The outlook for industry output and employment through 1990

The future looks bright for service,
durable goods, and high-technology industries;
projections assume lower unemployment and
taxes, higher investment and productivity,
and continued oil scarcity

VALERIE A. PERSONICK

The structure of employment in the United States has undergone considerable change in recent decades. Although employment is growing in virtually all sectors of the economy, growth has been much more rapid in service-producing industries than in goods-producing industries. This trend is projected to continue under the economic conditions assumed by the Bureau of Labor Statistics in its revised projections for the next decade, although at a different pace.

Three alternative scenarios for industry output and employment growth were prepared. The low-trend version assumes a decline in the rate of expansion of the labor force, continued high inflation, moderate productivity gains, and modest increases in real output and employment. In high-trend version I, the economy is buoyed by larger labor force growth, much lower unemployment rates, higher production, dampening of price increases, and greater improvements in productivity. The third alternative, high-trend II, is characterized by the rapid output growth of high-trend I but assumes the same labor force as the low-trend version. Productivity gains are quite substantial in this alternative.

Summary of employment trends

Between 1959 and 1969, total employment in the United States rose by 2.0 percent a year. The most rapid increase was posted by the government sector, which grew at an average annual rate of 4.0 percent. Expansion of public sector employment during the 1960's reflected strong demand for teachers and other educational personnel as the baby-boom generation entered school, effects of the Vietnam war buildup, and increases in government services resulting from "Great Society" and other programs. Job growth in miscellaneous service industries was also stronger than for the economy as a whole, while manufacturing, the largest sector in 1959, had a growth rate just about equal to the all-industries average.

During the 1970's, job growth accelerated in the sectors defined as service-producing but slowed in manufacturing and government. Between 1969 and 1979, employment rose 4.0 percent annually in other (or miscellaneous) services, 3.6 percent in finance, insurance, and real estate, and 3.0 percent in trade, but only 0.5 percent in manufacturing and 1.1 percent in government. By the end of the decade, wholesale and retail trade had replaced manufacturing as the largest employment sector. The fast-growing miscellaneous services sector ranked third, having overtaken government. Thus, while almost 1 out of every 4 jobs was in a manufacturing industry in 1959, by 1979 this sector accounted for only 1 out of every 5 jobs. In contrast, jobs in other services represented less than 1 of 7 in 1959, but by 1979 had expanded to almost 1 of 5.

During the 1980's, these trends are expected to continue under the conditions assumed by BLS for the 1990 economy. Other services is projected to continue to be the fastest-growing sector, accounting for more jobs than manufacturing by 1985. The employment shares of trade, mining, and finance, insurance, and real estate are

Valerie A. Personick is an economist in the Office of Economic Growth and Employment Projections, Bureau of Labor Statistics.

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also expected to rise over the next decade, while manufacturing, agriculture, transportation, communications, and public utilities, although posting gains during the 1980's, are projected to represent smaller portions of all jobs.

Under the low-trend assumptions, total employment will rise from 104.1 million in 1979 to 122.0 million by 1990, a net increase of 17.9 million jobs. In the high-trend high-employment model (version I), 26.5 million new jobs will be added to the 1979 level, for total employment of 130.7 million in 1990. In the high-trend low-employment model (version II), employment would reach 124.0 million by 1990.

The rates of job increase between 1979 and 1990 in the low-trend and high-trend II versions (1.4 and 1.6 percent a year, respectively) represent a slowdown over the previous two decades, while the high-trend I rate of 2.1 percent represents a somewhat faster pace.

Characteristics of the 1990 economy

Labor force. The civilian labor force is expected to grow 1.6 percent a year between 1979 and 1990 in the low-trend and high-trend II models, and 2.0 percent a year in the high-trend I model. Both rates are considerably smaller than the 2.7 percent average annual rate of expansion posted during 1975-79. The slowdown should occur as the last of the baby-boom generation enter the labor force.

Under both labor force scenarios, two-thirds of the growth is provided by women. The first assumes that the proportion of women age 20 to 44 in the labor force will rise at an increasing rate until 1983; participation rates of men in most age groups are expected to decline, although not as fast as they did during the 1970's. The second scenario assumes even faster growth for women's participation rates, and a reversal of the decline in men's rates:

			Projected			
			Low labor force scenario		High labor force scenario	
	Actual					
	1975	1979	1985	1990	1985	1990
Labor force						
(in millions)	92.6	102.9	115.0	122.4	118.3	128.1
Men	55.6	59.5	63.6	65.9	64.8	68.2
Women	37.0	43.4	51.4	56.5	53.4	59.9
Participation rate . .	61.2	63.7	66.5	67.9	68.4	71.1
Men	77.9	77.9	77.7	77.2	79.2	79.9
Women	46.3	51.0	56.5	59.6	58.7	63.2

Unemployment rate. Somewhat offsetting the effects of slower labor force growth on job creation are assumptions about unemployment. The unemployment rate is assumed to decline following the 1980 recession and then level off within a range of possible full employment levels. In the low-trend forecast, the rate is assumed to

fall from 7.1 percent in 1980 to 7.0 percent by 1985 and 6.0 percent by 1990. The more optimistic high-trend assumptions are for a 5.5-percent unemployment rate in 1985 and 4.0 percent in 1990 in version I, and 6.0 percent in 1985 and 4.5 percent in 1990 in version II.

Gross national product. Gross national product (GNP) is projected to expand 2.4 percent annually between 1979 and 1990 in the low-trend version, and 3.8 percent in the high-trend versions. The low-trend estimate roughly corresponds to the experience of the 1973–79 period, when real GNP increased at an average rate of 2.8 percent a year. Assumptions underlying the high-trend projections more closely resemble the growth path of an earlier period, 1955–68, during which the economy was expanding at a 3.7-percent annual pace.

Taxes. In all cases, reductions in both personal income taxes and the effective corporate tax rate are assumed to take place throughout the decade. The high-growth alternatives, in particular, incorporate an assumption of a vigorously pursued policy of investment incentives.

Productivity. The productivity slowdown which characterized the 1970's is assumed to at least stabilize during the 1980's, as some of the contributory factors are minimized or even reversed. The rate of productivity growth in the private sector declined from 3.0 percent a year during 1955–68 to 2.3 percent between 1968 and 1973 and 0.9 percent between 1973 and 1980. Among the reasons cited for this drop are an influx of inexperienced labor force entrants, energy price shocks, investment in environmental protection and energy conservation rather than in production, and less per-employee capital accumulation in general. In the coming decade, however, the baby-boom generation will be in the prime working age groups, creating a proportionately more experienced labor force. Investment in capital goods is projected to be stimulated by specific government policies, and businesses are expected to become more adept at responding to changes in energy resources. As a result, annual labor productivity growth in the private sector is projected to be 0.9 percent during 1980–85 and 1.9 percent during 1985–90 in the low-trend forecast, 1.4 percent and 2.6 percent in the high-trend I version, and 2.2 percent and 3.1 percent in the high-trend II model.

Energy assumptions

Higher prices and uncertain supply for oil and natural gas, both domestic and foreign, have begun to force both conservation and a shift to other energy sources. During the 1980's, these trends are projected to intensify. Domestic production of crude oil and natural gas and refined petroleum products is expected to remain virtually unchanged or decline slightly throughout the

decade, while oil imports are assumed to be cut back drastically. In 1977, imports of crude oil accounted for almost one-third of total U.S. supply. That ratio has begun to turn down somewhat, and is expected to continue to decline to 21.5 percent by 1990 in the low-trend version, or to between 24.2 and 24.5 percent in the high-trend models.

To the degree possible, the energy assumptions are based on the "1979 Annual Report to the Congress" of the U.S. Department of Energy.[1] (See table 1.) The mid-price case of the department was chosen as the basis for the BLS projections. This case assumes that crude oil nominal prices will rise from $31.37 a barrel in 1979 to $51.14 in 1985, and to $81.33 in 1990. The department's projected rates of growth for domestic output and imports under these price conditions were applied to BLS data to derive the 1985 and 1990 levels of domestic production of various types of energy and the level of oil imports.

