

Projections 2000

A look at occupational employment trends to the year 2000

High-skill job groups are projected to continue pacing occupational growth as groups requiring the most education and training are estimated to grow faster than average

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The Nation's economy is projected to generate more than 21 million jobs between 1986 and 2000. While a considerable number, this 19-percent increase is only about half the average annual rate of increase that occurred over the previous 14-year period, 1972 to 1986. (See table 1.) An accompanying article by Valerie Personick, pp. 30-45, discusses the projected changes in the industrial composition of employment. Our article presents the 1986-2000 occupational projections.

The Bureau of Labor Statistics has developed three sets of occupational projections, with each set tied to the high, moderate, or low economic and industry employment projections alternatives presented elsewhere in this issue of the *Review*. However, the basic changes in the occupational structure of the economy from 1986 to 2000 among the three alternatives are similar. Thus, for ease of presentation, we focus on the moderate alternative, because the discussion would be similar if either of the other scenarios was highlighted. The major differences among the alternatives are discussed briefly at the end of the article.

Broad occupational group changes

The structure of occupational employment over the 1986-2000 period is expected to shift because the change in total

employment will not be evenly distributed among the broad occupational groups. For example, each of the three broad occupational groups with the most highly trained workers in terms of educational attainment (executive, administrative, and managerial workers; professional workers; and technicians and related support workers) is projected to continue to grow more rapidly than the average for total employment. Collectively, these three groups, which accounted for 25 percent of total employment in 1986, are expected to account for almost 40 percent of the total job growth between 1986 and 2000. In contrast, many factors, such as office and factory automation, changes in consumer demand, and import substitution are expected to lead to relatively slow growth or a decline for occupational groups requiring less education (administrative support workers, including clerical; farming, forestry, and fishing workers; and operators, fabricators, and laborers). The service workers group (except private household workers), which is expected to grow at a faster rate than total employment and account for more of the total growth in employment than any other broad occupational group, is an important exception to the general trend, because its educational attainment is not in the high group. The expected shift away from low-skill jobs to high-skill jobs is discussed in greater detail later in this article. The following discussion on each broad occupational group is based on data found in table 1. Historical trends in table 1 are based on data from the Current Population Survey,

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Table 1. Employment by broad occupational group, 1986 and projected to 2000 moderate alternative, and percent change in employment for selected periods

[Numbers in thousands]

Occupation	1986		Projected, 2000		Percent change			
	Number	Percent	Number	Percent	1972-79	1979-86	1972-86	1986-2000
Total employment	111,623	100.0	133,030	100.0	20.3	10.9	33.4	19.2
Executive, administrative, and managerial workers	10,583	9.5	13,616	10.2	34.9	28.7	73.7	28.7
Professional workers	13,538	12.1	17,192	12.9	29.8	21.4	57.5	27.0
Technicians and related support workers	3,726	3.3	5,151	3.9	39.9	24.7	74.5	38.2
Salesworkers	12,606	11.3	16,334	12.3	24.3	24.4	54.6	29.6
Administrative support workers, including clerical	19,851	17.8	22,109	16.6	23.5	9.5	35.2	11.4
Private household workers	981	.9	955	.7	-23.0	-11.5	-31.9	-2.7
Service workers, except private household workers	16,555	14.8	21,962	16.5	25.7	16.0	45.9	32.7
Precision production, craft, and repair workers	13,924	12.5	15,590	11.7	21.7	6.5	29.6	12.0
Operators, fabricators, and laborers	16,300	14.6	16,724	12.6	8.7	-9.2	-1.3	2.6
Farming, forestry, and fishing workers	3,556	3.2	3,393	2.6	-5.1	-5.6	-10.4	-4.6

NOTE: Estimates of 1986 employment, the base year for the 2000 projections, were derived primarily from data collected in the Occupational Employment Statistics surveys. The 1972-79,

1979-86, and 1972-86 rates of change were derived from the Current Population Survey data because comparable Occupational Employment Statistics survey data were not available for 1972 and 1979.

whereas projected trends are based on data from the National Industry-Occupation Matrix. In order to compare data from both sources in table 1, the occupational categories from the Current Population Survey were selected. Table 8 also is based on the Current Population Survey occupational categories and data. In all other tables in this article, the National Industry-Occupation Matrix occupational classification and data were used.

Employment of executive, administrative, and managerial workers is expected to increase by more than 3 million jobs from 1986 to 2000 due to the ever-increasing complexity of business operations and the large employment gains in the wholesale and retail trade and services sectors. The rate of increase for this group is expected to be about 29 percent, or about one and one-half the average for all occupations. The relative growth rate for this occupational group is projected to be less than it was from 1972 to 1986 when executive, administrative, and managerial workers grew twice as fast as did total employment.

The number of professional workers is expected to continue to grow more rapidly than total employment, or by 27 percent, from 1986 to 2000. Employment in many of the occupations in this group is expected to surge, including the engineering, computer specialty, and health professional occupations, which together are expected to account for more than one-half of the 3.7 million new professional jobs added by the year 2000.

Employment in the technicians and related support workers category is projected to grow faster than any other major occupational group (38 percent), or more than twice as fast as total employment. The technicians occupational group also was the fastest growing group from 1972 to 1986. Jobs for health technologists and technicians are expected to account for 47 percent of the 1.4 million new technician jobs that will be added over the 1986-2000 period.

Employment in the salesworkers group is expected to increase by 30 percent, or by 3.7 million jobs, due mainly to the large employment gains in wholesale and retail trade

where salesworkers are concentrated. The share of total employment accounted for by these workers is projected to increase from 11.3 percent of the total in 1986 to 12.3 percent by the year 2000. This is the only major occupational group that grew as fast during the 1979-86 period as it did from 1972 to 1979, even though total employment had grown only half as fast in the latter period.

The number of administrative support workers, including clerical, which grew as fast as total employment in the 1972-86 period, is projected to increase significantly more slowly than the average for total employment from 1986 to 2000, or by only 11 percent. This slowing of growth was evident in the 1979-86 period when this occupational group grew slightly slower than the average for total employment; in the previous 7 years it had grown slightly faster than total employment. Although this group is projected to add 2 million jobs by the year 2000, its share of total employment is expected to decline from 17.8 percent to 16.6 percent because of its slow growth. Office automation and other technological changes are expected to cause employment to decline in several detailed occupations within this group, such as typists and word processors. Employment in several clerical occupations, however, is projected to grow faster than the average for total employment due to rapid growth in the industries that employ clerical workers such as hotel desk clerks and new account clerks in banking. Other occupations in this group are also expected to be favorably affected by technological change, such as the computer and peripheral equipment operators group, which is expected to grow rapidly due to the ever-increasing use of computers throughout the economy.

Employment in the service workers group (except private household workers) is expected to rise faster than the average for total employment, increasing by more than 5 million jobs—more than any other broad occupational group from 1986 to 2000. The projected growth rate of 33 percent for 1986-2000 is faster than total employment and, consequently, the share of total employment accounted for by

Table 2. Projected 1986–2000 employment change (number and percent) for wage and salary workers, by major industry division and for self-employed and unpaid family workers, in major occupational groups, moderate trend

Occupation	Total, all classes of workers	Total, wage and salary workers	Agriculture	Mining	Construction	Manufacturing	Transportation, communications, and public utilities	Wholesale and retail trade	Finance, insurance, and real estate	Services	Government	Self-employed and unpaid family workers
All occupations (thousands)	21,407	20,221	149	-58	891	-830	475	6,388	1,620	10,774	811	1,185
Managerial and management-related occupations	3,033	2,677	14	-2	111	85	76	619	479	1,128	167	356
Engineers, architects, and surveyors	495	470	4	-0	12	165	16	17	7	213	36	25
Natural, computer, and mathematical scientists	339	324	3	-1	1	23	12	25	41	199	21	15
Teachers, librarians, and counselors	772	751	0	0	0	0	1	0	0	743	6	21
Health diagnosing and treating occupations	1,081	1,072	7	0	0	0	0	29	1	1,013	22	9
Other professional specialists	967	811	3	0	0	28	29	46	30	582	93	156
Technician occupations	1,403	1,374	4	-2	4	70	28	86	51	1,070	63	28
Marketing and sales occupations	3,728	3,168	4	1	13	17	76	2,408	286	357	5	560
Administrative support occupations, including clerical	2,258	2,327	5	-19	0	-238	-27	287	551	1,815	-45	-69
Service occupations	5,381	5,205	2	-1	2	-31	37	2,251	74	2,596	276	176
Agriculture, forestry, fishing, and related occupations	-163	194	83	0	2	-8	1	21	26	55	15	-357
Blue-collar worker supervisors	144	138	3	-2	52	-58	15	41	4	65	17	5
Construction trades and extractive workers	704	537	1	-5	437	-18	-14	19	11	66	39	167
Mechanics, installers, and repairers	687	677	3	-4	64	-7	-2	217	52	317	37	11
Precision production and plant systems occupations	134	111	0	-2	26	-52	1	48	2	74	15	23
Machine setters, set-up operators, operators, and tenders	-194	-201	3	-2	5	-319	0	21	1	89	1	7
Assemblers and other handwork occupations	-113	-108	1	0	11	-203	2	32	0	47	2	-4
Transportation and material moving machine and vehicle operators	500	443	6	-12	62	-137	193	157	4	141	30	57
Helpers, laborers, and material movers, hand	249	251	4	-7	90	-147	32	65	2	204	9	-2

service workers is expected to jump from 14.8 percent in 1986 to 16.5 percent in 2000. Most of the large projected employment gain in this occupational group is concentrated in food service and health service occupations.

The number of private household workers is projected to decline by 2.7 percent. This is more in line with the recent moderate decline that occurred between 1979 and 1986 than it is with the rapid declines that occurred from 1972 to 1979 and in earlier periods.

