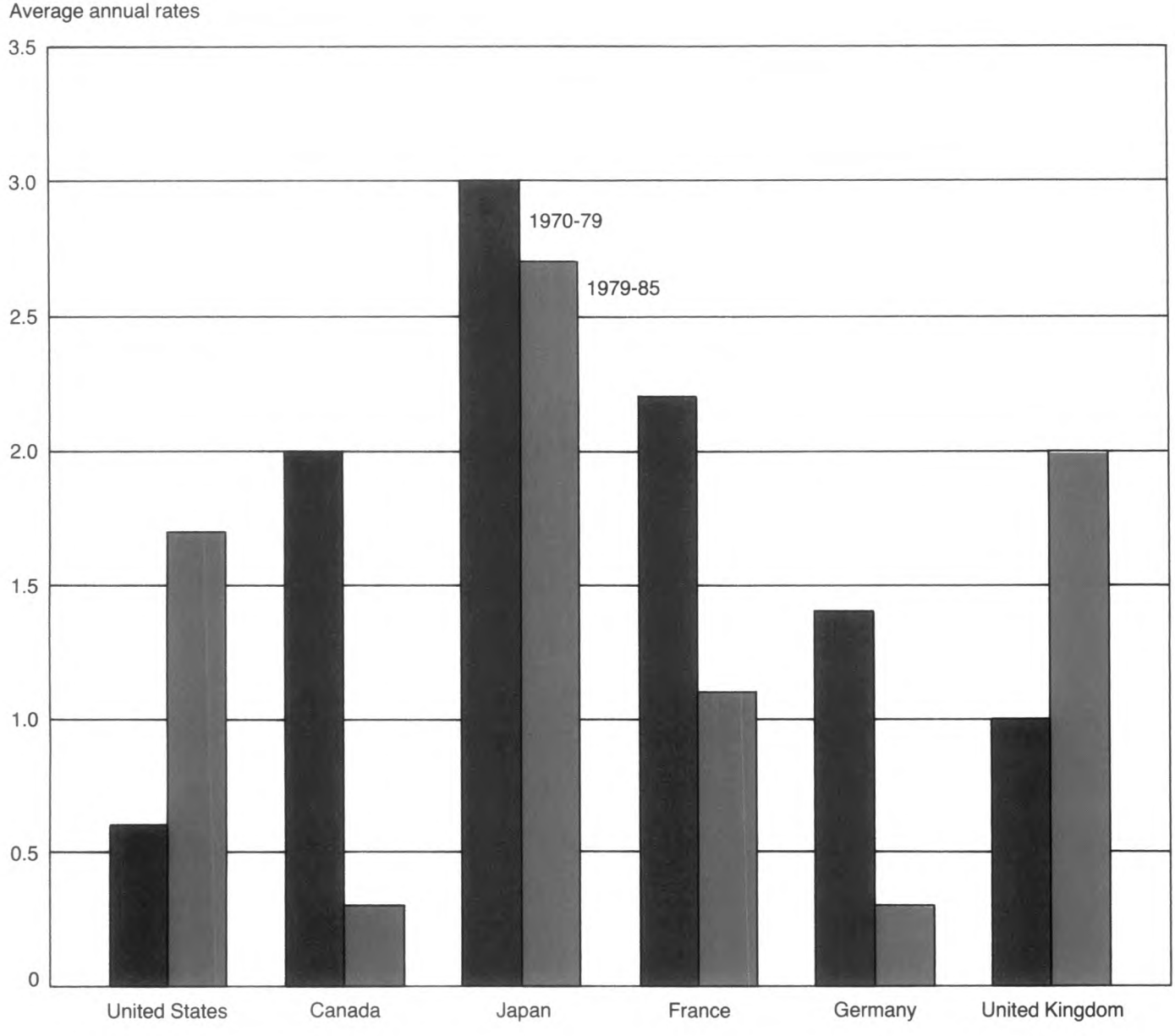
Chart 26.
Growth rates in gross fixed capital formation per employed person, selected countries, 1970-79 and 1979-85



Source: Bureau of Labor Statistics

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As a percent of gross national product, U.S. research and development expenditures generally have run ahead of other major industrial countries

Statistics on research and development activity are not as readily available for other countries as they are for the United States. Nevertheless, sufficient information exists for some comparisons between the United States and its major trading partners.

R&D expenditures as a proportion of GNP were higher in the United States than in the four other industrial countries compared until the mid-1970's. The rates for Germany and Japan then began to catch up with the U.S. rate. Data for recent years indicate that the proportion of GNP devoted to overall R&D expenditures is similar in the countries covered here.

More than half of U.S. R&D funds are provided by the Government, and more than half of these funds are for defense and space objectives. When R&D expenditures for national defense and space are excluded from the comparisons, Japan and Germany show the highest ratios of R&D expenditures to output.

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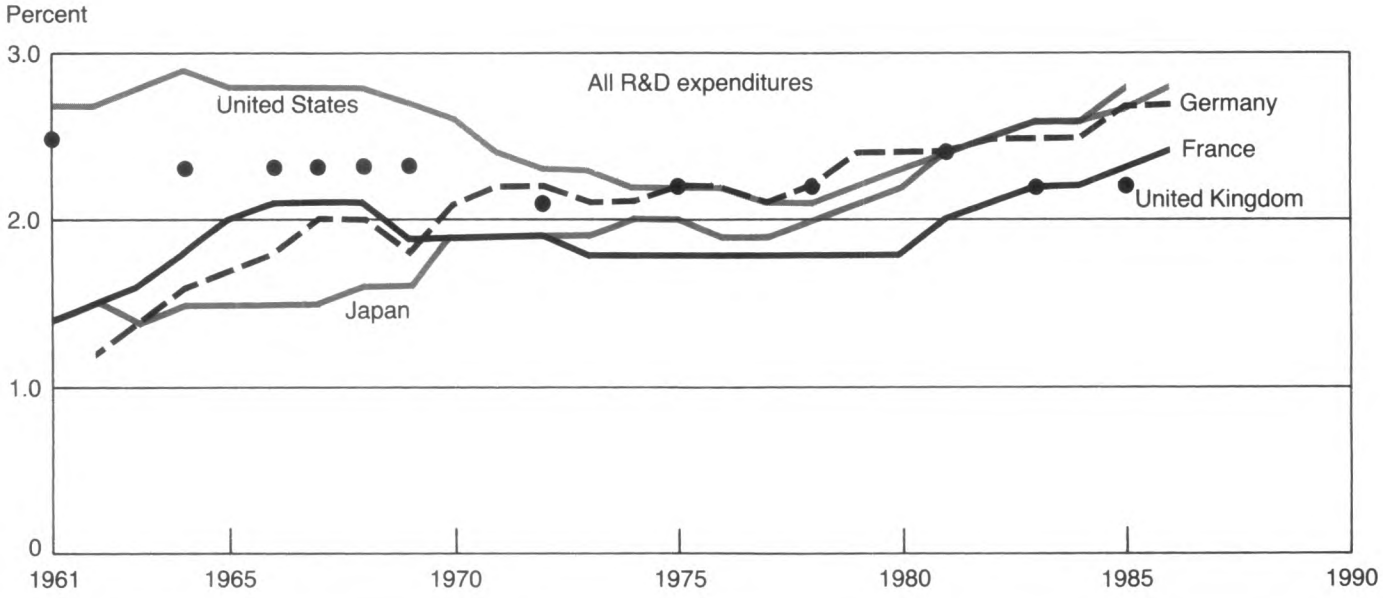
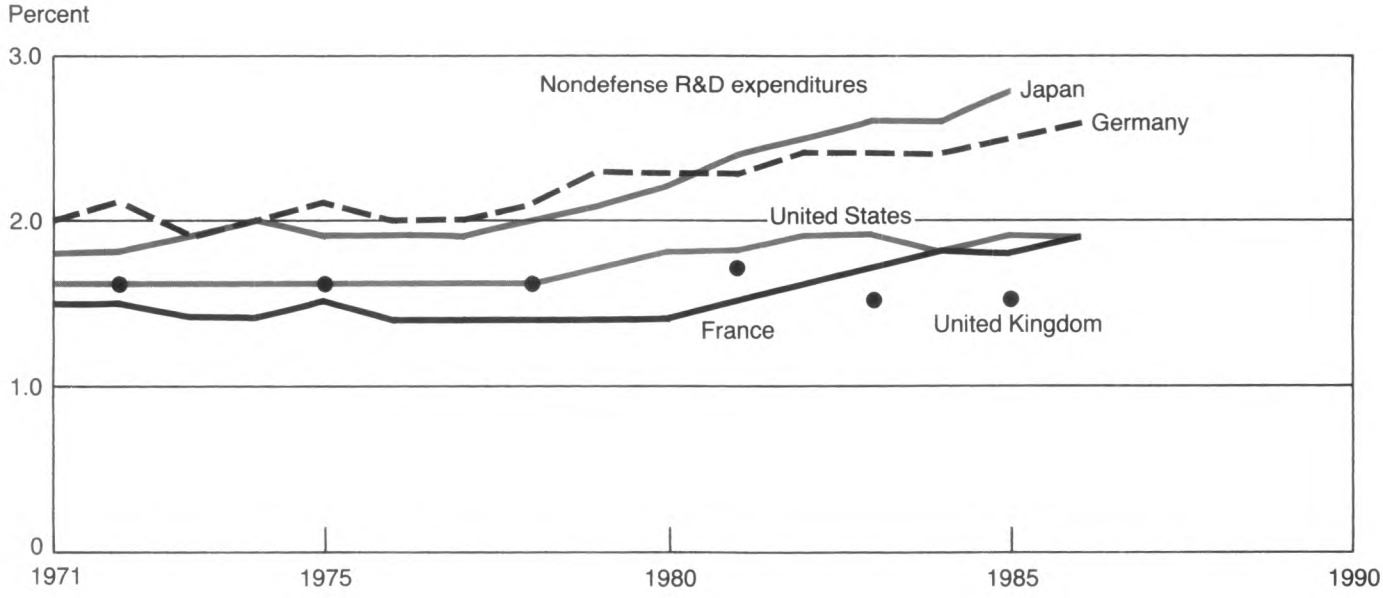
Chart 27.
Expenditures for research and development as a percent of gross national product, all R&D and nondefense R&D, selected countries, 1961-86