Coal output is projected to boom as electric utilities and other industrial users substitute it for scarcer, more expensive oil in their production processes. This return to coal as an important energy source has already had an impact on the industry—coal production increased 20.3 percent in 1979 and 8.3 percent in 1980; employment jumped 25.6 percent in 1979 to a 25-year high of 265,000 jobs and held close to that level in 1980. Coal output in the low-trend projection is estimated to sustain an 8.1 percent yearly growth, at least through 1985, after which the rate is expected to taper to 3.6 percent annually during 1985–90. In the high-trend versions, coal production will increase 9.1 to 9.4 percent a year during 1979–85, and 4.5 to 4.7 percent annually thereafter.

The vigorous rates of growth projected for coal production result not only from the assumption of strong domestic demand, but from substantial foreign demand as well. Exports of coal are expected to expand 5.7 percent annually between 1977 and 1990 in the low-trend

version, and 9.9 to 10.8 percent a year in the high-trend versions.

Consumption of electricity will rise during the 1980's as an alternative energy source for both home heating and industrial production. Output is projected to grow 3.3 percent a year between 1979 and 1990 in the low-trend version, and 4.4 percent a year in both high-trend scenarios. Coal is expected to be an increasingly important input in the production of electricity, while nuclear power sources are assumed to expand only slightly over the next decade and account for a very small fraction of total electricity production.

Final demand trends

Personal consumption dominant. Personal consumption expenditures accounted for nearly two-thirds of total gross national product in 1979, and while these outlays are projected to grow somewhat more slowly than total GNP over the next decade, they will still be by far its largest component.

Among consumption categories, expenditures for nondurable items, such as food and household supplies, are expected to continue to grow more slowly than outlays for durable goods and services. This long-term trend reflects the tendency of consumers to spend less of their budget on necessary staples and shift more discretionary income to higher-priced durable goods or to recreation and other services as disposable incomes rise.

Food and tobacco, which together accounted for almost 29 percent of the personal consumption budget in 1955, are projected to represent only 17 to 19 percent in 1990. Tobacco expenditures, in particular, are expected to have the second-fastest rate of decline of all personal consumption categories. (The most rapid drop is projected for gasoline and oil purchases.)

One of the fastest-growing components of personal expenditures projected is medical care services. This item accounted for 8.3 percent of personal consumption expenditures in 1972 and 8.7 percent in 1979, but is expected to represent more than 10 percent of such consumption in 1990. One of the main causes for rapid projected growth of real medical care expenditures will be an aging population. In 1979, the number of persons age 65 or older was 24.7 million, or 11.2 percent of the total population. In 1990, 29.8 million people, or 12.2 percent of the total, will be in this age group.[2]

Other categories of personal consumption expenditures projected to rise rapidly include amusements and recreation services, and airline transportation. Expenditures for recreation have been steadily growing as a share of all personal consumption expenditures, from about 5.7 percent in 1955 to 6.3 percent in 1968 and 7.9 percent in 1979. In 1990, they are projected to account for between 8.7 and 9.7 percent of all personal consumption expenditures. Airline transportation is

Table 1. U.S. energy supply by source, actual and projected, selected years, 1965–90

Item	Actual				Projected	
	1965	1973	1978	1979	1985	1990
Total domestic energy supply:						
Quadrillion BTU per year	53.7	75.0	78.4	79.3	81.6	89.1
Coal:						
Quadrillion BTU per year	13.4	14.4	15.0	17.4	25.0	29.3
Percent of total supply	25.0	19.2	19.1	21.9	30.6	32.9
Domestic oil and gas:						
Quadrillion BTU per year	34.2	44.3	40.2	39.6	36.9	38.3
Percent of total supply	63.7	59.1	51.3	49.9	45.2	43.0
Net oil and gas imports:						
Quadrillion BTU per year	5.4	14.0	17.6	17.7	12.9	12.5
Percent of total supply	10.1	18.7	22.4	22.3	15.8	14.0
Nuclear:						
Quadrillion BTU per year	...	.9	3.0	2.8	5.6	8.2
Percent of total supply	...	1.2	3.8	3.5	6.9	9.2

SOURCE: U.S. Department of Energy, Energy Information Administration.

expected to be the second-fastest growing component.

Outlays for consumer durables are projected to increase as a percentage of total personal consumption expenditures, particularly for household furnishings; home electronic equipment such as radios, televisions, video recorders, and personal computers; and motor vehicles. Under the low-trend version, most of the gains will occur in the second half of the decade, while the high-trend models assume the recovery from the 1980 recession will be swifter and purchases of consumer durables will rise rapidly throughout the decade.

Investment growth the strongest. Investment, currently about 15 percent of final demand, is projected to show significantly more growth than the 0.6-percent annual rate posted between 1973 and 1979, especially in the second half of the next decade. The largest category of investment, producers' durable equipment, rises 5.0 percent annually in the low-trend version during the latter years of the 1980's, in line with the long-term historical rate of growth; the high-trend versions predict an 8.1-percent annual expansion over the same period. The rapid gain in the high-trend models reflects the better business conditions and strong tax incentive programs assumed in these versions.

A list of the specific types of equipment for which demand is projected to be greatest reflects the full fruition of the "age of electronics." Leading the advance will be purchases of computers and peripheral equipment. Rapidly growing investment demand is also expected for optical equipment, typewriters and other office equipment, radio and communication equipment, and scientific and controlling instruments. These products are all characterized by or contribute to rapid advances in technology. As older machines or production processes become less efficient or even obsolete, businesses are expected to buy more of these high-technology items in relation to other capital goods to remain competitive.

Equipment for which slow growth in investment demand is expected includes special industry machinery; engines, turbines, and generators; and office furniture.

Business investment in new plants is projected to recover more slowly from the 1980 recession than investment in equipment, due to the longer lead-times required. After 1985, construction of new plants and other business structures is expected to rebound at a rate of growth in line with the long-term, pre-recession rate of 4.7 percent.

Projections of residential investment show a very different pattern than those for other types of investment. This sector was the most severely hit by the 1975 and 1980 recessions—new housing starts plummeted from a decade-high 2.4 million in 1972 to 1.3 million in 1980; expenditures for residential investment declined by 0.9 percent a year during 1973–79. Over the same period,

however, the rate of new household formation was accelerating, reflecting both the maturing of the baby-boom generation and a trend toward more single-person households. The demand for homeownership that was pent up during the recession years is projected to spur residential investment expenditures during the first half of the 1980's; growth is estimated at 2.2 percent a year between 1979 and 1985 in the low-trend model and 4.5 to 4.8 percent in the high-trend models. After 1985, however, the rate of new household formation is expected to decline, and residential investment growth drops to 1.0 percent annually in the low-trend version and 3.2 to 3.5 percent in the high-trend scenarios.

Foreign trade will grow rapidly. Exports and imports have been rising over time as a share of GNP, reflecting the growing economic interdependence of the United States and the rest of the world. This trend is projected to continue into the next decade in all scenarios. In 1955, exports accounted for 4.7 percent of final demand; by 1979 that share had risen to 9.9 percent, and is expected to climb to between 11.5 and 12.9 percent in 1990. Imports represented 3.6 percent of GNP in 1955, 7.4 percent in 1979, and are projected to account for 9.1 to 9.7 percent in 1990.

A wide variety of products is exported from the United States each year. Chief among them in the past have been food and feed grains, and other agricultural products; motor vehicles and parts; aircraft; chemicals; and construction, mining, and oilfield machinery. These goods are projected to continue to account for a sizable share of exports in the coming years, but they are expected to be joined by computers, electronic components, and coal as important export goods. Plastic products exports are expected to grow much faster than the average for all exports, but not as rapidly as in the past.

As the import share of GNP rises, raw materials purchases are becoming less significant compared to imports of finished capital and consumer goods, and this trend is expected to continue. Imports of crude petroleum are assumed to decline drastically, from 31 percent of the total supply of oil and natural gas in 1977 to between 21.5 and 24.5 percent by 1990.

The largest share of imported merchandise is accounted for by motor vehicles and parts—13.5 percent in 1977. As a percentage of the total value of output of all cars, trucks, buses, vans, and spare parts purchased in the United States, imports grew from less than 2 percent in 1963 to 12.5 percent by 1977 and to 13.8 percent in 1979. Further gains for imported motor vehicles are projected as the domestic auto industry struggles to recover from the devastating 1980 recession. The value of the import share is projected to top 15 percent in 1985 in all three scenarios. After that point, however, it declines somewhat to about 14.4 per-

cent by 1990. The downturn is expected to occur as American cars begin to compete effectively with gas-economizing imports, and more foreign automakers set up factories in the United States.