The number of precision production, craft, and repair workers is projected to increase more slowly than the average for total employment, or by only 12 percent. From 1972 to 1986, employment in this group grew about as fast as the average for total employment, although during the latter part of the 1979–86 period, its employment growth was slower than that for the total economy. Within this group, the rate of growth for the construction trades is projected to be close

to the 19-percent growth rate of the overall economy. This increase is expected to be offset, however, by occupations concentrated in manufacturing that are expected to grow more slowly than the average for total employment or to decline over the 1986–2000 period. Employment decreases are expected in occupations such as precision food, metal, printing, textile, and apparel workers.

Employment in the operators, fabricators, and laborers group is projected to be at virtually the same level in 2000 as it was in 1986. The stable employment level for this occupational group is a reversal of the decline of more than 9 percent that this group suffered from 1979 to 1986, which offset an approximately equal increase from 1972 to 1979. Its share of total employment is expected to decrease significantly from 14.6 percent to 12.6 percent. The drop in manufacturing employment and increasing factory automation are largely responsible for the lack of employment

Table 2. Continued—Projected 1986–2000 employment change (number and percent) for wage and salary workers, by major industry division and for self-employed and unpaid family workers, in major occupational groups, moderate trend

Occupation	Total, all classes of workers	Total, wage and salary workers	Agriculture	Mining	Construction	Manufacturing	Transportation, communications, and public utilities	Wholesale and retail trade	Finance, insurance, and real estate	Services	Government	Self-employed and unpaid family workers
All occupations (percent)	19.2	19.8	9.4	-7.4	18.2	-4.4	9.1	27.1	25.7	33.8	9.4	12.2
Managerial and management-related occupations	28.7	28.9	36.9	-2.7	23.7	5.5	18.1	28.8	39.4	47.9	16.7	27.1
Engineers, architects, and surveyors	31.6	31.6	35.4	-0.4	26.2	24.0	18.9	67.6	54.6	54.5	18.2	31.6
Natural, computer, and mathematical scientists	45.9	46.3	33.3	-2.8	47.8	15.3	50.6	80.8	58.6	85.9	13.4	39.8
Teachers, librarians, and counselors	15.6	15.6	7.5	-	-	8.9	10.4	28.3	24.6	15.8	6.1	17.2
Health diagnosing and treating occupations	41.7	46.3	32.0	-19.6	16.9	2.3	20.0	28.5	34.5	50.2	12.9	3.1
Other professional specialists	26.2	27.4	27.9	-4.5	13.9	11.0	22.2	30.8	41.1	35.9	13.0	21.4
Technician occupations	38.4	38.6	28.8	-6.6	10.4	11.7	17.7	57.1	43.7	52.2	15.2	32.6
Marketing and sales occupations	29.6	29.3	21.9	11.2	18.8	3.0	29.8	29.3	34.0	46.0	8.5	31.3
Administrative support occupations, including clerical	11.4	12.0	6.6	-19.6	-0.1	-10.6	-2.1	9.1	16.6	29.1	-1.7	-16.8
Service occupations	30.7	31.5	11.4	-14.6	5.6	-9.2	21.0	39.4	22.5	31.4	16.8	17.2
Agriculture, forestry, fishing, and related occupations	-4.6	10.0	6.6	-11.5	14.3	-8.3	17.8	32.7	29.1	17.9	12.5	-22.1
Blue-collar worker supervisors	7.9	8.2	31.6	-5.0	23.8	-7.3	8.0	25.9	35.2	44.8	14.3	4.1
Construction trades and extractive workers	17.6	17.2	19.9	-2.9	22.0	-6.6	-17.5	28.1	31.5	36.8	12.2	18.8
Mechanics, installers, and repairers	14.7	15.9	18.8	-7.1	21.9	-0.9	-3	20.1	34.3	38.6	12.0	2.4
Precision production and plant systems occupations	4.4	3.9	14.0	-12.5	20.9	-2.9	5	13.3	23.4	29.9	9.6	10.5
Machine setters, set-up operators, operators, and tenders	-3.9	-4.1	16.9	-9.1	19.4	-7.3	1.1	23.5	29.6	26.9	5.2	8.0
Assemblers and other handwork occupations	-4.2	-4.1	16.6	2.1	26.7	-8.8	9.2	30.9	43.6	41.9	7.6	-4.9
Transportation and material moving machine and vehicle operators	10.4	9.9	16.9	-9.7	18.5	-18.5	15.9	13.5	34.7	24.2	11.8	17.0
Helpers, laborers, and material movers, hand	5.8	6.0	9.2	-14.3	11.9	-10.3	9.4	8.0	12.3	40.9	3.5	-2.5

NOTE: Dash indicates division by zero.

growth for this group. Several transportation occupations, however, are not expected to be affected by these factors, including the truck and bus drivers and aircraft pilots and flight engineers occupations.

The number of farming, forestry, and fishing workers is projected to decrease 5 percent between 1986 and 2000. This represents a continuation of a very long-term decline, but nevertheless a slowing of the rate of decline that occurred during the previous 14 years.

Trends by industry

Occupational projections were developed through the use of an industry-occupation employment matrix. The 1986 matrix used as the base year of the projections presents the occupational structure of 258 detailed industries. These data

were derived primarily from the Bureau's Occupational Employment Statistics Survey, which obtains data on the occupational staffing patterns of industries.¹ The 1986 occupational structure of each industry was projected to 2000 through analysis of the factors that are expected to change the structure, such as changes in technology, business practices and methods of operation, and product demand. The projected structure was then applied to projections of total employment for each industry described in Personick's article. To derive the projections of total employment by occupation, the detailed cells of the matrix were aggregated across all industries.²

Table 2, derived from the National Industry-Occupation Matrix, shows the absolute and percent changes in employment between 1986 and 2000 for major occupational groups

by major industry division. More than 80 percent of the rise in total employment is projected to occur among wage and salary workers in wholesale and retail trade and in services. Increases in the number of marketing and sales and service workers are expected to account for almost half of the employment gains in these two industry divisions. This is as one would expect because of the high concentration of these two groups. What is not so obvious, however, is the impact that these two divisions may have on other occupational groups. For example, employment gains in wholesale and retail trade and services are expected to account for nearly all of the job growth for the teachers, librarians, and counselors occupation and workers in the health diagnosing and treating occupation;³ 82 percent of the growth for the technicians occupation; 66 percent of the increase in the scientists and computer specialists occupation; 65 percent of the rise in the other professionals occupation; and 58 percent of the growth in managers. Except for teachers in services, each of these occupational groups has a projected growth rate that is faster than that projected for total employment in the trade and services divisions.

Although most of the total employment change is projected to occur in trade and services, several other industry divisions have notable changes. Finance, insurance, and real estate is projected to account for 8 percent of the growth in total employment or 1.6 million jobs. Most of the growth in this industry division is expected to occur among workers in managerial and management-related occupations and workers in administrative support, including clerical workers. The increase in the number of clerical workers is projected to exceed that of managers within the finance, insurance, and real estate division. However, the overall rate of growth for clerical occupations is less than that for managers due to office automation in banking, credit reporting agencies, and insurance.

Another industry division adding significant numbers of jobs is construction, which accounts for 4 percent of the growth in total jobs (891,000). Nearly half of this industry's growth is expected to occur among the construction trades and extractive occupations.

Government (excluding State and local government employees in education and hospitals) is projected to account for 4 percent of total employment growth (811,000 jobs); this increase is expected to occur mainly among State and local government service workers, such as police and firefighters. Also noteworthy in government is the projected loss of 45,000 jobs among administrative support workers, including clerical. This loss is largely due to projected declines in typists, stenographers, payroll and timekeeping clerks, and statistical clerks.

The manufacturing industry division is projected to decrease by more than 800,000 jobs. The largest employment declines in manufacturing are projected to be for machine setters, set-up operators, operators, and tenders; assemblers and other handwork occupations; administrative support

workers, including clerical; helpers, laborers, and material movers, hand; and transportation and material moving machine and vehicle operators. Many of the detailed occupations in these groups are expected to be affected by automation and a decrease in demand for the products of industries in which they are concentrated because of changes in consumer tastes, shifts in governmental priorities, and increases in foreign competition. Despite the drop in employment, some occupational groups within manufacturing are expected to grow. The group with the largest job increase is engineers (165,000), followed by managers (85,000) and technicians (70,000).

The agriculture, forestry, and fishing division has a projected increase in employment among wage and salary workers, but if self-employed agriculture workers are included, the industry shows a decrease.

The number of self-employed workers and unpaid family workers combined is projected to increase by 12.2 percent, from 9.8 million in 1986 to 10.9 million in the year 2000. This estimate refers to both nonfarm and agricultural industries. All of this growth is expected to occur among self-employed workers, because jobs for unpaid family workers are projected to decline by a quarter of a million. For self-employed workers and unpaid family workers combined, sales occupations are expected to account for 560,000 of the total increase of 1.2 million jobs. The occupational group expected to add the next largest number of self-employed and unpaid family worker jobs is managers and management-related workers (356,000), followed by service workers (176,000), and construction trades and extractive workers (167,000).

Trends for occupational clusters

The Bureau has developed projections for 480 detailed occupations, which are grouped into clusters that conform to the Standard Occupational Classification system. (See table 3.) These clusters are discussed in terms of employment change, factors affecting change, and significant detailed occupational components. The occupational groups in this section below are based on the occupational classification used in the National Industry-Occupation Matrix. They differ somewhat from previously discussed groups based on the Current Population Survey, which is the only source of comparable occupational employment data for the entire 1972-86 period.