Source: National Science Foundation

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The number of U.S. scientists and engineers engaged in R&D is the highest among industrial countries

In proportion to its labor force, the United States has a greater number of scientists and engineers engaged in research and development than other large industrial countries, but the difference has narrowed. In 1976, the United States had 55 scientists and engineers in R&D per 10,000 persons in the labor force while the other countries had 30 to 48. The proportion has since increased in the United States but substantially more in the other countries, particularly in Germany and Japan.

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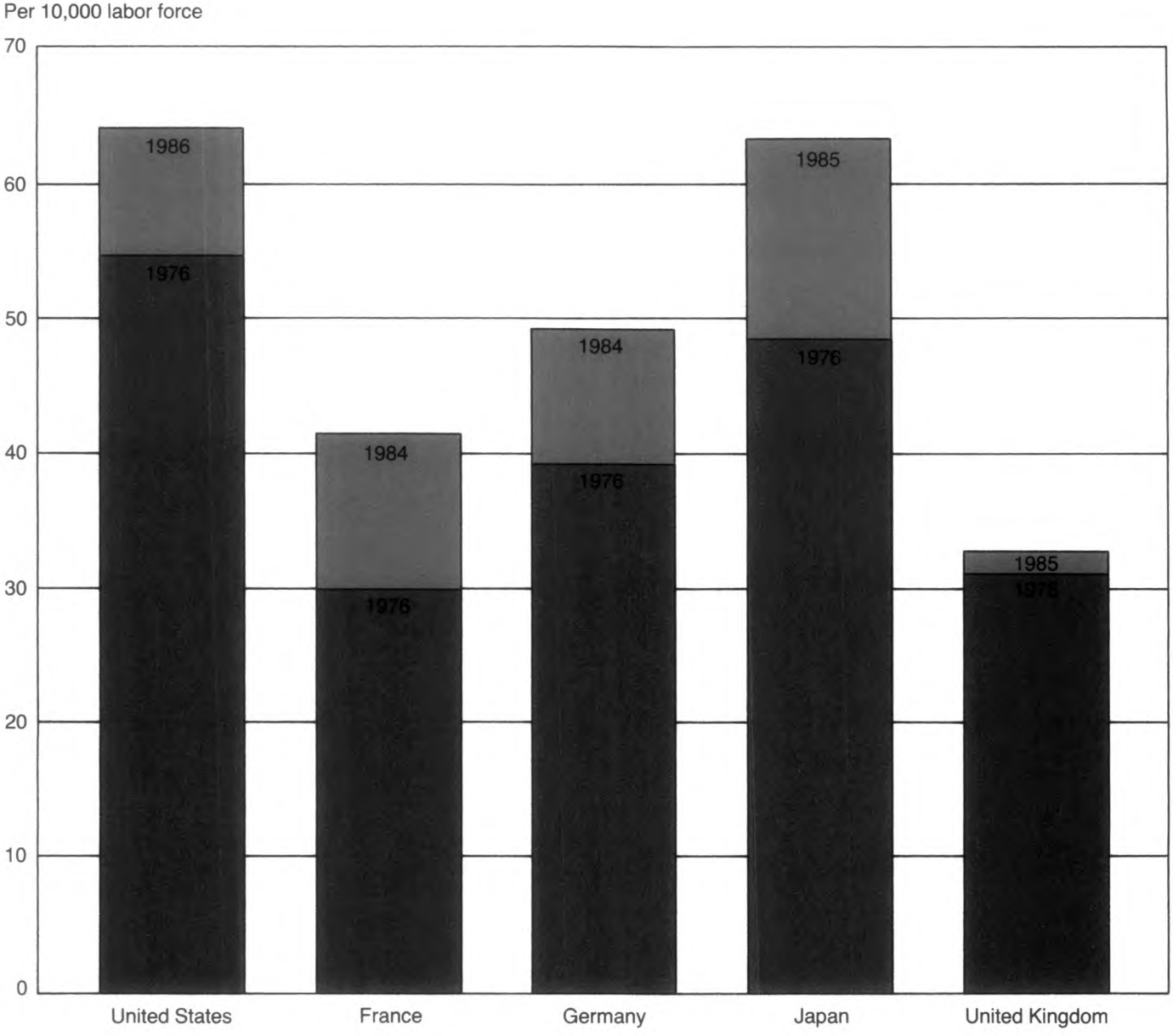
Chart 28.
Scientists and engineers engaged in R&D,
selected countries, 1976 and 1986



Source: Bureau of Labor Statistics

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Appendix.

Supporting data for charts

Table 1. Output per hour of all persons in the business economy,[1] 1909-87

(Index, 1909 = 100)

Year	Output per hour	Year	Output per hour
1909	100.0	1949	198.6
1910	105.6		
1911	101.2	1950	215.1
1912	103.0	1951	223.8
1913	103.3	1952	230.7
1914	100.3	1953	239.2
		1954	243.0
1915	99.7		
1916	100.6	1955	250.3
1917	98.0	1956	253.7
1918	107.0	1957	260.3
1919	108.2	1958	268.0
		1959	276.9
1920	101.5		
1921	104.0	1960	281.5
1922	113.3	1961	291.4
1923	117.8	1962	301.9
1924	121.4	1963	313.8
		1964	327.5
1925	126.2		
1926	129.7	1965	337.2
1927	130.0	1966	346.5
1928	129.9	1967	355.7
1929	133.8	1968	365.3
		1969	365.5
1930	129.9		
1931	125.6	1970	368.1
1932	120.9	1971	380.0
1933	117.7	1972	391.5
1934	129.1	1973	399.2
		1974	390.7
1935	134.4		
1936	140.3	1975	398.3
1937	143.0	1976	409.3
1938	145.5	1977	416.3
1939	150.0	1978	419.7
		1979	414.6
1940	155.9		
1941	167.6	1980	413.2
1942	176.7	1981	419.2
1943	182.6	1982	417.5
1944	188.9	1983	428.8
		1984	439.5
1945	194.3		
1946	186.8	1985	447.6
1947	187.0	1986	455.2
1948	196.5	1987	459.3

[1]Total private economy until 1946.

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Table 2. Output per hour of all persons in the total business and nonfarm business economy, 1960-87

(Index, 1960 = 100)

Year	Output per hour	
	Business	Nonfarm business
1960	100.0	100.0
1961	103.0	103.1
1962	107.2	106.5
1963	111.5	110.3
1964	116.3	114.7
1965	119.8	117.6
1966	123.1	120.1
1967	126.4	122.8
1968	129.8	126.0
1969	129.9	125.4
1970	130.8	125.7
1971	135.0	129.5
1972	139.1	133.5
1973	141.8	135.9
1974	138.8	132.9
1975	141.5	135.2
1976	145.4	138.7
1977	147.9	140.9
1978	149.1	142.1
1979	147.3	139.8
1980	146.8	139.2
1981	148.9	140.6
1982	148.3	139.8
1983	152.3	144.4
1984	156.1	147.4
1985	159.0	149.1
1986	162.0	151.5
1987	163.5	152.7

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Table 3. Output per hour of all persons by major sector, 1960-86
(Index 1960 = 100)

Year	Farm	Mining	Manufacturing	Transportation	Communications	Electric, gas, and sanitary services	Trade
1960	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1961	105.0	107.0	102.8	102.5	106.4	105.6	101.9
1962	107.4	112.2	107.2	106.0	113.3	111.4	107.7
1963	112.5	119.6	114.4	112.1	120.9	115.6	112.0
1964	114.5	122.6	120.0	113.6	124.3	123.4	115.5
1965	120.9	127.1	123.1	120.3	128.6	125.6	119.8
1966	121.4	134.1	124.7	127.4	133.9	133.1	125.0
1967	135.2	142.9	124.6	125.1	141.8	135.8	129.0
1968	131.7	150.6	128.7	130.7	149.3	146.9	134.2
1969	143.8	152.3	130.2	134.0	152.5	151.1	132.6
1970	160.7	159.7	130.2	133.1	158.0	150.3	133.7
1971	173.1	161.5	137.5	134.4	169.2	163.2	137.9
1972	172.0	158.1	143.4	142.9	178.0	164.5	145.2
1973	173.0	153.6	150.4	149.7	185.4	179.8	149.2
1974	172.7	139.5	145.9	149.7	190.5	182.1	145.1
1975	192.5	125.0	149.6	148.1	206.8	197.3	147.4
1976	193.6	116.4	156.4	156.6	219.3	194.7	151.0
1977	196.6	112.0	161.1	160.0	225.7	192.2	154.4
1978	190.0	109.1	163.4	163.2	234.7	186.5	156.3
1979	207.7	99.0	163.3	159.4	237.9	180.5	156.0
1980	213.7	95.1	163.3	154.2	248.8	181.6	153.4
1981	259.7	87.7	166.9	147.2	260.0	186.3	154.9
1982	275.5	86.0	170.6	140.3	266.5	188.2	156.5
1983	218.2	96.6	180.5	145.4	301.1	192.5	160.1
1984	252.5	99.5	190.4	151.1	286.3	206.5	167.0
1985	320.8	102.1	200.1	147.2	302.7	203.9	172.8
1986	354.4	111.0	207.5	152.6	312.8	197.8	179.6