Motorcycle and bicycle manufacturing is the industry with the largest proportion of imports; it is expected to rank first during the next decade as well, with imports holding an almost steady 65-percent share. Radio and television imports are projected to continue to dominate the output of that industry, rising from 39 percent of total output in 1977 to about 49 percent in 1990 in the low-trend forecast, and to about 46 percent in the high-trend models. Among other industries with large volumes of imports, rising import shares are projected for steel and primary nonferrous metals; steady or declining shares are expected for imports of apparel, leather products (including footwear), electronic components, and paper products.

Government share dipping. Government purchases[3] as a whole are projected to grow somewhat more slowly than total GNP in the coming decade, but wide variation is assumed for different functions within the public sector. For example, emphasis at the Federal level is expected to swing back to national defense. In past years, defense purchases have been declining in real terms as a proportion of GNP. Real outlays for defense dropped 7.3 percent annually between 1968 and 1973 as the Vietnam war drew to a close, and then contracted further, by an average of 0.3 percent each year through 1979. Sharp increases in defense spending are expected for the 1980's, particularly during the first half. Purchases are projected to grow 5.3 to 5.7 percent a year between 1979 and 1985, rising 1.5 to 2.1 percent annually thereafter.

All of the extra real defense expenditures are assumed to be for materiel; the size of the armed forces is projected to remain unchanged at 2.1 million. Among the industries particularly affected by the projected defense buildup are ordnance (which includes tanks), guided missiles, aircraft, ship and boat building and repair, and radio and other communication equipment.

In contrast, the nondefense portion of Federal purchases of goods and services is expected to show no growth over the next decade. As a share of total final demand, Federal nondefense purchases decline from 2.3 percent of GNP in 1979 to 1.9 percent by 1990 in the low-trend version, 1.7 percent in high-trend version I, and 1.5 percent in high-trend version II.

Expenditures for goods and services by State and local governments, which accounted for 12.1 percent of GNP in 1979, will show only minimal growth during the 1980's. Education expenditures are actually projected to decline between 1985 and 1990, as the school- and college-age population shrinks. In the latter year, there will be only about 45.3 million children age 5 to 17 and

25.1 million young adults between 18 and 24, compared with 46.9 million and 29.3 million in 1979.[4]

The only area of State and local spending expected to show any increase is the health field. It is assumed that purchases of goods and services for public health will just about keep pace with the rate of growth of the economy as a whole.

Industry output

The projections of final demand by industry were multiplied by an input-output table to yield projections of the domestic output required by each industry to meet that final demand. The table was based on the 1972 input-output matrix published by the Department of Commerce,[5] with several of the original coefficients modified to reflect 1977 Commerce Department data or other information on recent trends. Among the industries for which special studies or assumptions were made are the metals sectors, textiles, motor vehicles, the service sectors, and the energy industries.

Food production slows. As real incomes rise, purchases of food for home consumption tend to level off. Food purchases are projected to grow only slightly faster than the population, and considerably more slowly than purchases of other commodities. This slowdown will affect almost all of the food industries, and indirectly, the agricultural industries. The only food industries expected to post output gains at least equal to total GNP growth are those producing alcoholic beverages and soft drinks. Domestic output of alcoholic beverages, including beer and wine, is assumed to keep pace with rising incomes, while growth in the soft drink industry will arise from higher levels of exports.

Little growth in other nondurable goods industries. Several other nondurable manufacturing industries, such as tobacco manufacturing, paper products, cleaning preparations, and leather products, are also expected to exhibit only moderate output growth over the next decade. The output of the refined petroleum products industry is assumed to actually decline as demand shrinks dramatically. Partly as a result of the petroleum cutback, output of the nondurable goods sector will decline steadily as a share of total output. (See table 2.)

Although the output of the nondurable goods manufacturing sector is projected to show only moderate overall growth, several component industries are expected to post faster-than-average gains. These include the chemical products, drugs, apparel, and printing and publishing industries.

Growth strong for durable goods. The durable goods portion of manufacturing, unlike nondurables, is projected to grow faster than the all-industries average. Between 1979 and 1990, production is expected to expand

Table 2. Gross product originating[1] by major sector, actual and projected, selected years, 1959-90

Industry sector	Billions of 1972 dollars								
	Actual			Projected					
				1985			1990		
	1959	1969	1979	Low-trend	High-trend I	High-trend II	Low-trend	High-trend I	High-trend II
Total private	629.5	951.9	1,329.1	1,490.3	1,621.7	1,613.7	1,732.7	2,002.9	2,004.7
Agriculture	27.8	29.5	34.9	36.5	42.0	42.1	37.6	47.0	47.3
Nonagriculture	601.7	922.4	1,294.2	1,453.8	1,579.7	1,571.6	1,695.1	1,955.9	1,957.4
Mining	13.3	18.2	21.0	25.2	26.9	26.6	27.1	30.1	29.7
Construction	45.5	55.8	58.3	70.8	75.5	75.5	76.3	87.1	88.0
Manufacturing	171.2	277.2	368.0	411.6	448.4	444.2	474.6	554.3	550.9
Durable goods	100.9	170.3	223.5	251.7	277.9	274.7	294.6	354.7	350.6
Nondurable goods	70.3	106.8	144.5	159.9	170.5	169.5	180.0	199.6	200.3
Transportation, communications, and public utilities	55.4	92.6	141.1	175.7	187.3	186.3	218.7	244.8	244.0
Transportation	29.9	43.4	55.9	63.3	67.9	67.5	73.7	83.8	83.3
Communications	11.5	23.8	50.3	73.0	77.6	77.2	99.5	110.4	109.8
Public utilities	14.0	25.3	34.8	39.4	41.8	41.6	45.5	50.6	50.9
Wholesale and retail trade	115.4	173.6	248.1	271.8	296.1	294.4	316.0	365.0	366.6
Wholesale	42.0	70.6	103.4	114.4	124.2	123.5	132.6	154.8	154.6
Retail	73.4	103.0	144.8	157.4	171.9	170.9	183.4	210.2	212.0
Finance, insurance, and real estate	98.5	152.9	227.5	245.8	266.9	266.9	284.9	324.7	329.4
Other services[2]	83.6	127.2	183.3	205.2	220.1	218.9	239.0	276.9	278.1
Government enterprises	11.8	16.8	21.0	25.1	26.7	26.6	28.5	31.9	32.1
Rest of world and statistical discrepancy	7.9	8.1	25.9	22.6	31.8	32.2	30.0	41.1	38.6

Industry sector	Average annual rate of change							
	Actual		Projected					
			1979-85			1985-90		
	1959-69	1969-79	Low-trend	High-trend I	High-trend II	Low-trend	High-trend I	High-trend II
Total private	4.2	3.4	1.9	3.4	3.3	3.1	4.3	4.4
Agriculture	.6	1.7	.7	3.1	3.2	.6	2.3	2.4
Nonagriculture	4.4	3.4	2.0	3.4	3.3	3.1	4.4	4.5
Mining	3.2	1.4	3.1	4.2	4.0	1.5	2.3	2.2
Construction	2.1	.4	3.3	4.4	4.4	1.5	2.9	3.1
Manufacturing	4.9	2.9	1.9	3.3	3.2	2.9	4.3	4.4
Durable goods	5.4	2.8	2.0	3.7	3.5	3.2	5.0	5.0
Nondurable goods	4.3	3.1	1.7	2.8	2.7	2.4	3.2	3.4
Transportation, communications, and public utilities	5.3	4.3	3.7	4.8	4.7	4.5	5.5	5.5
Transportation	3.8	2.6	2.1	3.3	3.2	3.1	4.3	4.3
Communications	7.5	7.8	6.4	7.5	7.4	6.4	7.3	7.3
Public utilities	6.1	3.2	2.1	3.1	3.0	2.9	3.9	4.1
Wholesale and retail trade	4.2	3.6	1.5	3.0	2.9	3.1	4.3	4.5
Wholesale	5.3	3.9	1.7	3.1	3.0	3.0	4.5	4.6
Retail	3.4	3.5	1.4	2.9	2.8	3.1	4.1	4.4
Finance, insurance, and real estate	4.5	4.1	1.3	2.7	2.7	3.0	4.0	4.3
Other services[2]	4.3	3.7	1.9	3.1	3.0	3.1	4.7	4.9
Government enterprises	3.6	2.3	3.0	4.1	4.0	2.6	3.6	3.8
Rest of world and statistical discrepancy	.3	12.3	-2.2	3.5	3.7	4.8	5.3	3.7

[1] Gross product originating represents the value added by an industry after costs of materials and secondary products made in other industries have been subtracted from total output.