Managerial and management-related occupations. Several managerial occupations are expected to grow rapidly from 1986 to 2000 due to the increasing complexity of business operations and the large employment gains in trade and service industries where, because of small firm size, a higher than average proportion of employment is in management occupations. For example, the number of employment interviewers, private or public employment service, is projected to increase by 71 percent, largely as a result

Table 3. Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 [Numbers in thousands]

Occupation	Total employment			1986-2000 employment change						
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Total, all occupations	111,623	126,432	133,030	137,533	14,809	21,407	25,910	13	19	23
Managerial and management-related occupations	10,583	12,900	13,616	14,105	2,316	3,033	3,521	22	29	33
Managerial and administrative occupations	7,369	8,939	9,441	9,780	1,570	2,071	2,411	21	28	33
Education administrators	288	316	325	336	28	37	48	10	13	17
Financial managers	638	747	792	824	109	154	185	17	24	29
Food service and lodging managers	509	628	663	685	120	154	176	24	30	35
General managers and top executives	2,383	2,820	2,965	3,052	437	582	669	18	24	28
Marketing, advertising, and public relations managers	323	402	427	444	80	105	122	25	32	38
Personnel, training, and labor relations managers	151	183	194	201	32	43	50	21	28	33
Postmasters and mail superintendents	28	29	30	31	2	2	4	7	8	14
Property and real estate managers	128	166	178	184	38	50	56	30	39	44
Public administration chief executives, legislators, and general administrators	66	73	75	77	7	9	11	11	14	17
Purchasing managers	230	248	260	266	18	30	36	8	13	16
Management support occupations	3,214	3,961	4,175	4,324	747	962	1,110	23	30	35
Accountants and auditors	945	1,251	1,322	1,371	306	376	426	32	40	45
Claims examiners, property and casualty insurance	34	43	45	46	9	11	12	27	33	36
Inspectors and compliance officers, except construction	125	137	142	146	12	17	21	9	13	17
Construction and building inspectors	50	54	55	57	4	5	7	8	11	14
Cost estimators	157	180	188	197	23	31	39	15	20	25
Employment interviewers, private or public employment service	75	122	129	134	47	54	58	62	71	77
Loan officers and counselors	98	123	131	137	26	33	39	26	34	40
Management analysts	126	155	165	173	29	40	47	23	31	38
Personnel, training, and labor relations specialists	230	264	278	288	34	49	58	15	21	25
Purchasing agents, except wholesale, retail, and farm products	188	181	193	200	-7	5	12	-3	3	7
Tax examiners, collectors, and revenue agents	57	65	67	69	8	10	12	13	17	20
Underwriters	99	127	134	136	28	34	37	28	34	37
Wholesale and retail buyers, except farm products	192	200	209	213	8	17	21	4	9	11
Engineers, architects, and surveyors	1,567	1,917	2,062	2,138	350	495	571	22	32	36
Engineers	1,371	1,683	1,815	1,883	312	444	512	23	32	37
Aeronautical and astronautical engineers	53	53	58	60	0	6	8	1	11	15
Chemical engineers	52	57	60	64	5	8	11	9	15	21
Civil engineers, including traffic engineers	199	238	249	257	39	50	58	20	25	29
Electrical and electronics engineers	401	544	592	616	143	192	215	36	48	54
Industrial engineers, except safety engineers	117	140	152	158	22	35	41	19	30	35
Mechanical engineers	233	286	309	320	53	76	87	23	33	37
Architects, except landscape and marine	84	102	108	112	18	25	29	22	30	34
Surveyors	94	108	113	117	13	19	22	14	20	24
Natural, computer, and mathematical scientists	738	1,014	1,077	1,122	275	339	384	37	46	52
Computer systems analysts, electronic data processing	331	544	582	607	212	251	276	64	76	83
Life scientists	140	163	170	176	23	30	35	16	21	25
Biological scientists	61	72	75	82	11	14	16	18	23	27
Mathematical scientists, actuaries and statisticians	48	58	61	63	11	14	16	22	29	33
Operations and systems researchers	38	55	59	62	17	21	23	44	54	61
Physical scientists	180	194	205	214	13	24	34	7	13	19
Chemists	86	92	96	95	5	10	15	6	11	17
Geologists, geophysicists, and oceanographers	44	46	50	49	2	6	8	6	13	19
Teachers, librarians, and counselors	4,949	5,558	5,720	5,906	610	772	957	12	16	19
Teachers, preschool, kindergarten, and elementary	1,702	2,011	2,066	2,131	308	363	428	18	21	25
Teachers, preschool	176	233	240	248	57	64	72	33	36	41
Teachers, kindergarten and elementary	1,527	1,778	1,826	1,883	251	299	356	16	20	23
Teachers, secondary school	1,128	1,246	1,280	1,320	118	152	192	10	13	17
College and university faculty	754	703	722	745	-51	-32	-9	-7	-4	-1
Other teachers and instructors	1,097	1,296	1,340	1,386	199	243	289	18	22	26
Adult and vocational education teachers	427	489	509	529	62	82	102	14	19	24
Instructors, adult (nonvocational) education	202	229	241	251	26	39	49	13	19	24
Teachers and instructors, vocational education and training	225	260	268	278	35	43	53	16	19	24
Librarians, archivists, curators, and related workers	144	159	165	170	15	20	25	10	14	18
Librarians, professional	136	150	155	159	14	18	23	10	13	17
Counselors	123	144	148	154	21	25	32	17	21	26
Health diagnosing and treating occupations	2,592	3,528	3,674	3,785	935	1,081	1,192	36	42	46
Dentists	151	184	196	203	33	45	52	22	30	34
Dietitians and nutritionists	40	52	54	55	12	14	15	29	34	38
Optometrists	37	52	55	57	15	18	20	40	49	54
Pharmacists	151	179	187	191	29	36	41	19	24	27
Physician assistants	26	39	41	42	13	15	16	49	57	62
Physicians and surgeons	491	645	679	700	154	188	209	31	38	43
Registered nurses	1,406	1,951	2,018	2,077	546	612	671	39	44	48
Therapists	240	352	366	378	112	126	138	46	52	57
Occupational therapists	29	43	45	46	14	15	17	46	52	58
Physical therapists	61	109	115	118	48	53	57	79	87	94
Recreational therapists	29	41	43	44	12	14	15	42	49	52
Respiratory therapists	56	74	76	78	17	19	22	30	34	38
Speech pathologists and audiologists	45	58	61	63	13	15	18	29	34	39
Veterinarians and veterinary inspectors	37	52	54	57	15	17	19	39	46	52
Other professional specialists	3,692	4,421	4,660	4,842	729	967	1,150	20	26	31
Artists and commercial artists	176	218	235	246	43	59	70	24	34	40
Designers	259	322	343	357	63	84	97	24	32	38
Musicians	189	218	231	239	30	42	50	16	23	27
Photographers and camera operators	109	137	146	153	28	37	44	25	33	41

Table 3. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 [Numbers in thousands]

Occupation	Total employment				1986–2000 employment change					
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Photographers	100	126	133	140	25	33	40	25	33	40
Producers, directors, actors, and entertainers	73	87	97	103	15	24	30	20	34	41
Public relations specialists and publicity writers	87	115	122	127	28	35	39	32	40	45
Radio and TV announcers and newscasters	61	71	76	84	10	15	23	16	24	38
Reporters and correspondents	75	84	88	93	9	13	19	12	18	25
Writers and editors, including technical writers	214	268	287	301	54	73	88	25	34	41
Economists	37	47	50	52	10	13	15	27	34	40
Psychologists	110	140	148	153	30	37	43	27	34	39
Clergy	295	291	304	313	-4	9	18	-1	3	6
Directors, religious activities and education	46	43	45	46	-3	-1	0	-7	-3	0
Recreation workers	164	190	196	202	26	33	38	16	20	23
Social service technicians	88	117	122	125	29	34	37	33	38	42
Social workers	365	468	485	500	103	120	134	28	33	37
Judges, magistrates, and other judicial workers	38	46	47	48	8	9	10	21	23	27
Lawyers	527	676	718	748	149	191	221	28	36	42
Technician occupations	3,650	4,791	5,053	5,226	1,141	1,403	1,576	31	38	43
Health technicians and technologists	1,598	2,171	2,261	2,326	573	663	728	36	41	46
Dental hygienists	87	134	141	145	47	54	58	54	63	67
Emergency medical technicians	65	73	75	77	8	10	12	12	15	18
Licensed practical nurses	631	835	869	891	204	238	260	32	38	41
Medical and clinical lab technologists and technicians	239	285	296	307	46	57	67	19	24	28
Medical records technicians	40	67	70	72	28	30	32	69	75	80
Opticians, dispensing and measuring	50	69	72	74	19	23	24	39	46	49
Radiologic technologists and technicians	115	183	190	196	67	75	80	58	65	70
Surgical technicians	37	48	49	51	11	12	14	30	33	37
Engineering and science technicians and technologists	1,264	1,454	1,549	1,604	190	285	340	15	23	27
Engineering technicians	689	874	933	964	185	245	276	27	35	40
Electrical and electronic technicians and technologists	313	428	459	473	114	145	160	37	46	51
Drafters	348	331	354	366	-17	5	17	-5	2	5
Physical and life science technicians, technologists, and mathematical technicians	227	250	262	274	23	35	47	10	15	21
Technicians, except health and engineering and science	788	1,166	1,243	1,297	377	454	509	48	58	65
Air traffic controllers	26	27	28	29	1	2	3	4	8	10
Broadcast technicians	27	31	33	37	3	5	9	12	20	34
Computer programmers	479	758	813	850	279	335	371	58	70	78
Legal assistants and technicians, except clerical	170	258	272	282	87	102	112	51	60	66
Paralegal personnel	61	118	125	130	56	64	68	92	104	112
Title examiners and searchers	30	34	36	37	5	6	7	15	22	25
Technical assistants, library	51	56	57	59	5	7	8	10	13	16
Marketing and sales occupations	12,606	15,522	16,334	16,760	2,916	3,728	4,153	23	30	33
Cashiers	2,165	2,616	2,740	2,798	450	575	633	21	27	29
Counter and rental clerks	178	221	238	246	43	60	68	24	34	38
Insurance salesworkers	463	535	565	581	73	102	118	16	22	25
Real estate agents and brokers	376	507	542	562	131	166	186	35	44	49
Brokers, real estate	63	86	91	94	23	28	31	36	45	49
Sales agents, real estate	313	422	451	468	108	138	155	35	44	49
Real estate appraisers	36	48	51	53	12	15	17	33	41	46
Salespersons, retail	3,579	4,563	4,780	4,871	984	1,201	1,291	28	34	36
Securities and financial services salesworkers	197	266	279	290	69	82	93	35	42	47
Stock clerks, sales floor	1,087	1,255	1,312	1,333	168	225	246	15	21	23
Travel agents	105	146	154	159	41	49	53	39	46	51
Administrative support occupations, including clerical	19,851	21,028	22,109	22,885	1,177	2,258	3,034	6	11	15
Adjusters, investigators, and collectors	762	852	894	920	90	132	158	12	17	21
Adjustments clerks	136	157	165	170	20	29	34	15	21	25
Bill and account collectors	126	157	167	174	32	42	49	25	33	39
Insurance claims and policy processing occupations	355	367	385	393	13	30	38	4	9	11
Insurance adjusters, examiners, and investigators	119	147	154	158	29	36	39	24	30	33
Insurance claims clerks	85	84	88	90	-1	3	5	-1	4	6
Insurance policy processing clerks	151	136	142	145	-15	-9	-6	-10	-6	-4
Welfare eligibility workers and interviewers	86	98	100	103	12	14	17	14	16	20
Communications equipment operators	365	381	404	422	16	39	57	4	11	16
Telephone operators	353	369	391	408	15	38	55	4	11	16
Central office operators	42	32	34	37	-10	-8	-5	-25	-18	-13
Directory assistance operators	32	24	27	28	-8	-6	-4	-24	-18	-12
Switchboard operators	279	313	330	343	34	51	64	12	18	23
Computer operators and peripheral equipment operators	309	430	457	475	121	148	166	39	48	54
Computer operators, except peripheral equipment	263	364	387	403	101	124	140	39	47	53
Peripheral electronic data processing equipment operators	46	66	70	73	19	24	26	42	51	57
Duplicating, mail, and other office machine operators	166	169	178	185	3	12	19	2	7	11
Financial records processing occupations	5,093	5,350	5,637	5,832	257	544	739	5	11	15
Billing, cost, and rate clerks	307	298	313	322	-10	5	14	-3	2	5
Billing, posting, and calculating machine operators	105	108	114	117	4	9	12	4	9	12
Bookkeeping, accounting, and auditing clerks	2,116	2,085	2,208	2,291	-31	92	175	-1	4	8
Payroll and timekeeping clerks	204	171	180	186	-34	-25	-18	-16	-12	-9
General office clerks	2,361	2,688	2,824	2,916	327	462	554	14	20	23
Information clerks	1,111	1,452	1,534	1,587	341	423	476	31	38	43
Hotel desk clerks	109	146	156	163	37	47	54	34	43	49
Interviewing clerks, except personnel and social welfare	104	143	150	158	39	46	54	37	45	52
New accounts clerks, banking	94	110	117	122	16	23	28	17	24	30