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Table 4. Output per employee hour in selected industries, 1960-86

Industry	Average annual rates of change 1960-86	Industry	Average annual rates of change 1960-86
Semiconductors and related devices[1]	13.1	Meat packing plants[3]	3.3
Wet corn milling[2]	8.0	Iron mining, crude ore	3.3
Malt beverages	6.4	Drug and proprietary stores	3.2
Radio and television receiving sets	6.3	Furniture, home furnishings and equipment stores[3]	3.2
Synthetic fibers	6.2	Electric utilities	3.1
Hosiery	6.0	Copper mining, recoverable metal	3.1
Telephone communications	5.7	Tires and inner tubes	3.0
Women's ready-to-wear stores[3]	5.7	Canned fruits and vegetables[4]	3.0
Air transportation	5.2	Poultry dressing and processing[2]	2.9
Appliance, radio, television and music stores[3]	5.1	Red meat products[3]	2.9
Fluid milk[4]	4.7	Motor vehicles and equipment	2.8
Railroad transportation, revenue traffic	4.5	Household appliances, N.E.C.	2.8
Household refrigerators and freezers	4.5	Softwood veneer and plywood[6]	2.8
Petroleum pipelines	4.3	Department stores[3]	2.8
Aluminum rolling and drawing	4.2	Petroleum refining	2.8
Industrial organic chemicals, N.E.C.[2]	4.1	Cigars	2.8
Major household appliances	4.0	Railroad transportation, car-miles	2.7
Ceramic wall and floor tile[4]	4.0	Metal cans	2.7
Household cooking equipment	4.0	Preserved fruits and vegetables[4]	2.7
Family clothing stores[3]	3.8	Structural clay products	2.7
Household laundry equipment	3.8	Clay construction products	2.6
Cotton and synthetic broad woven fabrics[1]	3.7	Iron mining, usable ore	2.6
Corrugated and solid fiber boxes	3.7	Clay refractories	2.6
Gasoline service stations	3.7	Flour (including flour mixes) and other grains[2]	2.6
Apparel and accessory stores[3]	3.7	Cosmetics and other toiletries[4]	2.6
Copper mining, crude ore	3.7	Men's and boys' clothing stores[3]	2.6
Bottled and canned soft drinks	3.6	Crushed and broken stone	2.5
Pharmaceutical preparations[5]	3.5	Hydraulic cement	2.5
Grain mill products[2]	3.5	Paints and allied products	2.5
Paper, paperboard, and pulp mills	3.5	Alkalies and chlorine[6]	2.4
Veneer and plywood[4]	3.5	Gas and electric utilities	2.4
Primary copper	3.4	Nonwool yarn mills	2.4
Primary copper, lead, and zinc	3.4	Sawmills and planing mills, general	2.4
Mattresses and bedsprings	3.4	Glass containers	2.3
Prepared feeds for animals and fowls[2]	3.4	Copper rolling and drawing	2.3
Instruments to measure electricity[6]	3.3	Upholstered household furniture[4]	2.2
Flour and other grain mill products	3.3	Hardwood veneer and plywood[6]	2.2
		Automotive stampings[6]	2.2
		Metal household furniture[4]	2.2
		Soaps and detergents[4]	2.2
		Paper and plastic bags[4]	2.1

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Table 4. Output per employee hour in selected industries, 1960-86 (continued)

Industry	Average annual rates of change 1960-86	Industry	Average annual rates of change 1960-86
Farm and garden machinery[4]	2.1	Wood office furniture[4]	1.2
Household furniture	2.1	Wood kitchen cabinets[6]	1.2
Metal office furniture[4]	2.1	Commercial banking[8]	1.2
Miscellaneous plastics products[6]	2.1	Ball and roller bearings	1.1
Sugar	2.1	Metal doors, sash, and trim[8]	1.1
Steel	2.0	Refrigeration and heating equipment[8]	1.1
Cereal breakfast foods[2]	2.0	Metal stampings[2]	1.0
Concrete products[4]	2.0	Valves and pipe fittings[4]	1.0
Switchgear and switchboard apparatus[5]	2.0	Pumps and pumping equipment[6]	.9
Furniture and home furnishings stores[3]	2.0	Gas utilities	.8
Rice milling[2]	2.0	Air and gas compressors[6]	.8
Sausages and other prepared meats[3]	2.0	Machine tool accessories[2]	.8
Lighting fixtures[7]	1.9	Fabricated structural metal[4]	.8
Electric lamps	1.9	Ready-mixed concrete[4]	.7
Bakery products[4]	1.9	Coal mining	.6
Raw and refined cane sugar	1.9	Bituminous coal and lignite mining	.6
Office furniture	1.9	Hand and edge tools[4]	.6
Nonmetallic minerals, except fuels	1.9	Millwork[4]	.5
Lawn and garden equipment[6]	1.9	Liquor stores[1]	.5
Primary aluminum	1.8	Beauty shops[1]	.5
Franchised new car dealers	1.8	Metal cutting machine tools	.4
Wood household furniture[4]	1.8	Inorganic pigments[6]	.4
Gray iron foundries	1.7	Steel foundries	.4
Brick and structural clay tile	1.7	Footwear	.4
Total tobacco products	1.7	Retail food stores	.3
Pumps and compressors[4]	1.7	Laundry and cleaning services	.3
Folding paperboard boxes[5]	1.7	Eating and drinking places	.3
Motors and generators[4]	1.7	Beauty and barber shops[1]	.2
Intercity trucking[4]	1.7	Farm machinery and equipment[6]	.1
Heating equipment, except electric[6]	1.6	Machine tools	.1
Transformers[5]	1.6	Industrial inorganic chemicals[6]	0.0
Internal combustion engines, N.E.C.[8]	1.6	Oilfield machinery and equipment[3]	-0.1
Shoe stores[3]	1.6	Fabricated pipe and fittings[4]	-0.2
Hotels, motels, and tourist courts	1.6	Industrial inorganic chemicals, N.E.C.[6]	-0.4
Construction machinery and equipment	1.5	Metal stampings, N.E.C.[6]	-0.6
Beet sugar	1.5	Class I bus carriers[4]	-0.7
Intercity trucking, general freight[4]	1.5	Metal forming machine tools	-1.0
Cigarettes, chewing and smoking tobacco	1.5	Mining machinery and equipment[6]	-1.0
Hardware stores[1]	1.3	Automotive repair shops[1]	-1.2

[1] 1972-86
[2] 1963-85
[3] 1967-86
[4] 1960-85
[5] 1963-86
[6] 1972-85
[7] 1961-85
[8] 1967-85

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Table 5. Productivity rates in selected industries, 1973-79 and 1979-86
(Average annual rates)

Industry	1973-79	1979-86	Advance/ falloff from 1973-79 to 1979-86
Iron mining, usable ore	-0.3	7.1	7.5
Copper mining, recoverable metal	5.1	14.5	9.4
Bituminous coal and lignite mining	-3.7	7.4	11.1
Nonmetallic minerals, except fuels	1.8	1.6	-0.1
Red meat products	4.0	2.5	-1.5
Poultry dressing and processing[1]	5.0	4.5	-0.5
Fluid milk[1]	4.4	4.7	.3
Preserved fruits and vegetables[1]	1.8	2.6	.8
Grain mill products[1]	3.9	6.1	2.2
Bakery products[1]	.7	2.8	2.1
Sugar	1.3	.9	-0.4
Malt beverages	7.1	3.2	-3.8
Bottled and canned soft drinks	5.7	5.4	-0.3
Total tobacco products	2.4	2.0	-0.4
Cotton and synthetic broad woven fabrics	4.7	3.7	-1.0
Hosiery	5.7	1.3	-4.4
Nonwool yarn mills	3.3	4.6	1.4
Sawmills and planing mills	1.2	5.8	4.7
Millwork[1]	-1.3	-1.5	-0.2
Wood kitchen cabinets[1]	3.3	-0.7	-4.0
Veneer and plywood[1]	2.0	4.3	2.3
Household furniture	1.2	2.3	1.1
Office furniture	3.8	1.3	-2.4
Paper, paperboard, and pulp mills	2.9	3.1	.2
Paper and plastic bags[1]	.6	2.2	1.6
Folding paperboard boxes	1.8	-0.3	-2.1
Corrugated and solid fiber boxes	3.3	2.4	-1.0
Industrial inorganic chemicals[1]	1.4	0.0	-1.5
Synthetic fibers	6.9	3.5	-3.4
Pharmaceutical preparations	3.3	1.5	-1.8
Soaps and detergents[1]	.6	-1.0	-1.6
Cosmetics and other toiletries[1]	1.6	-0.3	-1.9
Paints and allied products[1]	3.9	2.9	-1.0
Industrial organic chemicals, N.E.C.[1]	3.0	1.0	-2.1
Petroleum refining	1.7	2.5	.8
Tires and inner tubes	2.7	5.8	3.2
Miscellaneous plastics products[1]	1.8	3.3	1.5
Footwear	.5	1.4	.8
Glass containers	1.1	4.1	3.0
Hydraulic cement	.9	6.5	5.6
Structural clay products	1.6	2.8	1.2
Concrete products[1]	.6	1.9	1.3
Steel	.4	5.2	4.8
Gray iron foundries	.7	1.9	1.2
Steel foundries	-1.3	-0.7	.6
Primary copper, lead, and zinc	2.7	10.0	7.3
Primary aluminum	-0.6	4.3	4.9
Copper rolling and drawing	2.5	5.2	2.6
Aluminum rolling and drawing	1.7	3.6	1.9
Metal cans	4.5	3.6	-0.9
Hand and edge tools[1]	.7	-2.3	-3.0