[2] Includes private households.

2.5 percent a year in the low-trend version, compared to 2.4 percent for total private-sector output. Corresponding figures for the high-trend version are 4.2 to 4.3 percent for durable goods versus 3.8 percent for the total. Spurring the rapid increase in durable goods output are the investment, defense, and personal consumption assumptions discussed previously.

Among specific industries in the durable manufacturing sector projected to enjoy substantial output growth are computers; optical equipment; construction, mining, and oilfield machinery; typewriters and other office machines; electronic components; material handling equipment; photographic equipment; and medical and dental instruments.

The computer industry, in fact, is expected to lead all industries studied in terms of output increase. As is well known, output of computer equipment has burgeoned in the past few decades; its 11.6-percent annual rate of increase between 1958 and 1979 surpassed that of all other industries studied. Growth came in response to greater demand for information processing as well as from expanding applications of computer technology to such fields as biotechnology and industrial robots. New uses and markets for computer technology will continue to spur output in the coming decade, at projected rates of increase ranging from 7.6 to 10.1 percent a year.

Services output growth in line with rest of economy. In 1959, service industries accounted for 13.3 percent of total private output; in 1979 the share was 13.8 percent. Service industries are expected to hold this steady share of output throughout the 1980's in all three scenarios.

Within the service sector, the most rapid output growth is projected for the amusement and recreation

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industry and the medical industries. Amusement and recreation services expanded by about 4.1 percent annually between 1958 and 1979. The same pace is expected for the 1979–90 period in the low-trend version, while the high-trend models project average annual growth of 5.4 to 5.6 percent. For the medical industries, an increase in output of doctors' and dentists' services is expected to average 3.3 to 4.7 percent a year between 1979 and 1990; output of hospitals is projected to expand by 3.6 to 5.1 percent; and annual output growth of other medical services is projected to be in the 3.0- to 5.0-percent range. These average rates are all higher than the 2.4- to 3.8-percent range forecast for output of the total private economy during 1979–90.

Construction pattern mixed. In all scenarios, the construction sector grows faster than the all-industries average between 1979 and 1985, but more slowly between 1985 and 1990. In the first half of the decade, rising residential construction is projected to stimulate this industry, but in the second half, a dropoff in new home construction is expected to more than offset the beginnings of a rebound in business construction of factories, offices, and public utilities. Shrinking government outlays for school and road construction are also expected to dampen the output growth of this sector.

Variations expected in other industry sectors. Trade, which represented 18.7 percent of total private-sector output in 1979, is projected to hold about the same share in 1990. Both the wholesale and retail portions will grow at about the same pace, although within retail trade, output of eating and drinking establishments is expected to expand more rapidly than that of other retail businesses.

Output of the mining sector is projected to keep pace with total private output after decades of slower-than-average growth. The rapid increase projected for coal production is expected to outweigh the minimal growth assumed for crude oil production and the absolute declines anticipated in copper mining and nonferrous ores mining. In addition to coal, above-average domestic output gains are also projected for iron ores and chemical mining.

Table 3 summarizes the low-path industry output forecast, showing the most- and least-rapidly growing or declining industries for 1979–90. In the high-trend versions (which assume more purchases of durable equipment), transportation services, amusement and recreation services, electronic components, and chemical mining drop off the list of the 10 fastest-growing industries (but remain within the top 20), and are replaced by those manufacturing radios and televisions, typewriters and other office equipment, material handling equipment, and telephone and telegraph apparatus.

Industry employment

Employment projections at the industry level are derived from the projections of output by industry, but the two are far from strictly parallel. The differences stem from the varying estimates of labor productivity by industry and of expected changes in the average workweek. Thus, although output in the low-trend version is projected to decline in only 4 of the 150 industries studied, employment drops are expected for 33 industries as a result of expected productivity growth in the private economy. In high-trend version I, only two industries experience output declines, but 24 show employment reductions. For the high-trend II case, output drops in two industries but employment falls in 30. (See table 4.)

The projected upturn in productivity is somewhat offset by a continued decline in the average workweek. Average weekly hours in the private sector dropped from 39.9 in 1959 to 38.3 in 1969, and further, to 36.6, in 1979. By 1990, hours paid are projected to average 35.0 a week in the low-trend model and 35.1 in the high-trend models.

While employment is expected to grow more slowly than in the recent past, at least in the low-trend version and high-trend II (which are based on a smaller labor force than high-trend I), the distribution of employment among major industry sectors in all versions will continue to change largely in line with past trends. (See tables 5 and 6.)

Services continue to pace growth. The fastest-growing employment sector is projected to be services, as it has

Table 3. Low-trend projected output changes for selected industries, 1979–90	
Industry	Average annual rate of output change (in percent)
All private industries	2.4
Fastest-growing:	
Computers and peripheral equipment	7.6
Communications, except radio and television	6.4
Coal mining	6.0
Radio and television broadcasting	5.7
Transportation services	4.3
Optical and ophthalmic equipment	4.2
Amusement and recreation services	4.0
Electronic components	3.9
Chemical and fertilizer mineral mining	3.8
Construction, mining, and oilfield machinery	3.8
Slowest-growing or declining:	
Petroleum refining and related products	−1.6
Copper ore mining	−.3
Private households	−.3
Nonferrous metal ores mining	−.3
Logging	.0
Barber and beauty shops	.0
Railroad equipment	.1
Gas utilities	.5
Tobacco manufacturing	.5

Table 4. Employment by industry, actual and projected, selected years, 1959–90

[In thousands]