Table 3. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 (Numbers in thousands)

Occupation	Total employment				1986-2000 employment change					
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Receptionists and information clerks	682	913	964	997	232	282	315	34	41	46
Reservation and transportation ticket agents and travel clerks	122	139	146	147	18	24	26	15	20	21
Mail and message distribution workers	876	924	947	992	48	71	116	5	8	13
Mail clerks, except mail machine operators and postal service	136	138	145	150	1	9	14	1	6	10
Messengers	101	116	123	128	16	22	28	16	22	28
Postal mail carriers	269	288	291	306	18	22	37	7	8	14
Postal service clerks	370	383	388	408	12	18	37	3	5	10
Material recording, scheduling, dispatching, and distribution occupations	2,173	2,151	2,264	2,330	-22	91	157	-1	4	7
Dispatchers	185	206	215	221	21	30	36	11	16	20
Dispatchers, except police, fire, and ambulance	124	138	146	151	14	22	26	11	18	21
Dispatchers, police, fire, and ambulance	61	67	69	71	6	8	10	11	13	16
Meter readers, utilities	48	42	43	44	-6	-5	-4	-12	-10	-7
Order fillers, wholesale and retail sales	195	200	208	211	5	13	16	3	7	8
Procurement clerks	41	33	35	37	-7	-5	-4	-18	-13	-9
Production, planning, and expediting clerks	213	210	228	239	-3	15	26	-1	7	12
Stock clerks, stockroom, warehouse, or yard	726	668	703	721	-57	-23	-4	-8	-3	-1
Traffic, shipping, and receiving clerks	548	557	585	604	9	38	56	2	7	10
Weighers, measurers, checkers, and samplers, recordkeepers	40	37	39	41	-3	0	1	-7	-1	3
Records processing occupations, except financial	848	898	939	969	49	91	121	6	11	14
Brokerage clerks	58	73	75	77	15	16	19	25	28	32
File clerks	242	260	274	283	18	32	41	8	13	17
Library assistants and bookmobile drivers	102	111	114	117	9	12	16	9	12	15
Order clerks, materials, merchandise, and service	271	263	277	285	-8	6	13	-3	2	5
Personnel clerks, except payroll and timekeeping	119	119	126	130	0	7	11	0	6	9
Statement clerks	43	54	57	59	11	14	16	26	32	37
Secretaries, stenographers, and typists	4,414	4,413	4,648	4,813	-2	234	398	0	5	9
Secretaries	3,234	3,470	3,658	3,789	236	424	554	7	13	17
Stenographers	178	123	128	133	-55	-50	-46	-31	-28	-26
Typists and word processors	1,002	820	862	892	-182	-140	-110	-18	-14	-11
Other clerical and administrative support workers	3,732	4,009	4,206	4,358	277	475	627	7	13	17
Bank tellers	539	576	610	635	37	71	96	7	13	18
Court clerks	40	49	51	52	9	10	12	23	26	30
Credit checkers	41	42	45	47	1	4	6	3	10	15
Customer service representatives, utilities	102	93	99	104	-9	-3	2	-9	-3	2
Data entry keyers, except composing	400	315	334	347	-85	-66	-53	-21	-16	-13
Data entry keyers, composing	29	41	43	45	13	15	17	44	51	58
First-line supervisors and managers	956	1,106	1,161	1,200	150	205	244	16	21	25
Loan and credit clerks	159	191	207	217	32	47	57	20	30	36
Real estate clerks	26	35	36	37	9	10	11	33	39	42
Statistical clerks	71	49	52	54	-21	-19	-17	-30	-26	-24
Teacher aides and educational assistants	648	752	773	797	104	125	150	16	19	23
Service occupations	17,536	21,933	22,917	23,532	4,397	5,381	5,996	25	31	34
Cleaning and building service occupations, except private household	3,107	3,662	3,819	3,937	555	712	830	18	23	27
Housekeepers, institutional	123	157	165	170	34	42	47	28	34	38
Janitors and cleaners, including maids and housekeeping cleaners	2,676	3,144	3,280	3,382	468	604	706	17	23	26
Pest controllers and assistants	50	56	58	59	6	8	10	13	16	19
Food preparation and service occupations	7,104	9,337	9,705	9,908	2,233	2,601	2,804	31	37	39
Chefs, cooks, and other kitchen workers	2,563	3,299	3,427	3,501	736	864	938	29	34	37
Cooks, except short order	1,023	1,324	1,378	1,413	301	355	390	29	35	38
Bakers, bread and pastry	114	155	162	165	41	48	51	36	42	45
Cooks, institution or cafeteria	389	442	457	469	53	68	80	14	17	20
Cooks, restaurant	520	727	759	778	207	240	259	40	46	50
Cooks, short order and fast food	591	748	775	788	157	184	197	27	31	33
Food preparation workers	949	1,227	1,273	1,300	277	324	351	29	34	37
Food service occupations	4,204	5,611	5,832	5,948	1,407	1,628	1,744	33	39	41
Bartenders	396	530	553	566	134	157	170	34	40	43
Dining room and cafeteria attendants and barroom helpers	433	607	631	644	174	197	211	40	46	49
Food counter, fountain, and related workers	1,500	1,879	1,949	1,985	378	449	485	25	30	32
Hosts and hostesses, restaurant, lounge, and coffee shops	172	236	245	250	64	73	78	37	42	45
Waiters and waitresses	1,702	2,360	2,454	2,503	658	752	801	39	44	47
Health service occupations	1,819	2,437	2,549	2,608	618	730	788	34	40	43
Dental assistants	155	231	244	250	76	88	95	49	57	61
Medical assistants	132	239	251	258	107	119	126	81	90	96
Nursing aides and psychiatric aides	1,312	1,673	1,750	1,786	361	437	474	28	33	36
Nursing aides, orderlies, and attendants	1,224	1,584	1,658	1,691	359	433	467	29	35	38
Psychiatric aides	88	90	92	95	2	4	7	2	5	8
Pharmacy assistants	64	77	79	81	13	15	17	20	24	27
Physical and corrective therapy assistants and aides	36	62	65	67	26	29	31	74	82	87
Personal service occupations	1,799	2,135	2,259	2,341	336	460	542	19	26	30
Amusement and recreation attendants	184	228	239	246	43	55	62	24	30	34
Baggage porters and bellhops	31	39	41	43	8	10	12	24	32	37
Barbers	80	76	81	85	-4	1	4	-5	1	5
Child care workers	589	664	708	739	75	118	150	13	20	25
Cosmetologists and related workers	595	666	702	724	71	107	129	12	18	22
Hairdressers, hairstylists, and cosmetologists	562	627	662	683	65	99	121	12	18	22
Flight attendants	80	101	105	106	21	26	26	26	32	33
Social welfare service and home health aides	197	320	336	349	123	139	152	63	71	77
Home health aides	138	236	249	258	98	111	120	71	80	87

Table 3. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 (Numbers in thousands)