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Table 5. Productivity rates in selected industries, 1973-79 and 1979-86 (continued)
(Average annual rates)

Industry	1973-79	1979-86	Advance/ falloff from 1973-79 to 1979-86
Heating equipment, except electric[1]	3.9	0.3	-3.6
Fabricated structural metal[1]	-1.4	2.1	3.5
Metal doors, sash, and trim[1]	1.1	2.7	1.6
Metal stampings[1]	1.2	1.1	-0.1
Valves and pipe fittings[1]	1.0	0.0	-1.0
Fabricated pipe and fittings[1]	-3.0	.4	3.3
Internal combustion engines, N.E.C.[1]	2.2	.6	-1.5
Farm and garden machinery[1]	.8	1.0	.2
Construction machinery and equipment	1.3	1.0	-0.3
Mining machinery and equipment[1]	-3.2	.4	3.6
Oilfield machinery and equipment	-1.0	-4.8	-3.7
Machine tools	-1.1	-1.2	-0.1
Machine tool accessories[1]	-0.6	-1.9	-1.3
Pumps and compressors[1]	1.3	.9	-0.4
Ball and roller bearings	.5	-1.1	-1.6
Refrigeration and heating equipment[1]	-0.2	1.1	1.4
Transformers	2.4	-1.5	-3.9
Switchgear and switchboard apparatus	.7	2.2	1.4
Motors and generators[1]	.1	2.1	2.0
Major household appliances	3.2	3.6	.4
Electric lamps	2.8	3.9	1.1
Lighting fixtures[1]	1.3	2.3	1.0
Radio and television receiving sets	5.6	14.1	8.6
Semiconductors and related devices	18.2	7.1	-11.1
Motor vehicles and equipment	3.3	4.7	1.4
Instruments to measure electricity[1]	1.9	4.7	2.8
Railroad transportation, revenue traffic	2.1	8.7	6.6
Class I bus carriers[1]	-1.6	-1.7	-0.1
Intercity trucking[1]	1.1	.5	-0.6
Air transportation	5.3	4.2	-1.1
Petroleum pipelines	1.1	2.0	.9
Telephone communications	7.2	5.2	-2.0
Electric utilities	1.9	0.0	-1.9
Gas utilities	-0.2	-4.5	-4.3
Hardware stores	2.0	.4	-1.6
Department stores	3.5	3.9	.5
Retail food stores	-1.4	-0.6	.8
Franchised new car dealers	.9	2.2	1.4
Gasoline service stations	4.1	3.0	-1.1
Apparel and accessory stores	2.1	5.0	3.0
Furniture, home furnishings and equipment stores	2.2	4.1	1.9
Eating and drinking places	-0.5	-0.7	-0.2
Drug and proprietary stores	1.3	-1.0	-2.3
Liquor stores	-0.7	1.0	1.8
Commercial banking[1]	1.6	2.3	.7
Hotels, motels, and tourist courts	2.2	0.0	-2.2
Laundry and cleaning services	.4	-1.2	-1.6
Beauty and barber shops	.9	-1.1	-2.0
Automotive repair shops	-0.9	-0.7	.2

[1]1979-85

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Table 6. Output per hour of all persons, output per unit of capital, and multifactor productivity, private business sector, 1960-86

(Index 1960 = 100)

Year	Output per hour of all persons	Output per unit of capital	Multifactor productivity
1960	100.0	100.0	100.0
1961	103.6	99.9	102.3
1962	107.4	102.4	105.6
1963	111.7	104.2	109.0
1964	116.6	106.9	113.0
1965	120.0	109.0	115.9
1966	123.3	109.0	117.9
1967	126.6	106.6	118.9
1968	130.2	106.7	121.1
1969	130.3	104.9	120.4
1970	131.3	99.8	119.0
1971	135.6	99.1	121.2
1972	139.7	101.7	124.7
1973	142.5	103.1	126.9
1974	139.5	96.7	122.3
1975	142.3	91.9	121.7
1976	146.2	95.2	125.4
1977	148.6	98.0	128.0
1978	149.8	99.9	129.6
1979	147.9	97.8	127.6
1980	147.4	92.3	124.7
1981	149.5	90.5	125.1
1982	149.0	84.9	122.0
1983	153.2	86.6	125.0
1984	157.0	90.9	129.3
1985	159.9	90.9	130.8
1986	163.0	90.9	132.4

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Table 7. Output per hour of all persons, capital effects, and multifactor productivity, selected periods, 1960-86
(Average annual rates, in percent)

Year	Output per hour of all persons	Multifactor productivity growth	Capital effects
Private business			
1960-73	2.7	1.8	0.9
1973-79	.6	.1	.5
1979-86	1.4	.5	.9
Manufacturing			
1960-73	3.2	2.4	.8
1973-79	1.4	.5	.9
1979-86	3.5	2.6	.9

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Table 8. Output per hour and multifactor productivity in selected manufacturing industry sectors, selected periods

(Average annual rates)

Industry	1960-83		1960-73		1973-83	
	Output per hour	Multifactor productivity	Output per hour	Multifactor productivity	Output per hour	Multifactor productivity
Total manufacturing	2.4	1.1	2.9	1.7	1.6	.3
Food and kindred products	2.8	.6	2.6	.8	3.1	.5
Tobacco manufactures	1.8	-0.3	2.4	.8	1.1	-1.7
Textile mill products	4.2	1.6	4.2	1.6	4.2	1.7
Apparel and other textile products	2.5	1.0	2.1	1.1	3.0	.9
Lumber and wood products	2.9	1.5	4.3	3.0	1.1	-0.5
Furniture and fixtures	2.3	.8	2.8	1.0	1.7	.4
Paper and allied products	3.0	.9	3.6	1.4	2.3	.2
Printing and publishing	1.7	.2	2.6	.6	.6	-0.3
Chemicals and allied products	3.1	.8	4.9	1.7	.8	-0.4
Petroleum and coal products	1.9	.2	4.5	1.1	-1.3	-0.9
Rubber and miscellaneous plastics products	2.1	.9	3.2	1.5	.6	.7
Leather and leather products	1.9	.5	2.3	.7	1.3	.2
Stone, clay, and glass products	1.4	.1	2.2	.7	.5	-0.7
Primary metal industries	1.1	-0.6	2.6	.6	-0.7	-2.1
Fabricated metal products	1.4	.3	1.8	.5	.9	-0.2
Machinery, except electrical	3.4	1.6	3.7	1.8	3.1	1.4
Electrical and electronic equipment	4.2	2.4	4.7	2.8	3.6	2.0
Transportation equipment	2.5	.9	4.1	1.4	.5	.3
Instruments and related products	3.3	1.4	4.1	2.0	2.3	.7
Micellaneous manufacturing	2.1	.2	3.6	1.1	.2	-1.0

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Table 9. Output per hour and multifactor productivity in four industries, 1960-85
(Indexes, 1960 = 100)