Industry	Actual			Projected					
				Low-trend		High-trend I		High-trend II	
	1959	1969	1979	1990	Average annual rate of change, 1979–90	1990	Average annual rate of change, 1979–90	1990	Average annual rate of change, 1979–90
Agriculture:									
Dairy and poultry products	1,551	814	511	354	−3.3	395	−2.3	411	−2.0
Meat and livestock products	979	756	528	452	−1.4	506	−.4	524	−.1
Cotton	565	178	142	121	−1.4	136	−.3	135	−.5
Food and feed grains	960	635	639	591	−.7	674	.5	661	.3
Other agricultural products	1,436	1,111	995	813	−1.8	920	−.7	903	−.9
Mining:									
Iron and ferroalloy ores mining	33	30	30	34	1.3	38	2.2	33	1.0
Copper ore mining	23	34	33	34	.4	37	1.2	36	.8
Nonferrous metal ores mining, except copper	31	25	39	40	.3	42	.8	40	.3
Coal mining	201	138	265	411	4.1	472	5.4	412	4.1
Crude petroleum and natural gas	200	157	211	311	3.6	325	4.0	307	3.5
Stone and clay mining and quarrying	105	99	103	103	.1	109	.5	100	−.3
Chemical and fertilizer mineral mining	19	18	25	31	2.1	33	2.8	32	2.1
Construction:									
Maintenance and repair construction	662	792	1,292	1,423	.9	1,532	1.6	1,460	1.1
New construction	3,163	3,594	4,605	5,497	1.6	5,977	2.4	5,643	1.9
Manufacturing:									
Durable goods:									
Ordnance	50	175	75	102	2.8	111	3.7	98	2.5
Complete guided missiles and space vehicles	94	107	81	70	−1.3	72	−.9	77	−.5
Logging	143	138	148	113	−2.4	120	−1.8	108	−2.8
Sawmills and planing mills	305	230	237	222	−.6	231	−.2	215	−.9
Other millwork, plywood, and wood products	261	310	386	344	−1.0	370	−.4	374	−.3
Wooden containers	43	36	25	20	−1.6	22	−1.0	22	−1.3
Household furniture	259	316	331	379	1.2	408	1.9	390	1.5
Furniture and fixtures, except household	124	153	176	180	.2	214	1.8	194	.9
Glass	153	188	205	239	1.4	252	1.9	242	1.5
Cement and concrete products	209	228	254	253	−.0	267	.5	261	.2
Structural clay products	78	64	52	44	−1.5	45	−1.2	43	−1.7
Pottery and related products	49	45	51	57	1.1	60	1.5	55	.7
Other stone and clay products	125	140	164	171	.4	186	1.2	181	.9
Blast furnaces and basic steel products	588	644	569	583	.2	586	.3	583	.2
Iron and steel foundries and forgings	269	312	324	375	1.4	387	1.6	377	1.4
Primary copper and copper products	137	160	159	163	.3	170	.7	165	.3
Primary aluminum and aluminum products	111	153	169	173	.3	181	.6	170	.0
Primary nonferrous metals and metal products	78	93	90	111	2.0	114	2.2	108	1.7
Metal containers	75	87	81	91	1.1	99	1.9	95	1.4
Heating apparatus and plumbing fixtures	71	76	76	100	2.6	105	3.0	103	2.8
Fabricated structural metal products	344	440	538	583	.7	640	1.6	601	1.0
Screw machine products	88	114	117	140	1.6	151	2.4	143	1.9
Metal stampings	189	255	243	266	.8	290	1.6	277	1.2
Cutlery, handtools, and general hardware	135	165	186	226	1.8	240	2.4	227	1.8
Other fabricated metal products	231	315	378	443	1.5	472	2.0	461	1.8
Engines, turbines, and generators	90	112	145	149	.3	175	1.7	160	.9
Farm machinery	128	141	183	217	1.6	239	2.5	224	1.9
Construction, mining, and oilfield machinery	162	202	282	369	2.4	474	4.8	369	2.4
Material handling equipment	65	95	113	148	2.5	183	4.5	150	2.6
Metalworking machinery	251	347	379	411	.7	547	3.4	424	1.0
Special industry machinery	164	206	205	227	1.0	234	1.2	231	1.1
General industrial machinery	221	291	329	393	1.6	430	2.5	390	1.6
Other nonelectrical machinery	166	246	309	344	1.0	381	1.9	373	1.7
Computers and peripheral equipment	111	224	350	552	4.2	614	5.2	555	4.3
Typewriters and other office equipment	28	52	48	77	4.5	89	5.8	73	3.8
Service industry machines	97	147	188	199	.6	226	1.7	208	.9
Electric transmission equipment	157	207	219	236	.7	277	2.2	247	1.1
Electrical industrial apparatus	176	223	251	307	1.9	355	3.2	315	2.1
Household appliances	157	187	180	192	.6	198	.9	190	.5
Electric lighting and wiring	134	205	226	309	2.9	335	3.7	324	3.3
Radio and television receiving sets	114	156	115	98	−1.4	120	.5	116	.0
Telephone and telegraph apparatus	105	146	169	201	1.6	231	2.9	229	2.8
Radio and communication equipment	252	409	357	424	1.6	433	1.8	418	1.5
Electronic components	213	394	525	666	2.2	669	2.2	669	2.2
Other electrical machinery and equipment	111	125	180	174	−.3	211	1.5	176	−.2
Motor vehicles	696	912	996	921	−.7	1,049	.5	940	−.5
Aircraft	722	805	632	768	1.8	839	2.6	779	1.9
Ship and boat building and repair	151	193	228	271	1.6	305	2.7	279	1.9
Railroad equipment	41	51	74	65	−1.0	81	.8	81	.8
Motorcycles, bicycles, and parts	9	14	20	24	1.8	30	4.0	32	4.4
Other transportation equipment	23	89	105	120	1.2	147	3.1	121	1.3

Table 4. Continued—Employment by industry, actual and projected, selected years, 1959–90

[In thousands]

Industry	Actual			Projected					
				Low-trend		High-trend I		High-trend II	
	1959	1969	1979	1990	Average annual rate of change, 1979–90	1990	Average annual rate of change, 1979–90	1990	Average annual rate of change, 1979–90
Scientific and controlling instruments	166	195	218	252	1.4	296	2.8	246	1.1
Medical and dental instruments	45	82	141	189	2.7	224	4.3	183	2.4
Optical and ophthalmic equipment	85	75	82	92	1.1	102	2.0	97	1.5
Photographic equipment and supplies	69	111	134	144	.7	165	1.9	152	1.2
Watches, clocks, and clock-operated devices . . .	30	35	28	25	–.7	28	.3	25	–.9
Jewelry and silverware	67	78	93	91	–.2	92	–.1	91	–.2
Musical instruments and sporting goods	116	149	145	164	1.2	175	1.8	175	1.7
Other manufactured products	229	233	244	263	.7	269	.9	262	.6
Nondurable goods:									
Meat products	324	344	364	379	.4	403	.9	372	.2
Dairy products	326	260	189	158	–1.6	168	–1.0	147	–2.2
Canned and frozen foods	249	291	306	289	–.5	307	.0	323	.5
Grain mill products	139	137	146	154	.5	165	1.2	151	.3
Bakery products	313	286	240	204	–1.5	217	–.9	209	–1.2
Sugar	38	36	30	33	1.1	34	1.4	33	1.0
Confectionery products	79	87	79	70	–1.0	75	–.5	73	–.7
Alcoholic beverages	107	97	88	62	–3.1	64	–2.7	65	–2.7
Soft drinks and flavorings	111	142	151	156	.3	166	.9	152	.1
Other food products	144	151	163	147	–.9	157	–.3	156	–.4
Tobacco manufactures	95	83	70	64	–.7	67	–.3	67	–.4
Fabric, yarn, and thread mills	619	616	532	534	.0	545	.2	529	–.1
Floor covering mills	39	58	60	62	.3	68	1.3	64	.6
Other textile mill products	74	82	70	74	.6	82	1.5	73	.4
Hosiery and knit goods	221	251	229	238	.4	261	1.2	232	.1
Apparel	1,100	1,244	1,132	1,190	.5	1,319	1.4	1,205	.6
Other fabricated textile products	143	182	200	233	1.4	251	2.1	236	1.5
Paper products	415	483	493	546	.9	548	1.0	545	.9
Paperboard containers and boxes	175	231	215	221	.3	233	.8	230	.6
Newspaper printing and publishing	328	376	435	506	1.4	549	2.1	526	1.7
Periodical and book printing and publishing	156	210	230	303	2.5	329	3.3	305	2.6
Other printing and publishing	446	550	641	664	.3	717	1.0	693	.7
Industrial inorganic and organic chemicals	260	296	323	417	2.4	426	2.6	425	2.5
Agricultural chemicals	54	65	70	73	.5	75	.7	71	.1
Other chemical products	82	124	100	113	1.2	118	1.5	122	1.8
Plastic materials and synthetic rubber	81	108	101	97	–.3	107	.6	106	.5
Synthetic fibers	79	132	118	93	–2.1	101	–1.4	102	–1.3
Drugs	106	143	194	228	1.5	247	2.2	232	1.6
Cleaning and toilet preparations	89	123	140	145	.4	162	1.3	152	.8
Paints and allied products	62	72	69	71	.3	74	.7	69	.1
Petroleum refining and related products	217	182	210	184	–1.2	201	–.4	184	–1.2
Tires and inner tubes	105	119	122	126	.3	129	.5	126	.3
Miscellaneous rubber and plastics products	178	162	167	179	.7	181	.8	183	.8
Other plastics products	94	320	493	658	2.7	669	2.8	645	2.5
Leather tanning and industrial leather	36	29	20	14	–2.7	15	–2.2	15	–2.6
Leather products including footwear	341	316	234	212	–.9	226	–.3	214	–.8
Transportation:									
Railroad transportation	930	651	561	462	–1.7	493	–1.2	468	–1.6
Local transit and intercity buses	311	315	303	354	1.4	364	1.7	339	1.0
Truck transportation	1,001	1,214	1,558	1,922	1.9	2,052	2.5	1,906	1.8
Water transportation	239	234	223	196	–1.1	204	–.8	183	–1.8
Air transportation	184	357	442	493	1.0	525	1.6	497	1.1
Pipeline transportation	24	18	20	22	1.1	22	1.2	22	.7
Transportation services	70	111	192	240	2.1	262	2.9	246	2.3
Communications:									
Radio and television broadcasting	90	131	193	266	3.0	277	3.4	267	3.0
Communications except radio and television	749	919	1,121	1,280	1.2	1,454	2.4	1,300	1.4
Public utilities:									
Electric utilities, public and private	430	460	606	650	.6	758	2.1	654	.7
Gas utilities, excluding public	215	220	223	242	.8	274	1.9	235	.5
Water and sanitary services, excluding public . . .	61	88	93	108	1.4	128	2.9	114	1.8
Trade:									
Wholesale trade	3,349	4,163	5,501	6,366	1.3	6,964	2.2	6,412	1.4
Eating and drinking places	1,960	2,812	4,924	6,836	3.0	7,179	3.5	6,843	3.0
Retail trade, except eating and drinking places . . .	7,936	9,729	11,952	13,830	1.3	15,088	2.1	14,190	1.6
Finance, insurance, and real estate:									
Banking	644	987	1,492	1,981	2.6	2,013	2.8	1,957	2.5
Credit agencies and financial brokers	389	652	898	1,174	2.5	1,329	3.6	1,303	3.4
Insurance	1,137	1,370	1,753	2,120	1.7	2,193	2.1	2,133	1.8
Real estate	753	855	1,371	1,732	2.1	1,926	3.1	1,716	2.1