Occupation	Total employment			1986–2000 employment change						
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Social welfare service aides	59	84	88	91	25	29	32	43	49	54
Ushers, lobby attendants, and ticket takers	42	41	46	49	-1	4	7	-2	9	16
Private household workers	981	883	955	970	-98	-26	-11	-10	-3	-2
Housekeepers and butlers	34	32	35	35	-2	1	1	-6	2	4
Child care workers, private household	400	334	362	367	-66	-38	-33	-16	-10	-8
Cleaners and servants, private household	531	501	543	551	-30	12	20	-6	2	4
Protective service occupations	2,055	2,589	2,700	2,813	534	645	758	26	31	37
Correction officers and jailers	176	231	236	243	55	60	67	31	34	38
Firefighting occupations	279	318	325	335	39	47	57	14	17	20
Firefighters	223	255	260	268	32	37	45	14	17	20
Firefighting and prevention supervisors	45	51	52	54	6	8	9	14	17	20
Police and detectives	489	563	576	594	74	87	105	15	18	21
Police and detective supervisors	84	98	100	103	14	17	20	17	20	23
Police detectives and investigators	57	65	67	68	8	10	12	14	17	21
Police patrol officers	349	400	409	422	52	61	73	15	17	21
Crossing guards	52	55	56	58	3	4	6	5	8	11
Guards	794	1,104	1,177	1,241	311	383	447	39	48	56
Agriculture, forestry, fishing, and related occupations	3,556	3,229	3,393	3,497	-327	-163	-59	-9	-5	-2
Animal caretakers, except farm	80	100	104	108	20	24	28	25	30	35
Gardeners and groundskeepers, except farm	767	964	1,005	1,033	197	238	266	26	31	35
Supervisors, farming, forestry, and agricultural-related occupations	65	59	62	64	-6	-3	-1	-9	-4	-1
Farm occupations	986	759	806	837	-227	-180	-149	-23	-18	-15
Farm workers	940	705	750	779	-235	-190	-161	-25	-20	-17
Nursery workers	46	54	57	58	8	11	12	18	24	27
Farm operators and managers	1,336	1,001	1,051	1,078	-335	-285	-258	-25	-21	-19
Farmers	1,182	810	850	871	-372	-332	-311	-31	-28	-26
Farm managers	154	191	201	207	37	47	53	24	31	34
Fishers, hunters, and trappers	77	94	97	101	16	20	23	21	26	30
Forestry and logging occupations	139	128	138	143	-11	-2	4	-8	-1	3
Forest and conservation workers	36	40	42	43	4	5	7	10	15	18
Timber cutting and logging occupations	103	88	96	100	-15	-7	-3	-15	-7	-3
Fallers and buckers	36	29	32	33	-7	-4	-3	-18	-11	-8
Logging tractor operators	28	26	28	29	-2	-1	0	-8	-2	1
Blue-collar worker supervisors	1,823	1,854	1,967	2,051	31	144	228	2	8	13
Construction trades and extractive workers	4,006	4,500	4,710	4,940	495	704	934	12	18	23
Bricklayers and stone masons	161	180	187	196	19	26	36	12	16	22
Carpenters	1,010	1,134	1,192	1,252	124	182	242	12	18	24
Carpet installers	66	78	83	87	12	17	21	19	26	31
Concrete and terrazzo finishers	118	137	142	149	19	24	31	16	20	26
Drywall installers and finishers	154	183	191	200	29	37	46	19	24	30
Electricians	556	617	644	676	61	89	120	11	16	22
Glaziers	47	54	56	58	7	9	11	15	19	24
Hard tile setters	32	37	39	41	6	8	10	19	25	31
Highway maintenance workers	167	184	188	194	18	22	27	11	13	16
Insulation workers	62	73	75	79	11	13	17	18	22	27
Painters and paperhangers, construction and maintenance	412	475	502	526	63	90	114	15	22	28
Paving, surfacing, and tamping equipment operators	59	67	69	72	9	11	13	15	18	23
Pipelayers and pipelaying fitters	52	58	59	62	6	8	10	11	15	20
Plasterers	28	30	31	33	2	3	5	8	12	17
Plumbers, pipefitters, and steamfitters	402	452	471	493	49	69	91	12	17	23
Roofers	142	174	181	190	32	39	48	23	28	34
Structural and reinforcing metal workers	86	101	104	109	14	17	23	17	20	26
Oil and gas extraction occupations	108	103	110	122	-5	2	14	-5	2	13
Roustabouts	56	48	52	57	-8	-4	1	-14	-7	2
Mechanics, installers, and repairers	4,678	5,060	5,365	5,547	382	687	869	8	15	19
Communications equipment mechanics, installers, and repairers	109	79	87	92	-30	-23	-17	-27	-21	-16
Central office and pax installers and repairers	74	52	57	60	-22	-17	-13	-29	-23	-18
Electrical and electronic equipment mechanics, installers, and repairers	533	576	614	637	43	81	105	8	15	20
Data processing equipment repairers	69	117	125	129	48	56	60	69	80	86
Electrical powerline installers and repairers	108	114	118	121	6	11	14	6	10	13
Electronic home entertainment equipment repairers	49	54	59	60	5	10	12	11	20	24
Electronics repairers, commercial and industrial equipment	81	97	104	107	17	23	26	21	28	33
Station installers and repairers, telephone	58	36	40	42	-22	-18	-16	-37	-32	-28
Television and cable TV line installers and repairers	119	102	108	115	-18	-11	-4	-15	-9	-4
Machinery and related mechanics, installers, and repairers	1,545	1,712	1,810	1,881	167	265	335	11	17	22
Industrial machinery mechanics	421	420	447	468	-1	26	48	0	6	11
Maintenance repairers, general utility	1,039	1,205	1,270	1,314	167	232	275	16	22	26
Millwrights	86	87	93	99	0	7	13	0	8	15
Vehicle and mobile equipment mechanics and repairers	1,559	1,654	1,759	1,806	94	200	247	6	13	16
Aircraft mechanics and engine specialists	107	122	129	130	15	22	23	14	20	21
Aircraft mechanics	91	104	109	110	13	19	20	14	20	22
Automotive body and related repairers	214	221	239	246	7	25	31	3	12	15
Automotive mechanics	748	758	808	830	10	60	82	1	8	11
Bus and truck mechanics and diesel engine specialists	263	308	325	334	45	63	72	17	24	27
Farm equipment mechanics	52	51	54	55	0	2	3	0	4	6
Mobile heavy equipment mechanics, except engines	102	121	127	131	19	25	29	19	24	29
Small engine specialists	38	45	48	49	6	9	11	16	24	28

Table 3. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 (Numbers in thousands)

Occupation	Total employment			1986–2000 employment change						
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Other mechanics, installers, and repairers	931	1,039	1,095	1,132	108	164	200	12	18	21
Coin and vending machine servicers and repairers	27	29	30	31	2	3	4	6	12	15
Heating, air conditioning and refrigeration mechanics and installers	222	260	272	283	38	50	61	17	22	27
Home appliance and power tool repairers	76	79	84	86	3	8	10	4	10	13
Office machine and cash register servicers	56	75	78	80	19	22	24	34	40	43
Precision instrument repairers	49	48	52	54	-1	3	5	-2	5	10
Tire repairers and changers	83	98	103	105	15	20	22	18	24	26
Precision production and plant systems occupations	3,066	2,993	3,200	3,329	-73	134	263	-2	4	9
Precision food workers	317	312	322	330	-6	5	13	-2	2	4
Bakers, manufacturing	38	34	35	37	-4	-3	-1	-10	-7	-3
Butchers and meatcutters	248	251	259	264	2	11	16	1	4	7
Precision metal workers	939	889	962	994	-51	22	55	-5	2	6
Boilermakers	30	30	32	33	0	2	3	-1	5	10
Jewelers and silversmiths	36	42	44	45	6	8	9	16	22	25
Machinists	378	345	373	385	-34	-5	6	-9	-1	2
Sheet metal workers	222	226	240	249	4	19	28	2	8	13
Tool and die makers	160	152	168	174	-8	8	14	-5	5	9
Precision printing workers	112	117	122	128	5	10	16	5	9	14
Compositors, typesetters, and arrangers, precision	30	24	25	26	-6	-5	-4	-21	-17	-13
Lithography and photoengraving workers, precision	48	57	59	62	9	11	14	18	22	29
Precision textile, apparel, and furnishing workers	285	287	306	320	1	21	34	0	7	12
Custom tailors and sewers	108	116	123	127	7	15	19	7	13	17
Shoe and leather workers and repairers, precision	35	28	29	30	-7	-6	-5	-20	-17	-14
Upholsterers	74	75	82	87	1	8	13	1	10	17
Precision woodworkers	204	214	234	250	10	30	46	5	15	23
Inspectors, testers, and graders	694	640	692	722	-55	-3	28	-8	0	4
Other precision workers	223	250	267	278	28	44	55	12	20	25
Dental lab technicians, precision	46	60	64	67	14	18	21	31	39	46
Chemical plant and system operators	33	23	23	25	-11	-10	-8	-32	-30	-25
Electric power generating plant operators, distributors, and dispatchers	45	48	50	51	3	5	6	7	11	14
Power generating and reactor plant operators	25	27	28	29	3	3	4	10	14	16
Gas and petroleum plant and system occupations	31	19	20	21	-11	-11	-9	-37	-34	-30
Stationary engineers	41	41	42	44	0	2	4	0	5	9
Water and liquid waste treatment plant and systems operators	74	83	85	88	9	11	14	13	15	19
Machine setters, set-up operators, operators, and tenders	4,964	4,470	4,770	5,012	-494	-194	47	-10	-4	1
Numerical control machine tool operators and tenders, metal and plastic	56	55	60	61	-2	4	5	-3	7	9
Combination machine tool setters, set-up operators, operators, and tenders	92	88	97	100	-3	5	8	-4	6	9
Machine tool cutting and forming set-up operators and tenders, metal and plastic	822	668	737	766	-155	-85	-56	-19	-10	-7
Drilling machine tool setters and set-up operators, metal and plastic	63	51	57	58	-11	-6	-4	-18	-10	-7
Grinding machine setters and set-up operators, metal and plastic	88	72	80	82	-16	-8	-6	-18	-9	-6
Lathe machine tool setters and set-up operators, metal and plastic	96	78	86	89	-18	-9	-7	-18	-10	-7
Machine forming operators and tenders, metal and plastic	170	141	156	163	-29	-15	-7	-17	-9	-4
Machine tool cutters operators and tenders, metal and plastic	167	134	148	153	-33	-19	-14	-20	-11	-8
Punching machine setters and set-up operators, metal and plastic	61	50	55	58	-11	-6	-4	-18	-9	-6
Metal fabrication machine setters, operators, and related workers	180	152	167	172	-28	-13	-8	-16	-7	-4
Metal fabricators, structural metal products	37	35	38	39	-2	1	3	-4	4	7
Welding machine setters, operators, and tenders	126	101	112	115	-25	-15	-11	-20	-12	-9
Metal and plastic process machine setters, operators, and related workers	300	296	320	338	-3	21	39	-1	7	13
Electric plating machine operators and tenders, setters and set-up operators, metal and plastic	47	41	45	46	-6	-1	0	-12	-3	0
Metal molding machine operators and tenders, setters and set-up operators	37	29	33	34	-8	-4	-3	-22	-12	-7
Plastic molding machine operators and tenders, setters and set-up operators	147	174	183	193	27	36	46	19	25	31
Printing, binding, and related workers	412	458	478	505	46	66	93	11	16	23
Bindery machine operators, setters, and set-up operators	72	86	90	95	14	17	22	19	24	31
Printing press operators	222	252	262	278	29	40	56	13	18	25
Offset lithographic press setters and set-up operators	73	92	96	101	19	23	28	27	32	39
Printing press machine setters, operators, and tenders	115	126	131	140	11	17	25	10	15	22
Photoengraving and lithographic machine operators and photographers	29	37	38	40	7	9	11	24	29	36
Typesetting and composing machine operators and tenders	37	35	36	37	-2	-1	1	-6	-3	2
Textile and related setters, operators, and related workers	1,165	959	995	1,048	-206	-170	-117	-18	-15	-10
Pressing machine operators and tenders, textile, garment, and related workers	89	83	88	90	-6	-1	2	-7	-2	2
Sewing machine operators, garment	633	526	541	567	-106	-92	-66	-17	-14	-10
Sewing machine operators, nongarment	135	119	125	131	-16	-10	-3	-12	-7	-2
Textile draw-out and winding machine operators and tenders	219	156	164	175	-62	-55	-43	-28	-25	-20
Textile machine setters and set-up operators	54	45	47	51	-9	-7	-3	-16	-13	-6
Woodworking machine setters, operators, and other related workers	147	140	159	173	-7	12	26	-5	8	18
Head sawyers and sawing machine operators and tenders, setters and set-up operators	74	68	78	85	-5	5	12	-7	7	16
Woodworking machine operators and tenders, setters and set-up operators	74	72	81	88	-2	7	14	-2	9	19
Other machine setters, set-up operators, operators, and tenders	1,700	1,575	1,668	1,754	-125	-32	54	-7	-2	3
Cementing and gluing machine operators and tenders	42	39	41	45	-3	-1	3	-8	-2	6
Chemical equipment controllers, operators and tenders	73	50	52	55	-24	-22	-18	-33	-30	-25
Cooking and roasting machine operators and tenders, food and tobacco	26	22	22	23	-4	-4	-3	-17	-14	-11
Crushing and mixing machine operators and tenders	132	117	123	129	-16	-9	-3	-12	-7	-2
Cutting and slicing machine setters, operators, and tenders	82	79	82	88	-3	0	6	-4	0	7
Electronic semiconductor processors	29	13	14	14	-15	-15	-15	-53	-51	-52