Year	Iron and Steel		Motor Vehicles		Tires and Tubes		Footwear	
	Output per hour	Multifactor productivity	Output per hour	Multifactor productivity	Output per hour	Multifactor productivity	Output per hour	Multifactor productivity
1960	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1961	103.9	101.6	101.2	99.5	103.4	101.2	100.7	101.5
1962	106.9	102.2	110.9	108.4	113.7	105.9	101.5	101.8
1963	112.9	106.4	115.7	113.5	122.1	109.5	105.4	102.3
1964	119.1	114.0	116.6	113.1	133.0	115.8	105.1	101.3
1965	123.3	117.3	124.4	117.4	135.5	114.8	104.0	99.1
1966	126.3	117.3	124.4	114.8	138.0	113.2	105.8	99.8
1967	122.5	108.0	124.8	109.7	137.7	107.6	103.6	91.0
1968	124.9	108.6	135.5	118.3	147.1	113.5	107.3	93.3
1969	127.7	109.9	132.6	118.9	142.5	109.0	100.4	87.5
1970	125.3	108.1	127.3	110.2	146.1	107.9	108.1	89.3
1971	131.1	109.8	148.0	115.4	156.6	114.5	110.0	88.5
1972	139.3	112.3	151.0	120.2	162.6	116.7	107.3	87.4
1973	150.0	120.9	153.5	124.5	158.0	115.7	106.2	87.0
1974	158.1	128.7	146.5	123.3	154.4	113.3	104.9	84.2
1975	138.7	111.2	157.0	125.5	152.1	108.9	109.2	83.6
1976	144.2	117.2	167.7	131.9	166.5	113.2	109.8	85.6
1977	144.5	116.3	178.3	134.8	167.5	124.7	111.9	86.1
1978	152.0	121.9	177.5	134.9	181.1	129.2	113.9	87.5
1979	154.0	121.4	173.8	133.2	180.2	131.8	111.5	91.7
1980	152.9	119.1	160.1	120.8	171.2	128.8	109.6	85.4
1981	162.0	118.1	164.0	121.7	197.8	138.4	106.3	82.3
1982	141.8	112.1	171.5	122.5	215.7	146.3	118.6	86.4
1983	172.7	133.7	195.0	130.3	228.8	157.0	116.4	85.4
1984	189.7	138.8	205.5	136.3	247.4	163.8	117.4	84.0
1985	203.0	143.7	216.0	141.6	246.7	161.1	117.9	78.7

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Table 10. Output per employee year, output, and employee years in the Federal Government, measured sample, fiscal years 1967-86

(Index, 1967 = 100)

Fiscal year	Output per employee year	Output	Employee years
1967	100.0	100.0	100.0
1968	101.1	103.7	102.6
1969	103.5	107.1	103.4
1970	104.0	107.4	103.3
1971	105.6	108.8	103.0
1972	106.3	109.0	102.5
1973	109.3	110.7	101.3
1974	108.7	110.9	102.0
1975	110.3	112.8	102.2
1976	112.2	113.7	101.3
1977	115.5	115.7	100.1
1978	117.5	118.4	100.8
1979	118.2	119.2	100.9
1980	120.7	122.7	101.6
1981	123.6	124.5	100.7
1982	125.4	126.0	100.4
1983	127.5	129.3	101.4
1984	127.8	132.3	103.6
1985	128.6	135.9	105.6
1986	130.8	139.0	106.3

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Table 11. Output per employee year by functional grouping, and total measured sample, Federal Government, fiscal years 1967-86

(Average annual percent change)

Functional groupings	Output per employee year
Total Federal Sample	1.5
Audit of operations	1.0
Buildings and grounds	3.5
Communications[1]	10.9
Education and training[2]	1.8
Electric power production and distribution	-2.9
Equipment maintenance[2]	1.0
Finance and accounting	4.7
General support services	4.4
Information services	1.1
Legal and judicial activities	.2
Library services	4.6
Loans and grants	3.3
Medical services	.3
Military base services	.4
Natural resources and environmental management	1.5
Personnel investigations	2.6
Personnel management	1.0
Postal service	1.3
Printing and duplication	.3
Procurement	2.7
Records management	3.3
Regulation - compliance and enforcement	2.7
Regulation - rulemaking and licensing	3.5
Social services and benefits	2.3
Specialized manufacturing	3.3
Supply and inventory control	1.3
Traffic management[3]	1.9
Transportation	2.4

[1]Fiscal years 1973-86
[2]Fiscal years 1968-86
[3]Fiscal years 1972-86

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Table 12. Trends in real gross domestic product per employed person, selected countries, 1960-86

(Index, 1960 = 100)

Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom
1960	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1961	102.5	101.5	113.1	105.5	103.2	107.5	102.2
1962	106.0	105.8	119.7	112.6	107.7	114.5	102.8
1963	108.8	108.8	131.1	117.7	110.1	123.0	106.9
1964	112.2	112.1	146.3	124.0	117.3	126.9	110.9
1965	115.8	115.3	151.4	129.5	123.0	134.3	112.4
1966	119.1	118.3	163.9	135.2	132.0	144.7	114.3
1967	119.6	118.4	177.9	141.2	130.9	153.2	118.8
1968	122.0	122.5	196.9	147.7	138.2	163.3	124.3
1969	122.0	125.2	218.9	155.6	146.3	174.5	126.0
1970	121.0	127.2	237.7	162.3	151.9	182.9	129.3
1971	123.8	131.5	246.0	170.3	155.4	186.1	134.7
1972	126.1	135.1	266.1	179.3	162.4	195.5	137.0
1973	128.1	138.7	279.8	186.3	168.9	207.5	144.8
1974	124.9	139.1	277.4	190.7	171.6	212.0	143.0
1975	125.0	140.3	285.6	192.6	173.8	203.2	143.0
1976	126.9	146.1	296.5	201.1	184.8	213.7	149.6
1977	128.1	148.6	308.1	205.6	190.5	215.6	151.0
1978	129.2	150.2	319.8	211.6	194.8	221.1	155.1
1979	128.3	150.0	332.3	218.3	200.2	229.4	156.6
1980	127.5	147.8	343.5	221.7	200.8	235.0	154.7
1981	128.6	149.1	353.8	225.7	202.5	237.1	158.5
1982	126.4	149.2	360.2	231.0	204.6	238.0	161.6
1983	129.5	152.6	365.5	233.6	210.7	238.7	168.4
1984	133.1	158.3	381.6	239.0	216.2	245.7	169.2
1985	134.8	160.5	396.1	244.0	220.4	251.2	173.1
1986	136.0	161.3	402.5	248.5	223.7	256.6	176.6

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Table 13. Relative levels in gross domestic product per employed person,[1] selected countries, 1960-86

(Index, United States = 100)

Year	United States	Canada	Japan	France	Germany	Italy	United Kingdom
1960	100.0	80.1	23.3	46.1	49.2	43.9	54.2
1961	100.0	79.2	25.7	47.5	49.5	46.1	54.1
1962	100.0	79.9	26.3	49.0	49.9	47.5	52.6
1963	100.0	80.0	28.0	49.9	49.7	49.7	53.3
1964	100.0	80.1	30.4	51.0	51.4	49.7	53.6
1965	100.0	79.7	30.4	51.6	52.2	51.0	52.6
1966	100.0	79.5	32.0	52.4	54.5	53.4	52.0
1967	100.0	79.2	34.6	54.5	53.8	56.3	53.8
1968	100.0	80.4	37.6	55.8	55.7	58.8	55.3
1969	100.0	82.2	41.8	58.8	58.9	62.8	56.0
1970	100.0	84.1	45.7	61.9	61.7	66.4	57.9
1971	100.0	85.1	46.3	63.5	61.7	66.1	59.0
1972	100.0	85.8	49.1	65.6	63.3	68.1	58.9
1973	100.0	86.7	50.8	67.1	64.8	71.2	61.3
1974	100.0	89.2	51.7	70.4	67.5	74.6	62.1
1975	100.0	89.9	53.2	71.1	68.4	71.4	62.0
1976	100.0	92.2	54.4	73.1	71.6	74.0	63.9
1977	100.0	92.9	56.0	74.0	73.1	74.0	63.9
1978	100.0	93.1	57.6	75.5	74.1	75.2	65.1
1979	100.0	93.6	60.3	78.5	76.7	78.5	66.2
1980	100.0	92.8	62.7	80.2	77.4	81.0	65.8
1981	100.0	92.8	64.1	81.0	77.5	81.0	66.8
1982	100.0	94.5	66.3	84.3	79.6	82.7	69.3
1983	100.0	94.4	65.7	83.2	80.0	81.0	70.5
1984	100.0	95.2	66.7	82.8	79.9	81.1	68.9
1985	100.0	95.3	68.4	83.5	80.4	81.9	69.6
1986	100.0	95.0	68.9	84.3	80.9	82.9	70.4

[1]Output based on price weights of the Organization for Economic Cooperation and Development.

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Table 14. Trends in output per employee hour in manufacturing, selected countries, 1960-86

(Index, 1960 = 100)

Year	United States	Canada	Japan	France	Germany	United Kingdom
1960	100.0	100.0	100.0	100.0	100.0	100.0
1961	102.8	105.4	113.3	105.8	104.5	100.1
1962	107.2	112.8	118.1	112.2	111.7	102.3
1963	114.5	116.9	127.7	117.6	116.4	107.7
1964	119.9	122.4	144.7	126.4	126.1	114.9
1965	123.1	128.2	150.8	135.1	133.8	118.4
1966	124.4	131.1	166.1	145.6	139.5	122.3
1967	124.3	133.6	190.5	154.6	149.0	128.0
1968	128.3	143.3	214.5	171.0	160.8	137.4
1969	129.8	151.0	247.8	180.6	171.3	140.7
1970	129.8	149.1	279.3	190.9	176.4	143.8
1971	137.1	159.6	295.7	201.4	183.5	150.5
1972	143.1	167.4	324.5	213.3	195.4	159.0
1973	150.1	178.1	357.9	225.7	208.2	170.7
1974	145.7	180.9	372.6	234.1	216.5	173.5
1975	149.3	174.7	377.9	242.9	223.4	169.6
1976	156.1	186.9	406.3	260.8	239.1	177.2
1977	160.7	197.2	431.0	274.4	247.8	178.8
1978	163.1	199.4	465.4	287.1	255.6	181.5
1979	163.0	201.3	494.6	301.1	268.1	183.2
1980	163.0	193.6	528.6	303.5	269.1	182.0
1981	166.6	203.0	548.3	312.7	275.0	191.3
1982	170.2	193.8	581.6	334.8	279.0	202.9
1983	180.0	207.9	613.1	343.5	295.4	220.2
1984	189.9	230.4	657.2	354.1	306.4	232.1
1985	199.6	236.1	705.3	365.1	319.0	240.9
1986	207.0	235.5	724.9	372.1	323.7	249.4