[In thousands]

Industry	Actual			Projected					
				Low-trend		High-trend I		High-trend II	
	1959	1969	1979	1990	Average annual rate of change, 1979-90	1990	Average annual rate of change, 1979-90	1990	Average annual rate of change, 1979-90
Services:									
Hotels and lodging places	868	1,065	1,543	1,887	1.8	2,126	3.0	2,035	2.5
Personal and repair services	1,157	1,232	1,278	1,281	.0	1,555	1.8	1,424	1.0
Barber and beauty shops	538	634	613	649	.5	770	2.1	733	1.6
Miscellaneous business services	814	1,691	3,144	4,314	2.9	4,757	3.8	4,509	3.3
Advertising	121	134	166	192	1.3	213	2.3	198	1.6
Miscellaneous professional services	746	1,046	1,720	2,179	2.2	2,413	3.1	2,292	2.6
Automobile repair	422	569	837	1,168	3.1	1,208	3.4	1,148	2.9
Motion pictures	228	248	308	315	.2	329	.6	306	-.1
Amusement and recreation services	372	497	761	1,029	2.8	1,042	2.9	1,019	2.7
Doctors' and dentists' services	605	806	1,317	1,896	3.4	1,982	3.8	1,875	3.3
Hospitals	974	1,776	2,621	3,967	3.8	4,206	4.4	3,954	3.8
Other medical services	283	652	1,403	2,312	4.6	2,553	5.6	2,403	5.0
Educational services (private)	839	1,229	1,683	2,098	2.0	2,149	2.2	2,075	1.9
Nonprofit organizations	1,331	1,764	2,244	2,638	1.5	2,839	2.2	2,722	1.8
Forestry and fishery products	47	41	76	78	.3	82	.8	76	.1
Agricultural, forestry, and fishery services	261	296	447	542	1.8	593	2.6	543	1.8
Private households	2,574	2,322	1,723	1,576	-.8	1,593	-.7	1,587	-.7
Government enterprises:									
Post Office	574	732	661	675	.2	700	.5	680	.3
Other Federal enterprises	104	152	153	202	2.6	236	4.0	207	2.8
Local government passenger transit	71	87	130	185	3.3	200	4.0	190	3.5
Other state and local government enterprises	225	351	492	695	3.2	774	4.2	701	3.3

been in the past. In 1959, service industries accounted for 13.6 percent of total employment; by 1979, that share had risen to 19.4 percent. It is expected that in 1990, service industries will account for about 22 percent of all jobs in the economy.

Leading the advance among service industries will be health care. Employment in doctors' and dentists' offices and in hospitals is expected to grow faster than the all-industries average, but the most rapid gains are projected for other related medical care services, such as nursing homes, medical laboratories, therapists' offices, and nurses' services. Between 1958 and 1979, employment in these establishments expanded by 8.8 percent a year, the fastest growth rate for any industry in the economy. During the 1980's, other medical services employment will again post the fastest rate of growth under all scenarios: 4.6 percent a year in the low-trend model, 5.6 percent in high-trend I, and 5.0 percent in high-trend II.

Trade will offer most new jobs. The trade sector is expected to continue to increase its share of all jobs, but within the sector the pattern of job growth varies. Wholesale trade is projected to show only modest gains, while eating and drinking establishments in the retail portion enjoy more rapid growth. Although the anticipated rate of job increase for eating and drinking places is higher than for many other industries in the economy, it is still below the historical rate, due to an assumption of more rapid productivity gains. Other retail trade establishments are projected to average job

growth at about the same pace as the total private economy.

The greatest increase in employment opportunities over the next 11 years is expected to be in the trade sector, primarily because of its initial large size. Between 4.7 and 6.9 million new jobs are projected to appear in wholesale and retail trade establishments between 1979 and 1990.

Manufacturing growth to pick up. Manufacturing jobs will grow by 0.8 percent a year during 1979-90 in the low-trend version, 1.6 percent in high-trend I, and 1.0 percent in high-trend II, slower than the rates projected for total jobs but faster than manufacturing sector growth in recent years. Between 1969 and 1979, manufacturing employment rose by only 0.5 percent a year, and its share of total jobs dropped from 23.7 percent to 20.6 percent. Manufacturing will account for between 19.2 and 19.5 percent of all jobs in 1990.

The projected turnaround in the rate of manufacturing job growth is more pronounced for durable goods manufacturing than for nondurables, reflecting assumptions of strong demand for consumer durables and for producers' durable equipment, especially in the high-trend versions. Employment in durable manufacturing industries will expand by 1.0 percent a year during 1979 -90 in the low-trend model, 1.9 percent in high-trend I, and 1.2 percent in high-trend II. Annual growth averaged only 0.7 percent in the 1969-79 period.

Within the durable goods sector, rapid job gains are projected for industries manufacturing typewriters and

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other office equipment; computers; electric lighting and wiring equipment; and medical and dental instruments. Employment in guided missiles and space vehicles is projected to decline between 1979 and 1990, despite output growth related to defense demand, because of productivity advances.

In the motor vehicles industry, the high-trend assumption is for employment to rebound from the layoffs of 1980, but under low-trend assumptions, the recovery will not be as complete. In 1977, 1978, and 1979, em-

ployment in the industry hovered around the 1 million mark. In 1980, however, it plunged to 776,000. In the high-trend I case, these lost jobs are expected to be recouped and employment is projected to be 1.049 million in 1990. In the low-trend case, 1990 motor vehicle employment will be about 921,000.

The number of jobs in basic steel declined steadily during the 1970's, but is projected to stabilize over the next 10 years. Employment is expected to rise slightly from the 1979 level of 569,000 to between 583,000 and

Table 5. Employment by major sector, actual and projected, selected years, 1959–90

Industry sector	Thousands of jobs								
	Actual			Projected					
				1985			1990		
	1959	1969	1979	Low-trend	High-trend I	High-trend II	Low-trend	High-trend I	High-trend II
Total employment	70,512	86,278	104,120	113,775	118,981	114,935	121,971	130,665	123,958
General government [1]	9,973	14,818	16,523	17,587	17,587	17,441	18,106	18,106	17,886
Federal	4,289	5,614	4,223	4,355	4,355	4,209	4,429	4,429	4,209
Military	2,552	3,506	2,103	2,129	2,129	2,129	2,129	2,129	2,129
Civilian	1,737	2,108	2,120	2,226	2,226	2,080	2,300	2,300	2,080
State and local	5,684	9,204	12,300	13,232	13,232	13,232	13,677	13,677	13,677
Education	2,687	5,036	6,642	6,679	6,679	6,679	6,513	6,513	6,513
Noneducation	2,997	4,168	5,658	6,553	6,553	6,553	7,164	7,164	7,164
Total private	60,539	71,460	87,597	96,188	101,394	97,494	103,865	112,559	106,072
Agriculture	5,491	3,494	2,815	2,621	2,921	2,922	2,333	2,633	2,634
Nonagriculture	55,048	67,966	84,782	93,566	98,472	94,572	101,531	109,925	103,438
Mining	612	501	706	898	946	896	967	1,059	959
Construction	3,825	4,386	5,897	6,747	7,080	6,810	6,920	7,509	7,104
Manufacturing	16,985	20,469	21,433	22,609	23,855	22,895	23,476	25,520	23,905
Durable goods	9,560	12,081	13,009	13,833	14,644	14,036	14,560	16,045	14,872
Nondurable goods	7,425	8,388	8,424	8,775	9,210	8,859	8,916	9,475	9,033
Transportation, communications, and public utilities	4,304	4,718	5,535	5,903	6,213	5,898	6,239	6,815	6,241
Transportation	2,759	2,900	3,299	3,488	3,627	3,468	3,693	3,924	3,671
Communications	839	1,050	1,314	1,447	1,535	1,459	1,546	1,731	1,567
Public utilities	706	768	922	968	1,051	971	1,000	1,160	1,003
Wholesale and retail trade	13,245	16,704	22,377	24,868	26,150	24,961	27,032	29,231	27,445
Finance, insurance, and real estate	2,923	3,864	5,514	6,096	6,427	6,252	7,008	7,464	7,108
Other services	9,606	13,680	20,161	23,249	24,497	23,642	26,553	28,824	27,313
Government enterprises	974	1,322	1,436	1,606	1,681	1,625	1,758	1,911	1,778
Private households	2,574	2,322	1,723	1,586	1,618	1,592	1,576	1,593	1,587