Table 3. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1986 and projected to 2000
 (Numbers in thousands)

Occupation	Total employment			1986-2000 employment change						
	1986	Projected, 2000			Number			Percent		
		Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Extruding and forming machine setters, operators, and tenders	100	91	96	102	-9	-3	2	-9	-3	2
Furnace, kiln, or kettle operators and tenders	58	49	53	56	-9	-5	-2	-16	-8	-3
Laundry and drycleaning machine operators and tenders, except pressers	140	160	170	175	21	31	36	15	22	26
Packaging and filling machine operators and tenders	299	280	293	308	-19	-5	10	-6	-2	3
Painting and paint spraying machine operators	100	94	102	107	-7	1	6	-7	1	6
Painting machine operators, tenders, setters, and set-up operators	66	62	68	72	-3	2	6	-5	3	9
Painters, transportation equipment	35	31	34	35	-4	-1	0	-10	-2	1
Paper goods machine setters and set-up operators	60	58	60	66	-2	0	6	-4	0	10
Photographic processing machine operators and tenders	39	45	48	51	6	9	12	16	24	32
Separating and still machine operators and tenders	26	22	23	24	-4	-3	-2	-16	-12	-7
Shoe sewing machine operators and tenders	27	18	18	18	-8	-9	-8	-31	-32	-31
Assembler and other handwork occupations	2,701	2,389	2,589	2,695	-312	-113	-6	-12	-4	0
Precision assemblers	351	315	348	358	-36	-3	7	-10	-1	2
Electrical and electronic equipment assemblers, precision	170	155	171	177	-15	1	6	-9	1	4
Electromechanical equipment assemblers, precision	59	57	62	64	-2	4	5	-3	7	9
Machine builders and other precision machine assemblers	50	44	48	49	-6	-2	-1	-12	-4	-1
Other hand workers, including assemblers and fabricators	2,350	2,074	2,240	2,338	-277	-110	-13	-12	-5	-1
Cannery workers	78	69	72	76	-8	-5	-1	-11	-7	-2
Coil winders, tapers, and finishers	34	25	28	29	-9	-6	-5	-26	-19	-16
Cutters and trimmers, hand	50	48	50	53	-2	0	3	-4	1	6
Electrical and electronic assemblers	249	105	116	119	-145	-134	-131	-58	-54	-52
Grinders and polishers, hand	73	62	69	72	-11	-4	-2	-15	-6	-2
Machine assemblers	50	44	49	50	-6	-1	0	-12	-2	1
Meat, poultry, and fish cutters and trimmers, hand	101	105	106	108	3	4	7	3	4	7
Painting, coating, and decorating workers, hand	42	42	46	48	0	4	6	-1	9	14
Solderers and brazers	25	24	27	28	-1	2	3	-3	7	10
Welders and cutters	287	284	307	320	-4	19	32	-1	7	11
Transportation and material moving machine and vehicle operators	4,789	5,029	5,289	5,456	240	500	667	5	10	14
Aircraft pilots and flight engineers	76	94	98	99	17	22	23	23	29	30
Motor vehicle operators	3,089	3,520	3,693	3,798	431	604	709	14	20	23
Bus drivers	478	541	555	572	63	77	94	13	16	20
Bus drivers, except school	143	172	177	182	29	34	39	20	24	27
Bus drivers, school	334	369	378	390	34	44	56	10	13	17
Taxi drivers and chauffeurs	88	88	94	98	0	6	10	0	7	11
Truck drivers	2,463	2,821	2,968	3,050	358	505	587	15	21	24
Driver-salesworkers	252	222	232	239	-30	-20	-13	-12	-8	-5
Truck drivers, light and heavy	2,211	2,599	2,736	2,811	388	525	600	18	24	27
Rail transportation workers	117	66	74	79	-51	-43	-39	-44	-37	-33
Railroad brake, signal, and switch operators	42	22	25	27	-20	-17	-15	-47	-40	-36
Railroad conductors and yardmasters	29	15	17	18	-14	-12	-11	-48	-41	-37
Water transportation and related workers	50	43	46	49	-8	-4	-1	-15	-8	-3
Other transportation and related workers	416	401	421	430	-15	5	15	-4	1	4
Parking lot attendants	30	34	37	38	4	7	8	12	21	25
Service station attendants	299	272	285	291	-28	-14	-8	-9	-5	-3
Material moving equipment operators	998	857	905	947	-140	-93	-51	-14	-9	-5
Crane and tower operators	58	56	60	64	-2	3	7	-4	5	11
Excavation and loading machine operators	70	75	79	83	6	9	13	8	13	19
Grader, dozer, and scraper operators	92	100	104	109	8	11	17	8	12	18
Industrial truck and tractor operators	426	265	283	296	-161	-143	-131	-38	-34	-31
Operating engineers	150	167	172	180	17	23	30	11	15	20
Helpers, laborers, and material movers, hand	4,273	4,295	4,522	4,705	22	249	432	1	6	10
Freight, stock, and material movers, hand	831	768	811	838	-63	-19	8	-8	-2	1
Hand packers and packagers	566	606	639	662	40	73	96	7	13	17
Helpers, construction trades	519	570	587	616	51	68	97	10	13	19
Machine feeders and offbearers	278	242	262	280	-36	-16	2	-13	-6	1
Refuse collectors	113	130	135	138	17	22	25	15	19	22
Vehicle washers and equipment cleaners	189	190	203	208	1	14	19	0	7	10

of the rapid growth of the personnel supply services industry, which has many small establishments. Other managerial occupations projected to grow rapidly because of large employment gains in industries where the occupations are concentrated include insurance underwriters (34 percent), property and real estate managers (39 percent), and loan officers and counselors (34 percent). However, not all occupations in the managerial group will fare as well. Employment for purchasing managers; purchasing agents, except wholesale, retail, and farm products; and wholesale and retail buyers is expected to grow more slowly than total employment due to the computerization of purchasing tasks

and more efficient purchasing methods. Other occupations with low projected growth rates are in Federal, State, and local governments, which are not expected to grow as fast as the overall economy; these occupations include postmasters and mail superintendents, public administrators, and construction and building inspectors.

Engineers, architects, and surveyors. The electrical engineers occupation is projected to have the largest employment gain (192,000 jobs) and the most rapid increase (48 percent) in this cluster. Most of the increase is expected to occur in industries such as communications equipment,

computers, and other electronics equipment manufacturing. The need to remain competitive will require an increasing number of these engineers to update product designs, explore more cost-efficient ways of producing goods, and develop new products.