Table 15. Output per employee hour in manufacturing, selected countries, selected periods, 1960-86

(Average annual rate of change, in percent)

Country	Manufacturing output per hour			
	1960-86	1960-73	1973-79	1979-86
United States	2.8	3.2	1.4	3.5
Canada	3.1	4.5	2.1	1.4
Japan	7.9	10.3	5.5	5.6
France	5.3	6.5	5.0	3.6
Germany	4.6	5.8	4.3	2.8
United Kingdom	3.6	4.3	1.1	4.4

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Table 16. Output per hour of all persons, unit labor costs, and compensation per hour in the business economy, 1960-86

(Percent change from previous year)

Year	Output per hour of all persons	Unit labor costs	Compensation per hour
1960	1.7	2.6	4.3
1961	3.5	.3	3.9
1962	3.6	1.1	4.7
1963	4.0	-0.2	3.8
1964	4.3	.8	5.2
1965	3.0	.9	3.8
1966	2.8	4.1	6.9
1967	2.7	2.6	5.4
1968	2.7	5.0	7.9
1969	.1	6.9	7.0
1970	.7	6.5	7.3
1971	3.2	3.1	6.4
1972	3.0	3.3	6.4
1973	2.0	6.2	8.3
1974	-2.1	11.9	9.5
1975	2.0	7.6	9.7
1976	2.8	5.9	8.9
1977	1.7	6.0	7.8
1978	.8	7.6	8.5
1979	-1.2	11.1	9.7
1980	-0.3	10.9	10.5
1981	1.4	7.7	9.2
1982	-0.4	8.3	7.8
1983	2.7	1.4	4.2
1984	2.5	1.5	4.1
1985	1.8	2.8	4.7
1986	1.9	2.0	3.9

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Table 17. Composition of price change, business economy, 1960-86
(Percent change)

Year	Implicit price deflator	Point contribution to percent change	
		Unit labor costs	Unit nonlabor payments
1960	1.4	1.7	-0.2
1961	.5	.2	.3
1962	1.9	.7	1.2
1963	.9	-0.1	1.0
1964	1.0	.5	.5
1965	2.3	.5	1.8
1966	3.3	2.6	.8
1967	2.5	1.7	.8
1968	4.6	3.2	1.4
1969	5.1	4.5	.6
1970	4.7	4.3	.5
1971	4.9	2.0	3.0
1972	4.0	2.1	1.9
1973	6.4	4.0	2.4
1974	9.6	7.9	1.8
1975	10.3	4.9	5.5
1976	5.9	3.8	2.1
1977	6.4	3.9	2.5
1978	7.3	4.9	2.4
1979	9.0	7.3	1.8
1980	9.0	7.3	1.8
1981	9.6	5.0	4.6
1982	5.9	5.6	.5
1983	3.3	1.0	2.4
1984	3.3	1.0	2.4
1985	2.7	1.8	.9
1986	2.1	1.3	.8

Table 18. Output per hour of all persons, compensation per hour, unit labor costs, and prices in major sectors, 1979-86
(Average annual percent change)

Sector	Output per hour of all persons	Compensation per hour	Unit labor costs	Prices
Communications	4.0	7.0	2.9	5.7
Farm	7.9	2.0	-5.5	-4.0
Manufacturing	3.5	6.4	2.8	3.3
Transportation	-0.6	5.3	5.9	6.6
Trade	2.0	6.0	3.9	4.3
Electric, gas, and sanitary services	1.3	7.6	6.2	8.9
Mining	1.6	7.1	5.4	5.4

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Table 19. Output per employee hour and compensation per employee hour, selected manufacturing industries, 1972-85

(Average annual percent change)

Industry	Output per employee hour	Compensation per hour	Industry	Output per employee hour	Compensation per hour
Red meat products	3.1	6.7	Folding paperboard boxes	.7	8.3
Poultry dressing and processing	4.1	7.9	Industrial inorganic chemicals	0.0	9.8
Fluid milk	4.9	8.6	Synthetic fibers	4.7	9.7
Preserved fruits and vegetables	1.9	8.8	Pharmaceutical preparations	2.3	9.0
Grain mill products	4.3	9.0	Soaps and detergents	.3	8.7
Bakery products	1.1	8.5	Cosmetics and other toiletries	-0.6	7.1
Sugar	.6	8.4			
Malt beverages	5.6	9.5			
Bottled and canned soft drinks	5.0	8.7	Paints and allied products	2.4	8.5
Total tobacco products	1.5	12.8	Industrial organic chemicals, N.E.C.	1.7	9.2
			Petroleum refining	.1	9.4
Cotton and synthetic broad woven fabrics	3.7	8.5	Tires and inner tubes	3.7	9.4
Hosiery	3.8	7.7	Miscellaneous plastics products	2.1	8.3
Nonwool yarn mills	3.3	8.6			
Sawmills and planing mills, general	2.3	7.9	Footwear	.5	7.5
Millwork	-1.4	8.4	Glass containers	2.3	9.7
			Hydraulic cement	1.8	8.7
Wood kitchen cabinets	1.2	7.0	Structural clay products	1.6	8.6
Veneer and plywood	2.6	8.6	Clay construction products	1.6	8.0
Household furniture	1.3	7.3	Clay refractories	1.8	10.0
Office furniture	2.6	8.7	Concrete products	.4	7.4
Paper, paperboard, and pulp mills	2.7	9.9	Ready-mixed concrete	-0.6	7.0
			Corrugated and solid fiber boxes	2.9	8.4
Paper and plastic bags	.7	8.3	Steel	1.8	7.6

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Table 19. Output per employee hour and compensation per employee hour, selected manufacturing industries, 1972-85 (continued)

(Average annual percent change)

Industry	Output per employee hour	Compensation per hour	Industry	Output per employee hour	Compensation per hour
Gray iron foundries	.6	8.7	Machine tools	-1.3	8.4
Steel foundries	-1.1	8.2	Machine tool accessories	-1.1	7.7
Primary copper, lead, and zinc	5.1	12.1	Pumps and compressors	.9	9.2
Primary aluminum	1.4	10.6	Ball and roller bearings	-1.1	7.8
Copper rolling and drawing	3.0	8.0	Refrigeration and heating equipment	.1	8.6
Aluminum rolling and drawing	1.8	9.4	Transformers	.6	8.4
Metal cans	3.7	9.8	Switchgear and switchboard apparatus	.9	8.4
Hand and edge tools	-0.8	7.8	Motors and generators	.8	8.8
Heating equipment, except electric	1.6	7.0	Major household appliances	2.8	8.4
Fabricated structural metal	0.0	7.3	Electric lamps	2.8	9.6
Metal doors, sash, and trim	.9	8.2	Lighting fixtures	.7	7.9
Metal stamping	.8	8.1	Radio and television receiving sets	8.7	9.7
Valves and pipe fittings	.7	8.7	Semiconductors and related devices	14.1	10.4
Fabricated pipe and fittings	-1.6	8.0	Motor vehicles and equipment	2.4	8.5
Internal combustion engines, N.E.C.	.4	9.5	Instruments to measure electricity	3.3	9.5
Farm and garden machinery	.4	8.5			
Construction machinery and equipment	.2	9.4			
Mining machinery and equipment	-1.0	9.4			
Oilfield machinery and equipment	-1.7	9.2			

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Table 20. Output per employee hour and prices, selected industries, 1965-85
(Average annual percent change)

Industry	Output per employee hour	Prices	Industry	Output per employee hour	Prices
Iron mining, usable ore	2.0	7.0	Pharmaceutical preparations	3.4	5.1
Bituminous coal and lignite mining	-0.4	10.9			
Red meat products[1]	2.9	5.8	Soaps and detergents	1.8	6.2
Poultry dressing and processing	3.2	3.9	Cosmetics and other toiletries	1.7	5.3
Fluid milk	5.0	5.0	Paints and allied products	2.4	6.4
			Industrial organic chemicals, N.E.C.	3.8	8.0
Preserved fruits and vegetables	2.5	6.6			
Grain mill products	3.5	5.1	Footwear	.4	6.3
Bakery products	1.5	7.1	Glass containers	2.1	8.1
Sugar	1.6	7.4	Hydraulic cement	1.9	8.3
Malt beverages	6.5	4.5	Structural clay products	2.5	7.0
			Concrete products	1.2	7.0
Bottled and canned soft drinks	4.1	7.5	Steel	1.8	8.4
Total tobacco products	1.5	3.6	Gray iron foundries	1.4	8.2
Hosiery	5.8	1.9	Steel foundries	.1	8.2
Nonwool yarn mills	2.5	5.1	Primary copper	3.8	3.7
Sawmills and planing mills, general	2.1	7.9	Primary aluminum	1.5	7.9
			Copper rolling and drawing	1.9	4.6
Millwork	-0.2	8.0			
Veneer and plywood	3.2	6.0	Aluminum rolling and drawing	3.6	7.3
Household furniture	2.0	4.9	Metal cans	3.0	7.8
Office furniture	1.9	6.9	Hand and edge tools	0.0	8.1
Paper, paperboard, and pulp mills	3.2	.4			
			Fabricated structural metal	.3	7.5
Paper and plastic bags	1.9	7.1	Metal doors, sash, and trim[1]	1.1	7.6
Folding paperboard boxes	1.8	6.3	Metal stampings	1.0	7.1
Corrugated and solid fiber boxes	3.7	6.2	Valves and pipe fittings	.6	7.8
Synthetic fibers	6.4	3.4			