Industry sector	Percent distribution								
	Actual			Projected					
				1985			1990		
	1959	1969	1979	Low-trend	High-trend I	High-trend II	Low-trend	High-trend I	High-trend II
Total employment	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
General government [1]	14.1	17.2	15.9	15.5	14.8	15.2	14.8	13.9	14.4
Federal	6.1	6.5	4.1	3.8	3.7	3.7	3.6	3.4	3.4
Military	3.6	4.1	2.0	1.9	1.8	1.9	1.7	1.6	1.7
Civilian	2.5	2.4	2.0	2.0	1.9	1.8	1.9	1.8	1.7
State and local	8.1	10.7	11.8	11.6	11.1	11.5	11.2	10.5	11.0
Education	3.8	5.8	6.4	5.9	5.6	5.8	5.3	5.0	5.3
Noneducation	4.3	4.8	5.4	5.8	5.5	5.7	5.9	5.5	5.8
Total private	85.9	82.8	84.1	84.5	85.2	84.8	85.2	86.1	85.6
Agriculture	7.8	4.0	2.7	2.3	2.5	2.5	1.9	2.0	2.1
Nonagriculture	78.1	78.8	81.4	82.2	82.8	82.3	83.2	84.1	83.4
Mining	.9	.6	.7	.8	.8	.8	.8	.8	.8
Construction	5.4	5.1	5.8	5.9	6.0	5.9	5.7	5.7	5.7
Manufacturing	24.1	23.7	20.6	19.9	20.0	19.9	19.2	19.5	19.3
Durable goods	13.6	14.0	12.5	12.2	12.3	12.2	11.9	12.3	12.0
Nondurable goods	10.5	9.7	8.1	7.7	7.7	7.7	7.3	7.3	7.3
Transportation, communications, and public utilities	6.1	5.5	5.3	5.2	5.2	5.1	5.1	5.2	5.0
Transportation	3.9	3.4	3.2	3.1	3.0	3.0	3.0	3.0	3.0
Communications	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Public utilities	1.0	.9	.9	.9	.9	.8	.8	.9	.9
Wholesale and retail trade	18.8	19.4	21.5	21.9	22.0	21.7	22.2	22.4	22.1
Finance, insurance, and real estate	4.1	4.5	5.3	5.4	5.4	5.4	5.7	5.7	5.7
Other services	13.6	15.9	19.4	20.4	20.6	20.6	21.8	22.1	22.0
Government enterprises	1.4	1.5	1.4	1.4	1.4	1.4	1.4	1.5	1.4
Private households	3.7	2.7	1.7	1.4	1.4	1.4	1.3	1.2	1.3

[1] National Income Accounts basis.

Table 6. Average annual percent change in employment by major sector, actual and projected, selected years, 1959–90

Industry sector	Actual		Projected					
	1959–69	1969–79	1979–85			1985–90		
			Low-trend	High-trend I	High-trend II	Low-trend	High-trend I	High-trend II
Total employment	2.0	1.9	1.5	2.3	1.7	1.4	1.9	1.5
General government¹	4.0	1.1	1.0	1.0	.9	.6	.6	.5
Federal	2.7	-2.8	.5	.5	.0	.3	.3	.0
Military	3.2	-5.0	.2	.2	.2	.0	.0	.0
Civilian	2.0	.1	.8	.8	-.3	.7	.7	.0
State and local	4.9	2.9	1.2	1.2	1.2	.7	.7	.7
Education	6.5	2.8	.1	.1	.1	-.5	-.5	-.5
Noneducation	3.4	3.1	2.5	2.5	2.5	1.8	1.8	1.8
Total private	1.7	2.1	1.6	2.5	1.8	1.5	2.1	1.7
Agriculture	-4.4	-2.1	-1.2	.6	.6	-2.3	-2.1	-2.1
Nonagriculture	2.1	2.3	1.7	2.5	1.8	1.6	2.2	1.8
Mining	-2.0	3.5	4.1	5.0	4.0	1.5	2.3	1.4
Construction	1.4	3.0	2.3	3.1	2.4	.5	1.2	.8
Manufacturing	1.9	.5	.9	1.8	1.1	.8	1.4	.9
Durable goods	2.4	.7	1.0	2.0	1.3	1.0	1.8	1.2
Nondurable goods	1.2	.0	.7	1.5	.8	.3	.6	.4
Transportation, communications, and public utilities	.9	1.6	1.1	1.9	1.1	1.1	1.9	1.1
Transportation	.5	1.3	.9	1.6	.8	1.1	1.6	1.1
Communications	2.3	2.3	1.6	2.6	1.8	1.3	2.4	1.4
Public utilities	.8	1.8	.8	2.2	.9	.7	2.0	.6
Wholesale and retail trade	2.3	3.0	1.8	2.6	1.8	1.7	2.3	1.9
Finance, insurance, and real estate	2.8	3.6	1.7	2.6	2.1	2.8	3.0	2.6
Other services	3.6	4.0	2.4	3.3	2.7	2.7	3.3	2.9
Government enterprises	3.1	.8	1.9	2.7	2.1	1.8	2.6	1.8
Private households	-1.0	-2.9	-1.4	-1.0	-1.3	-.1	-.3	-.1

¹ National Income Accounts basis.

586,00 by 1990. An increase in steel jobs is projected despite an assumption that imports will account for a larger share of total steel output, because demand for basic steel products is expected to be strong in the next decade as the result of rapid investment growth.

The projected increase in nondurable goods employment, although positive compared to the zero growth posted during 1969–79, is much slower than the all-industries average. Nondurable goods industries accounted for 8.1 percent of all jobs in 1979, but are expected to represent only 7.3 percent in 1990.

In fact, 5 of the 10 industries with the greatest rate of projected job loss are in the nondurable goods sector. (See table 7.) The five industries have already experienced job declines either because of falling demand or rapid productivity growth, and these trends are expected to continue. Sluggish demand for leather tanning services and processed foods (especially dairy and bakery products) is expected to cause employment to fall; for alcoholic beverages and synthetic fibers, productivity gains are assumed to more than offset rapidly rising demand.

Employment in textiles will remain essentially unchanged from the 1979 level of 892,000 in the low-trend and high-trend II versions, and rise by about 65,000 jobs in high-trend I. Demand for textile products is projected to expand in all models, but imports are expected to hold a 6.7- to 7.5-percent market share 1990, somewhat larger than at present.

Jobs in apparel are projected to rise from 1.1 million to between 1.2 and 1.3 million between 1979 and 1990. Demand will increase with disposable incomes, out-weighing the assumption that the import share of total apparel output will rise to between 14 and 16 percent.

Public sector growth will halt. Although most major economic sectors are expected to follow past trends in terms of shares of total jobs, State and local governments are an exception. Their employment share rose from 8.1 percent of the total in 1959 to 11.8 percent in 1979, but by 1990, it will account for 11.2 percent of all jobs in the low-trend version and 10.5 percent in high-trend I. The slow growth is expected to result primarily from reductions in school enrollment, which will more than offset gains expected in the public health and hospitals field.

Federal employment is assumed to change only slightly from the 1979 level, and in one case (high-trend II) is projected to decline. Government employment in high-trend I, the model with the largest labor force, is the same as in the low-trend model because of assumptions that investment and tax policies will allow the private sector to completely absorb the larger labor force.

Other sectors show mixed patterns. Finance, insurance, and real estate employment is projected to continue to rise as a share of total jobs during the 1980's, despite slower than average output growth. Demand for credit and banking services, in particular, is expected to stimulate employment growth in this area despite sluggish demand for real estate services.