The mechanical engineers occupation is projected to have the next largest employment gain (76,000 jobs) and the second most rapid increase (33 percent) among occupations in the engineers, architects, and surveyors group. Most of the employment increase is expected in manufacturing because of increasing product design requirements. Other sources of demand for mechanical engineers include services, such as engineering and architectural services, miscellaneous business services, and temporary help supply services. Construction and government industries are expected to employ an increasing number of mechanical engineers as well. The number of civil engineers, including traffic engineers is projected to increase by 50,000 jobs (25 percent), based on the need to improve the highway system and other large-scale construction projects in the economic infrastructure. Also, the number of industrial engineers, except safety engineers, is projected to increase by 35,000 workers (30 percent) as industry seeks to improve its efficiency through the introduction of new production techniques, such as integrated manufacturing systems. The architects, except landscape and marine, occupation is projected to gain 25,000 jobs (30 percent) because of increased demand for office buildings, apartment buildings, and residential housing. Computer-assisted design equipment will allow architects to provide more flexible services by producing variations in design more easily.

Natural, computer, and mathematical scientists. The computer systems analysts occupation is expected to have the largest employment gain (251,000 jobs) and the fastest growth (76 percent) of any occupation within this job cluster. Close to half the employment gain for computer systems analysts is projected to occur in the computer and data processing services industry. The remaining increase will be scattered throughout the economy as computers continue to be used more intensively by an ever-expanding number of industries and firms. New business and defense computer applications will continue to be prime sources of demand. The number of operations and systems researchers is projected to grow very rapidly (54 percent) due to the increased importance of quantitative analysis throughout industries.

The number of life scientists is expected to grow 21 percent, or by 30,000 jobs, from 1986 to 2000. The government and health services industries are expected to employ increasing numbers of life scientists as genetic research expands into such areas as new medicines, plant and animal variations, and diagnostic techniques for genetic defects. Employment of physical scientists is to increase moderately at 13 percent, with 24,000 jobs added due to military and private research and development. Employment oppor-

tunities are expected to open up in laser research, high-energy physics, and other areas of advanced science.

Teachers, librarians, and counselors. This group of occupations is projected to grow about as fast as the average for total employment and add about 772,000 jobs. However, not all detailed occupations within this cluster are expected to have the same growth rate due to differing trends in the cohorts that comprise school-age youth in different levels of education. Employment for preschool teachers, for example, is projected to increase faster than total employment, or by 36 percent, because of the increased demand by working parents for child daycare services. The number of kindergarten and elementary school teachers is expected to grow about as fast as the average for total employment; this growth is because of rising enrollments that reflect the increase in births beginning in the late 1970's from the "echo" effect of the post-World War II baby boom. Employment for secondary teachers, however, is expected to grow more slowly than the average for total employment due to the small projected increase in enrollments from 1986 to 2000. The number of college and university faculty is projected to decrease by 4 percent because of the decline in college enrollments projected through 2000. Employment in the professional librarians occupation is expected to grow just slightly less than total employment, or by 13 percent; while the duties of librarians have become heavily automated, their work still requires extensive judgment. The number of counselors in education is projected to grow by 21 percent, as their duties are expected to extend beyond academic counseling into such areas as family relations and substance abuse.

Health diagnosing and treating occupations. Employment for health professionals is expected to grow rapidly (42 percent), adding over 1 million jobs by 2000. Job growth in the health industries where these workers are employed is projected to be among the fastest in the economy, except for the hospital industry, which is projected to grow more slowly than total employment. A variety of health practitioner occupations in the health industries are projected to grow faster than the average for total employment, including physical therapists (87 percent), optometrists (49 percent), and speech pathologists and audiologists (34 percent).

The projections show 2 million registered nurses in 2000, an increase of more than 600,000 jobs. The demand for registered nurses is expected to be particularly strong in hospitals, where, in response to cost-containment pressures, nurses will assume some of the duties previously performed by other health personnel. The number of registered nurses is projected to grow rapidly in physicians' offices, due to the increasing size of physician practices and more sophisticated medical technology, and also in nursing and personal care facilities to care for patients who are expected to have shorter stays in hospitals.

Employment for physicians and surgeons is projected to grow rapidly (38 percent), adding 188,000 jobs. Employ-

ment for physician assistants, a relatively small occupation, is projected to grow much faster than that of physicians. In addition, health maintenance organizations and other group practices are expected to use physician assistants to a greater degree.

Other professional workers. Most other professional occupations are expected to have average or above-average growth rates by 2000. Employment for lawyers is expected to grow about twice as fast as total employment, or by 36 percent, because of projected strong demand for legal services by individuals and businesses. Employment of social workers is expected to rise 33 percent due to the increased demand for social workers as mental health counselors and therapists.

Technicians. Health services, computer applications, research and development, and legal services will be areas of the economy where technician occupations are projected to experience large employment gains. The increase in employment for health technicians and technologists is expected to account for about half of the increase for total technicians—663,000 of the 1,403,000 jobs. The health technicians and technologists group contains occupations with duties ranging from cleaning teeth to administering electrocardiographs. The licensed practical nurses occupation is expected to have the largest numerical increase (238,000 jobs) among the health technicians, with many of these employed in nursing and personal care facilities that are expected to grow in response to an aging population. The radiologic technologists and technicians occupation is expected to have the second largest increase (75,000 jobs), with gains mainly in offices of physicians and in hospitals. The number of medical and clinical laboratory technologists and technicians is expected to increase by 57,000 jobs throughout the health industries and the number of dental hygienists is projected to increase by 54,000 jobs.

Employment for computer programmers is expected to grow rapidly by 70 percent, adding 335,000 jobs. Despite more effective programming tools, demand for software is expected to spur the growth because of the ever-expanding range of new applications for computers. Close to one-half of the job increase for computer programmers is expected to occur in the computer and data processing services industry. The remaining job increases for programmers are expected to be found throughout the economy.

The engineering and science technicians and technologists group is expected to gain 285,000 jobs. These workers are expected to realize healthy job gains in trade, services, and manufacturing. They perform testing, diagnose complicated problems with equipment, and assist scientists and engineers in research and development.

The paralegal personnel occupation is projected to be the fastest growing technician occupation and the fastest growing occupation overall, increasing by 104 percent. (See

table 4.) Nearly all of its employment gain is expected in legal services where the paralegal workers assist lawyers.

Marketing and salesworkers. A rapid projected growth rate for the real estate industry is expected to have a favorable impact on employment for brokers (increasing by 44 percent) and appraisers (increasing by 41 percent). Other sales occupations that are expected to grow rapidly are travel agents (46 percent) and securities and financial services salesworkers (42 percent). The largest detailed occupation in the group—salespersons, retail—is projected to grow 34 percent and add more jobs than any other detailed occupation (1.2 million jobs by 2000). (See table 5.)

Administrative support occupations, including clerical. Office automation and other technological changes are projected to result in employment declines in several clerical occupations, including typists and word processors (14 percent); stenographers (28 percent); payroll and timekeeping clerks (12 percent); telephone central office operators (18 percent); telephone directory assistance operators (18 percent); procurement clerks (13 percent); data entry keyers, except composing (16 percent); and statistical clerks (26 percent). Other clerical occupations, however, are expected to increase because of rapid growth rates in the industries employing them or because of the difficulty in automating their duties. The number of real estate clerks, for example, is expected to grow by 39 percent; hotel desk clerks by 43 percent; brokerage clerks by 28 percent; receptionists and

Table 4. Fastest growing occupations, 1986-2000, moderate alternative
[Numbers in thousands]

Occupation	Employment		Change in employment, 1986-2000		Percent of total job growth, 1986-2000
	1986	Projected, 2000	Number	Percent	
Paralegal personnel	61	125	64	103.7	.3
Medical assistants	132	251	119	90.4	.6
Physical therapists	61	115	53	87.5	.2
Physical and corrective therapy assistants and aides	36	65	29	81.6	.1
Data processing equipment repairers	69	125	56	80.4	.3
Home health aides	138	249	111	80.1	.5
Podiatrists	13	23	10	77.2	0
Computer systems analysts, electronic data processing	331	582	251	75.6	1.2
Medical records technicians	40	70	30	75.0	.1
Employment interviewers, private or public employment service	75	129	54	71.2	.3
Computer programmers	479	813	335	69.9	1.6
Radiologic technologists and technicians	115	190	75	64.7	.3
Dental hygienists	87	141	54	62.6	.3
Dental assistants	155	244	88	57.0	.4
Physician assistants	26	41	15	56.7	.1
Operations and systems researchers	38	59	21	54.1	.1
Occupational therapists	29	45	15	52.2	.1
Peripheral electronic data processing equipment operators	46	70	24	50.8	.1
Data entry keyers, composing	29	43	15	50.8	.1
Optometrists	37	55	18	49.2	.1

information clerks by 41 percent; and interviewing clerks, except personnel and social welfare, by 45 percent. Furthermore, certain clerical occupations are expected to grow as a result of being favorably affected by technological change. The rising use of computers throughout the economy is expected to spur the demand for computer operators and peripheral electronic data processing equipment operators; these occupations are projected to grow by 47 percent and 51 percent, respectively. Also, the data keyers, composing, occupation is projected to grow by 51 percent, a result of the increasing use of computerized typesetting technology.

Service workers. This group is projected to have several rapidly growing occupations and add large numbers of new jobs. Near the top of the list are several health service occupations. The medical assistant occupation, with a growth rate of 90 percent, is projected to be one of the fastest growing occupations from 1986 to 2000 because of the growing acceptance of those workers as a cost-effective way to provide both clinical and clerical support to physicians and other health professionals. The number of home health aides is projected to grow by 80 percent due to a number of factors, mainly the growing elderly population and the continuation of the trend to provide medical care outside of the traditional hospital setting.