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Table 20. Output per employee hour and prices, selected industries, 1965-85 (continued)
(Average annual percent change)

Industry	Output per employee hour	Prices
Fabricated pipe and fittings	-0.6	8.8
Internal combustion engines, N.E.C.[1]	1.6	8.7
Farm and garden machinery	1.7	7.0
Construction machinery and equipment	1.1	8.3
Oilfield machinery and equipment[1]	.3	10.1
Machine tools	-0.5	8.5
Machine tool accessories	.6	6.7
Pumps and compressors	1.4	7.2
Ball and roller bearings	.3	7.8
Petroleum refining	1.7	13.6
Tires and inner tubes	2.8	6.0
Transformers	1.5	5.6
Switchgear and switchboard apparatus	1.8	6.6
Motors and generators	1.0	7.8
Major household appliances	3.6	4.9
Electric lamps	1.9	7.7
Lighting fixtures	1.6	6.4
Radio and television receiving sets	6.6	-0.7
Motor vehicles and equipment	2.6	6.4
Railroad transportation, revenue traffic	3.9	9.5
Class I bus carriers	-1.3	9.0
Air transportation	4.3	8.8
Telephone communications	5.9	3.4
Electric utilities	2.2	7.8
Gas utilities	-0.2	11.1
Department stores[1]	2.7	4.8
Retail food stores	-0.4	6.8
Franchised new car dealers	1.5	5.6
Gasoline service stations	3.8	8.7
Apparel and accessory stores[1]	3.6	3.4
Men's and boys' clothing stores[1]	2.4	3.6
Women ready-to-wear stores[1]	5.5	2.7
Family clothing stores[1]	3.9	3.6
Shoe stores[1]	1.3	4.5
Refrigeration and heating equipment[1]	1.1	5.4
Appliance, radio, television and music stores[1]	4.8	3.2
Furniture, home furnishings and equipment stores[1]	3.1	4.2
Furniture and home furnishings stores[1]	2.0	4.9
Eating and drinking places	-0.1	7.6
Drug and proprietary stores	2.8	5.4
Hotels, motels, and tourist courts	1.3	7.8
Laundry and cleaning services	-0.1	7.8

[1]1967-85

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Table 21. Output per employee hour and employment, selected industries, 1973-86

(Average annual percent change)

Industry	Productivity 1973-86	Hours 1973-86	Industry	Productivity 1973-86	Hours 1973-86
Iron mining, usable ore	3.4	-8.8	Corrugated and solid fiber boxes	2.6	-0.2
Copper mining, recoverable metal	7.4	-8.9	Industrial inorganic chemicals[1]	0.0	-0.4
Bituminous coal and lignite mining	2.9	.4	Synthetic fibers	4.7	-4.3
Nonmetallic minerals, except fuels	.8	-1.1	Pharmaceutical preparations	2.2	-0.1
Red meat products	3.2	-1.0	Soaps and detergents[1]	.1	1.0
Poultry dressing and processing[1]	4.5	2.2	Cosmetics and other toiletries[1]	-1.0	2.6
Fluid milk[1]	5.0	-4.3	Paints and allied products	2.5	-1.6
Preserved fruits and vegetables[1]	1.7	-0.5	Industrial organic chemicals N.E.C.[1]	1.4	-0.2
Grain mill products[1]	4.6	-1.3	Petroleum refining	.5	-0.7
Bakery products[1]	1.2	1.2	Tires and inner tubes	4.2	-4.9
Sugar	.7	-3.1	Miscellaneous plastics products[1]	2.1	3.5
Malt beverages	4.9	-1.9	Footwear	.6	-5.3
Bottled and canned soft drinks	5.0	0.0	Glass containers	2.5	-3.7
Total tobacco products	1.6	-2.4	Hydraulic cement	2.5	-3.0
Cotton and synthetic broad woven fabrics	4.1	-3.6	Structural clay products	1.7	-3.5
Hosiery	3.1	.5	Concrete products[1]	.3	-1.7
Nonwool yarn mills	3.4	-2.3	Steel	2.3	-6.0
Sawmills and planing mills, general	3.3	-2.2	Gray iron foundries	.5	-5.0
Millwork[1]	-1.2	1.1	Steel foundries	-1.3	-4.1
Wood kitchen cabinets[1]	1.2	3.9	Primary copper, lead, and zinc	6.2	-10.0
Veneer and plywood[1]	2.8	-2.1	Primary aluminum	1.8	-3.1
Household furniture	1.4	-1.1	Copper rolling and drawing	3.4	-4.7
Office furniture	2.7	4.7	Aluminum rolling and drawing	1.9	-0.9
Paper, paperboard, and pulp mills	2.8	-0.9	Metal cans	3.6	-3.1
Paper and plastic bags	.5	.2	Hand and edge tools[1]	-0.8	-0.5
Folding paperboard boxes	.5	.3	Heating equipment, except electric[1]	1.7	-1.7

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Table 21. Output per employee hour and employment, selected industries, 1973-86 (continued)

(Average annual percent change)

Industry	Productivity 1973-86	Hours 1973-86	Industry	Productivity 1973-86	Hours 1973-86
Fabricated structural metal[1]	.3	-0.7	Instruments to measure electricity[1]	3.3	4.3
Metal doors, sash, and trim[1]	1.1	1.1	Railroad transportation, revenue traffic	5.1	-4.8
Metal stampings[1]	.9	-0.4	Class I bus carriers[1]	-1.2	-1.8
Valves and pipe fittings[1]	.8	0.0	Intercity trucking[1]	.4	-0.9
Fabricated pipe and fittings[1]	-1.7	2.6	Air transportation	3.9	1.5
Internal combustion engines, N.E.C.[1]	.2	-0.9	Petroleum pipelines	.4	1.1
Farm and garden machinery[1]	.2	-4.5	Telephone communications	6.0	.2
Construction machinery and equipment	.3	-5.4	Electric utilities	.2	2.6
Mining machinery and equipment[1]	-1.2	-4.4	Gas utilities	-2.3	.6
Oilfield machinery and equipment	-2.5	1.4	Hardware stores	1.5	.7
Machine tools	-1.4	-4.1	Department stores	3.1	.1
Machine tools and accessories[1]	-1.3	-0.3	Retail food stores	-0.9	1.9
Pumps and compressors	.8	-0.5	Franchised new car dealers	1.3	-0.1
Ball and roller bearings	-1.1	-2.0	Gasoline service stations	3.1	-3.6
Refrigeration and heating equipment[1]	.3	.3	Apparel and accessory stores	4.0	1.6
Transformers	.7	-1.1	Furniture, home furnishings & equipment stores	3.2	1.6
Switchgear and switchboard apparatus	1.3	-1.7	Eating and drinking places	-0.6	3.4
Motors and generators[1]	.9	-1.7	Drug and proprietary stores	.6	.4
Major household appliances	3.1	-1.4	Liquor stores	.6	-0.5
Electric lamps	2.9	-3.3	Commercial banking[1]	.9	3.1
Lighting fixtures[1]	.7	.3	Hotels, motels, and tourist courts	.3	3.5
Radio and television receiving sets	9.6	-5.2	Laundry and cleaning services	-1.2	-0.8
Semiconductors and related devices	12.8	6.9	Beauty and barber shops	.4	.4
Motor vehicles and equipment	2.7	-0.9	Automotive repair shops	-1.3	4.3

[1] 1973-85

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Table 22. Output and employment in selected industries with similar productivity growth, 1960-85

(Average annual rates of change)

Industry	Output per employee hour	Output	Employee hours
Gas utilities	3.3	5.6	2.2
Drug and proprietary stores	3.5	3.4	-0.1
Pulp and paper mills	3.5	2.8	-0.7
Machine tools	.1	-1.2	-1.3
Eating and drinking places	.3	3.2	2.8
Laundry and drycleaning	.4	-2.7	-3.0
Saw mills and planing mills	2.2	.6	-1.6
Glass containers	2.2	1.7	-0.5
Nonwool yarn mills	2.4	3.3	.9

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Table 23. Output per hour of all persons and real compensation per hour in the business economy, 1950-86

(Index, 1950 = 100)

Year	Output per hour of all persons	Real compensation per hour
1950	100.0	100.0
1951	104.0	101.7
1952	107.3	105.7
1953	111.2	112.0
1954	112.9	115.1
1955	116.3	118.4
1956	117.9	124.5
1957	121.0	128.2
1958	124.6	130.5
1959	128.7	135.1
1960	130.9	138.7
1961	135.5	142.5
1962	140.3	147.5
1963	145.9	151.2
1964	152.2	157.0
1965	156.7	160.4
1966	161.0	166.7
1967	165.3	170.8
1968	169.8	176.8
1969	169.9	179.5
1970	171.1	181.8
1971	176.6	185.5
1972	182.0	191.1
1973	185.6	194.7
1974	181.6	192.2
1975	185.2	193.3
1976	190.3	198.9
1977	193.5	201.4
1978	195.1	203.1
1979	192.7	200.2
1980	192.1	194.9
1981	194.8	192.8
1982	194.0	195.9
1983	199.3	197.8
1984	204.3	197.4
1985	208.0	199.6
1986	211.9	203.5