The rate of employment increase in construction is projected to parallel the output trends discussed earlier, accelerating in the first half of the decade in response to

Table 7. Low-trend projected employment changes for selected industries, 1979–90

Fastest growing	Average annual rate of job growth
Other medical services	4.6
Typewriters and other office equipment	4.5
Computers and peripheral equipment	4.2
Coal mining	4.1
Hospitals	3.8
Crude petroleum and natural gas	3.6
Doctors' and dentists' services	3.4
Local government passenger transit	3.3
Other state and local government enterprises	3.2
Automobile repair	3.1

Most rapidly declining	Average annual rate of job decline
Dairy and poultry products	-3.3
Alcoholic beverages	-3.1
Leather tanning and industrial leather	-2.7
Logging	-2.4
Synthetic fibers	-2.1
Other agricultural products	-1.8
Railroad transportation	-1.7
Wooden containers	-1.6
Dairy products (processed)	-1.6
Bakery products	-1.5

Largest job gains	Employment gain (in thousands)
Eating and drinking places	1,912
Retail trade, except eating and drinking places	1,878
Hospitals	1,347
Miscellaneous business services	1,171
Other medical services	909
New construction	892
Wholesale trade	866
Doctors' and dentists' services	580
Banking	490
Educational services (private)	416

the shifting energy picture. Coal mining is projected to be one of the fastest growing of all industries during the next decade. Over the past 30 years, employment in the coal industry has experienced major cycles. Following severe job cutbacks between 1950 and 1965, employment stabilized during 1965–69, then expanded steadily over the next 10 years. Although a shift from underground mines to more capital-intensive surface mines will cause output per worker-hour to grow faster in the coal industry than in the private nonfarm economy as a whole, employment is expected to continue to rise rapidly in response to increased demand for coal. Annual growth of 4.1 to 5.4 percent is projected for 1979–90. In the crude petroleum and natural gas drilling industry, employment is expected to rise faster than domestic output, as exploration for new oil creates demand for more workers but yields a decreasing rate of return.

Previous projections for 1990

In April 1979, BLS published its first look at industry output and employment for the year 1990, in the form of a base case and a high-employment alternative. The first case, intended as a base-line projection, incorporated a moderately expanding labor force, a relatively slow decline in inflation and unemployment, and moderate government expenditures. The high-employment alternative assumed a much larger labor force, and a heavy emphasis on job creation which would lower the unemployment rate. What are the differences between

strong housing demand, then slowing somewhat during the second half as demand for residential construction tapers. Between 1.0 million (low-trend) and 1.6 million (high-trend I) new jobs will be added in the construction industry between 1979 and 1990.

Farm employment is expected to continue to decline through the next decade, but the drop is not expected to be as rapid as in the last few decades; in the high-trend versions there is even a small gain between 1979 and 1985. Past productivity advances in agriculture have been very great: Between 1959 and 1979, output per hour of all persons in the farm sector rose by almost 5 percent annually, compared with about 2 or 3 percent for the private nonfarm economy before 1973 and less than 1 percent a year thereafter. These advances have already begun to slow, however, and the continued tapering of increases in farm productivity during the 1980's is expected to moderate the rate of decline in farm jobs.

Mining job growth above average. The largest industries within the mining sector in terms of jobs—coal mining and crude petroleum and natural gas extraction—are expected to experience employment changes in line with

Table 8. Comparison of previous and current employment projections for 1990

[In thousands]

Industry sector	Previous	Current		
	Base case	Low-trend	High-trend I	High-trend II
Total employment	121,204	121,971	130,665	123,958
General government[1]	18,066	18,106	18,106	17,886
Federal	4,389	4,429	4,429	4,209
Military	2,089	2,129	2,129	2,129
Civilian	2,300	2,300	2,300	2,080
State and local	13,677	13,677	13,677	13,677
Education	6,513	6,513	6,513	6,513
Noneducation	7,164	7,164	7,164	7,164
Total private	103,138	103,865	112,559	106,072
Agriculture	2,634	2,333	2,633	2,634
Nonagriculture	100,504	101,531	109,925	103,438
Mining	787	967	1,059	959
Construction	6,033	6,920	7,509	7,104
Manufacturing	23,882	23,476	25,520	23,905
Durable goods	14,692	14,560	16,045	14,872
Nondurable goods	9,189	8,916	9,475	9,033
Transportation, communications, and public utilities	5,658	6,239	6,815	6,241
Transportation	3,332	3,693	3,924	3,671
Communications	1,473	1,546	1,731	1,567
Public utilities	1,104	1,000	1,160	1,003
Wholesale and retail trade	27,370	27,032	29,231	27,445
Finance, insurance, and real estate	6,695	7,008	7,464	7,108
Other services	26,742	26,553	28,824	27,313
Government enterprises	1,779	1,758	1,911	1,778
Private households	1,307	1,576	1,593	1,587

[1] National Income Accounts basis.

those initial 1990 forecasts and the present ones?

One important change has been the development of a range of possible values for 1990 rather than a single base-line case plus an alternate. The new low-trend and high-trend I versions are intended to present a band within which a "base case" might fall.

In addition, estimates of the 1990 civilian labor force have been revised upward in all of the new scenarios. (For both 1990 employment projections, BLS prepared three alternative labor force projections—a low growth path, a middle growth path, and a high growth path. The old base case and the new low-trend and high-trend II models were based on the BLS middle labor force growth path. The old high-employment alternative and the new high-trend I model were based on the high labor force growth path.) Between 1977, the last year for which data were available for the first projections, and 1979, the last year for which data were available for the new ones, labor force participation rates of women have risen faster than expected. Consequently, the new 1990 labor force projections are higher than the old ones for all three labor force scenarios:

	Old projection (000's)	New projection (000's)
Low growth path . . .	113,521	117,394
Middle growth path .	119,366	122,375
High growth path . .	125,603	128,123

Somewhat offsetting a larger labor force are new assumptions about the unemployment rate in light of the recent recession; except in the case of the 1990 high-trend I version, the new rates are higher than in the old projections:

	1985	1990
Old projections: Base case	4.7	4.5
High-employment alternative .	4.0	4.0
New projections: Low-trend	7.0	6.0
High-trend I	5.5	4.0
High-trend II	6.0	4.5

Military force levels are virtually unchanged in the new scenarios from those previously assumed. The result is a projection of total employment for 1990 that is higher than the old base case in all new scenarios:

	1985 (000's)	1990 (000's)
Old projections: Base case	114,440	121,204
High-employment alternative	119,627	128,400
New projections: Low-trend	113,775	121,971
High-trend I	118,981	130,665
High-trend II	114,935	123,958

At the industry level, the new assumptions raise the employment projections for most sectors, although the 1978–79 experience has altered the original outlook for many individual industries. For example, the synthetic fibers industry was projected to be one of the top 10 job gainers (in terms of rate of growth) in the first set of projections, but this time ranks among the top 10 losers. Rising prices which curbed demand, and gains in productivity contributed to this reversal.

The distribution of final demand also changed between the old and new scenarios, affecting both industry output and employment projections. Defense procurement was originally assumed to experience a slowdown during the 1980's but is now projected to increase its share of GNP; personal consumption expenditures are not expected to grow as rapidly as initially forecast; and levels of exports and imports are both higher in the new versions. These revisions contribute to a change in the 1990 distribution of output and jobs at the industry level. (See table 8.)

The earlier forecasts assumed a shift in energy resources from oil and gas to coal, as do the new forecasts, but oil price shocks have been even more severe than originally anticipated, leading to a more pronounced shift in the new projections.

And finally, the previous forecasts used Department of Commerce input-output tables for 1963 and 1967 and a BLS-estimated table for 1973. Subsequently, a 1972 input-output table was published by the Department of Commerce. Use of this table in the new projections resulted in widespread data revisions in many historical series and provided more current information on technological trends.   □

——— FOOTNOTES ———

[1] Annual Report to Congress, 1979, Volume 3, (Energy Information Administration, U.S. Department of Energy, 1980).

[2] Projections of the Population of the United States: 1977 to 2050. Current Population Reports, Series P-25, No. 704 (Census Bureau 1977).

[3] Government purchases are outlays for goods and services, while government expenditures include not only purchases but also grants, transfers, and net interest payments.

[4] Projections of the Population of the United States: 1977 to 2050.

[5] The Detailed Input-Output Structure of the U.S. Economy: 1972, (U.S. Department of Commerce, Bureau of Economic Analysis, 1979).