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Table 24. Gross domestic product per capita and average weekly hours, in the business economy, 1950-86
(Index, 1950 = 100)

Year	GDP per capita	Average weekly hours
1950	100.0	100.0
1951	108.4	100.0
1952	110.7	99.5
1953	113.3	99.0
1954	109.8	98.1
1955	113.8	98.7
1956	114.1	98.0
1957	113.8	96.7
1958	111.2	95.9
1959	115.8	96.6
1960	116.4	96.2
1961	117.4	95.8
1962	121.7	96.0
1963	124.9	96.0
1964	129.7	95.8
1965	135.5	96.0
1966	141.8	95.5
1967	144.3	94.2
1968	148.8	93.8
1969	151.0	93.4
1970	148.8	92.0
1971	150.9	91.6
1972	156.6	91.6
1973	162.7	91.4
1974	160.2	90.3
1975	157.0	89.4
1976	162.9	89.3
1977	168.7	89.2
1978	175.6	88.9
1979	177.2	88.4
1980	174.8	87.5
1981	176.5	87.2
1982	170.3	86.3
1983	175.0	86.7
1984	185.5	87.2
1985	189.8	86.8
1986	194.0	86.5

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Table 25. Gross nonresidential capital formation per employed person, selected countries, averages for periods, 1970-85 and 1979-85

(Index, United States = 100 each period)

Country	1970-85	1979-85
Canada	103.5	110.1
Japan	85.8	94.2
France	82.6	86.4
Germany	87.8	90.8
Italy	63.1	63.1
United Kingdom	58.2	58.8

Note: Capital formation converted to U.S. dollars using purchasing-power-parity exchange rates for capital investment.

Table 26. Gross fixed capital formation per employed person, selected countries, 1970-79 and 1979-85

(Average annual rates)

Country	1970-79	1979-85
United States	0.6	1.7
Canada	2.0	.3
Japan	3.0	2.7
France	2.2	1.1
Germany	1.4	.3
Italy	.3	1.5
United Kingdom	1.0	2.0

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Table 27. Expenditures for research and development as a percent of gross national product[1], all R&D and nondefense R&D, selected countries, 1961-86

Year	United States	France	Germany	Japan	United Kingdom
All R&D expenditures					
1961	2.7	1.4	NA	1.4	2.5
1962	2.7	1.5	1.2	1.5	NA
1963	2.8	1.6	1.4	1.4	NA
1964	2.9	1.8	1.6	1.5	2.3
1965	2.8	2.0	1.7	1.5	NA
1966	2.8	2.1	1.8	1.5	2.3
1967	2.8	2.1	2.0	1.5	2.3
1968	2.8	2.1	2.0	1.6	2.3
1969	2.7	1.9	1.8	1.6	2.3
1970	2.6	1.9	2.1	1.9	NA
1971	2.4	1.9	2.2	1.9	NA
1972	2.3	1.9	2.2	1.9	2.1
1973	2.3	1.8	2.1	1.9	NA
1974	2.2	1.8	2.1	2.0	NA
1975	2.2	1.8	2.2	2.0	2.2
1976	2.2	1.8	2.2	1.9	NA
1977	2.1	1.8	2.1	1.9	NA
1978	2.1	1.8	2.2	2.0	2.2
1979	2.2	1.8	2.4	2.1	NA
1980	2.3	1.8	2.4	2.2	NA
1981	2.4	2.0	2.4	2.4	2.4
1982	2.5	2.1	2.5	2.5	NA
1983	2.6	2.2	2.5	2.6	2.2
1984[2]	2.6	2.2	2.5	2.6	NA
1985[2]	2.7	2.3	2.7	2.8	2.2
1986[2]	2.8	2.4	2.7	NA	NA
Nondefense R&D expenditures					
1971	1.6	1.5	2.0	1.8	NA
1972	1.6	1.5	2.1	1.8	1.6
1973	1.6	1.4	1.9	1.9	NA
1974	1.6	1.4	2.0	2.0	NA
1975	1.6	1.5	2.1	1.9	1.6
1976	1.6	1.4	2.0	1.9	NA
1977	1.6	1.4	2.0	1.9	NA
1978	1.6	1.4	2.1	2.0	1.6
1979	1.7	1.4	2.3	2.1	NA
1980	1.8	1.4	2.3	2.2	NA
1981	1.8	1.5	2.3	2.4	1.7
1982	1.9	1.6	2.4	2.5	NA
1983	1.9	1.7	2.4	2.6	1.5
1984[2]	1.8	1.8	2.4	2.6	NA
1985[2]	1.9	1.8	2.5	2.8	1.5
1986[2]	1.9	1.9	2.6	NA	NA

NA = Not Available

[1]For France, as a percent of gross domestic product.

[2]Preliminary or estimates.

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Table 28. Scientists and engineers engaged in research and development, per 10,000 labor force, selected countries and years

Country	1976	1980	1984	1986
United States	54.8	60.0	65.1	64.0
France	29.9	32.4	41.2	NA
Germany	39.2	46.5[2]	49.1	NA
Japan	48.4	53.6	62.4	63.2[3]
United Kingdom	31.1[1]	46.5[2]	34.2	32.8[3]

[1]1975
[2]1981
[3]1985

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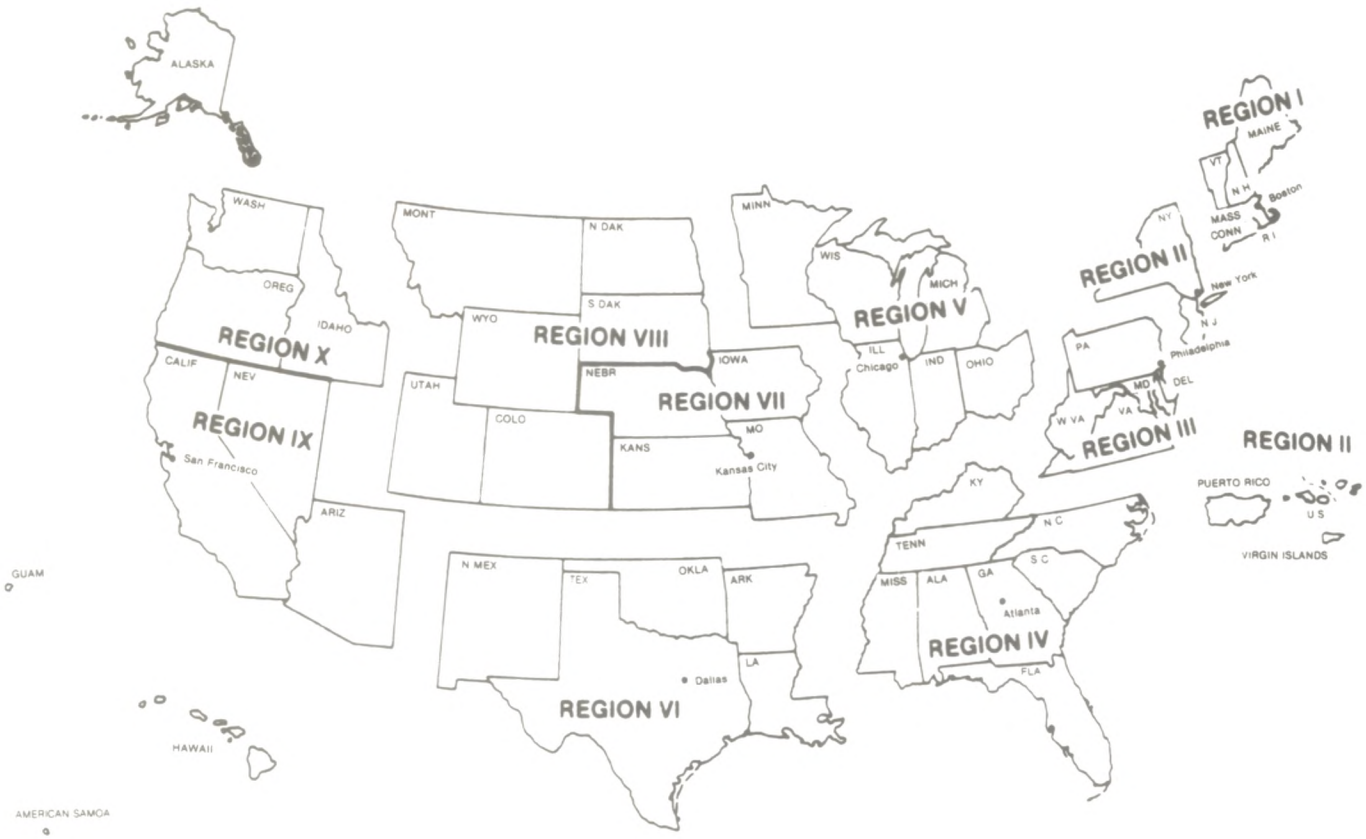

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