Other health service occupations with rapid projected rates of growth over the 1986–2000 period include physical and corrective therapy assistants (82 percent) and dental assistants (57 percent). Employment for nursing aides, orderlies, and attendants is projected to grow by 35 percent, adding 433,000 jobs by 2000; much of the employment growth of these workers is expected in the rapidly expanding nursing and personal care industry. In the slower growing hospital industry, however, employment in this occupation is expected to decline by 62,000 jobs due to cost-cutting efforts.

Employment for food preparation and service occupations is projected to grow by 37 percent, increasing by 2.6 million jobs. These workers are concentrated in eating and drinking places. This industry is projected to have the largest numerical job growth of all the industries in the economy from 1986 to 2000—nearly 2.5 million additional jobs. Occupational employment growth ranges from 17 percent for institution or cafeteria cooks to 46 percent for restaurant cooks.

The protective service workers group is projected to grow by 31 percent, or by 645,000 jobs. Within this group, the largest and most rapidly growing occupation is guards, with a projected increase of 48 percent. Their growth is expected to occur mainly in the protective services industry as more and more firms choose to contract out for protective services.

Another large service occupation with a sizable employment increase is janitors and cleaners (604,000 jobs), although the growth rate for the occupation will be about the average for the economy. More and more firms also are

Table 5. Occupations with the largest job growth, 1986–2000, moderate alternative

[Numbers in thousands]

Occupation	Employment		Change in employment, 1986–2000		Percent of total job growth, 1986–2000
	1986	Projected, 2000	Number	Percent	
Salespersons, retail	3,579	4,780	1,201	33.5	5.6
Waiters and waitresses	1,702	2,454	752	44.2	3.5
Registered nurses	1,406	2,018	612	43.6	2.9
Janitors and cleaners, including maids and housekeeping cleaners	2,676	3,280	604	22.6	2.8
General managers and top executives	2,383	2,965	582	24.4	2.7
Cashiers	2,165	2,740	575	26.5	2.7
Truck drivers, light and heavy	2,211	2,736	525	23.8	2.5
General office clerks	2,361	2,824	462	19.6	2.2
Food counter, fountain, and related workers	1,500	1,949	449	29.9	2.1
Nursing aides, orderlies, and attendants	1,224	1,658	433	35.4	2.0
Secretaries	3,234	3,658	424	13.1	2.0
Guards	794	1,177	383	48.3	1.8
Accountants and auditors	945	1,322	376	39.8	1.8
Computer programmers	479	813	335	69.9	1.6
Food preparation workers	949	1,273	324	34.2	1.5
Teachers, kindergarten and elementary	1,527	1,826	299	19.6	1.4
Receptionists and information clerks	682	964	282	41.4	1.3
Computer systems analysts, electronic data processing	331	582	251	75.6	1.2
Cooks, restaurant	520	759	240	46.2	1.1
Licensed practical nurses	631	869	238	37.7	1.1
Gardeners and groundskeepers, except farm	767	1,005	238	31.1	1.1
Maintenance repairers, general utility	1,039	1,270	232	22.3	1.1
Stock clerks, sales floor	1,087	1,312	225	20.7	1.0
First-line supervisors and managers	956	1,161	205	21.4	1.0
Dining room and cafeteria attendants and barroom helpers	433	631	197	45.6	.9
Electrical and electronics engineers	401	592	192	47.8	.9
Lawyers	527	718	191	36.3	.9

expected to contract out for janitorial services, rather than using their own employees for this work.

Agriculture, forestry, and fishing workers. Although this group as a whole is projected to have an employment decline of 163,000 jobs, several detailed occupations are projected to have significant employment increases. The most important of these increases is for the gardeners and groundskeepers, except farm, occupation that is projected to gain nearly 240,000 jobs largely because of growth in lawn services and landscaping services for both individuals and businesses.

Occupations in farming are projected to account for most of the employment decline in this group. Employment for farmers is expected to decline by 332,000 jobs as small farms continue to be consolidated into larger ones. However, the process of farm consolidation is projected to lead to an increase in the number of jobs (47,000) for farm managers. Employment for farm workers is expected to decrease by almost 200,000 jobs as farming methods and equipment improve.

Blue-collar worker supervisors. The blue-collar worker supervisors occupation is expected to gain 144,000 jobs, an increase of only 8 percent. This slow growth rate is due mainly to the projected employment decline in manufacturing. However, small employment gains are expected in some manufacturing industries, including plastics, electronics, and commercial printing. Most of the growth in the blue-collar worker supervisors occupation is expected to occur outside manufacturing, especially in construction and services.

Construction trades and extractive workers. Employment for carpenters is projected to grow by about 18 percent, or by 182,000 jobs—the largest numerical increase among occupations in this cluster. Close to one-third of the gain is expected to occur among self-employed carpenters. The residential building and nonresidential carpentering and flooring industries are expected to add the bulk of the remaining jobs.

Employment in the electricians occupation is projected to grow by 89,000 jobs. Most of the increase is expected to occur in construction, which will more than offset job losses projected for electricians in manufacturing.

Employment for painters and paperhangers (construction and maintenance) is projected to increase by 90,000 jobs. More than 40 percent of this increase is expected among self-employed painters and paperhangers. The wage and salary worker increase is projected to occur in the construction, real estate, and services sectors.

Employment in the plumbers, pipefitters, and steamfitters occupation is projected to have an increase of 69,000 jobs, mainly occurring in construction.

Mechanics, installers, and repairers. The general utility maintenance repairers occupation is projected to have the largest job gain (232,000 jobs) within this job cluster, although the growth of 22 percent will be the same as that for total employment. A large part of the increase is expected in real estate and services, such as business services, hotels, nursing care, and education. Employment for bus and truck mechanics and diesel engineers is projected to grow by 63,000 jobs due to employment gains in trucking, repair services, and trade. Employment in the data processing equipment repairers group is projected to increase by 56,000 jobs, or 80 percent, the largest percentage increase of any occupation in the mechanics, installers, and repairers group. Most of the increase is expected in the machinery and equipment wholesale trade industry and in the computer and data processing services industry.

The number of automotive mechanics is projected to grow by 60,000 jobs, an increase of only 8 percent. This modest rate of increase is due to a decline in repair work done in gasoline service stations and from better design and workmanship in automobiles.

Precision production and plant system operators. The precision production and plant systems operators group is projected to experience little growth through the year 2000. The precision woodworkers occupation is expected to add 30,000 of the 134,000 new jobs for the group; the dental laboratory technicians and sheet metal workers occupations are expected to add 18,000 jobs and 19,000 jobs, respectively. The number of machinists is projected to drop by 5,000 jobs. Shoe and leather workers and repairers are expected to be one of the most rapidly declining occupations (17 percent) due to the projected declines in the shoe and leather industries.

Machine setters, set-up operators, operators, and tenders. This occupational group is projected to have the largest job decline, down 194,000 jobs. Employment for garment sewing machine operators is expected to decline by 14 percent, or by 92,000 jobs, as a result of the impact of technology and foreign imports on employment in the apparel industry. Other occupations expected to decline include textile drawout and winding machine operators (55,000 jobs); chemical equipment controllers and operators (22,000 jobs); and machine tool cutters, operators, and tenders (19,000 jobs). However, several occupations in this group are in industries that are growing and are expected to make modest gains: plastic molding machine operators and tenders (36,000 jobs), laundry and dry cleaning machine operators and tenders (31,000 jobs), and offset lithographic press setters and operators (23,000 jobs).

Assemblers and other handwork occupations. Employment in this group as a whole is projected to decline by 113,000 jobs as many tasks of the workers are automated. The increasing use of industrial robots, for example, is expected to cause electrical and electronic assemblers to be the fastest declining occupation with a projected loss of 54 percent (table 6) and to cause a more modest 7-percent decline for welders and cutters. The impact of technological change is expected to be less severe on precision assemblers as a group because current robots, which are expected to be used on a large scale in the 1990's, are not capable of performing more complex assembly tasks. The employment of precision assemblers, therefore, is expected to remain virtually unchanged from 1986 to 2000.

Transportation and material moving occupations. Employment in many occupations in this group is expected to decrease between 1986 to 2000 due to declining industry employment and technological changes. The railroad industry, for example, is expected to lose about 190,000 jobs, causing the number of rail transportation workers to drop by 37 percent. The number of water transportation workers is expected to decline by 8 percent as a result of the projected employment losses in the water transportation industries.

The greater use of automated materials handling equipment in factories and warehouses is projected to cause employment in the industrial truck and tractor operators occupation to decrease by about 34 percent. Employment in the truck drivers occupation, however, is projected to grow by 21 percent, increasing by more than half a million jobs between 1986 and 2000. Other occupations expected to have average growth rates include bus drivers, parking lot attendants, excavation and loading machine operators, grading machine operators, and operating engineers. The aircraft pilots and flight engineers occupation is projected to increase faster than the average for total employment, or by 29 percent.

Helpers, laborers, and hand material movers. Occupations in this group are generally expected to grow more slowly than the average for total employment except for the refuse collectors occupation, which is projected to have an average rate of growth through the year 2000. Declines in the machine feeders and offbearers occupation (6 percent) and freight, stock, and material movers occupation (2 percent) are expected as a result of technological changes.

Low and high projections

The distribution of employment by broad occupational group varies little among the projected alternatives for 2000 because of offsetting changes within the broad occupational groups. (See table 7.) In specific occupations, however, some significant differences may exist between the moderate and either the low or high alternatives. The differences in occupational employment from one alternative to another are caused only by differences in projected industry employment levels, because the same set of occupational staffing

Table 6. Fastest declining occupations, 1986–2000, moderate alternative
[Numbers in thousands]

Occupation	Employment		Percent decline in employment
	1986	Projected, 2000	
Electrical and electronic assemblers	249	116	-53.7
Electronic semiconductor processors	29	14	-51.1
Railroad conductors and yardmasters	29	17	-40.9
Railroad brake, signal, and switch operators	42	25	-39.9
Gas and petroleum plant and system occupations	31	20	-34.3
Industrial truck and tractor operators	426	283	-33.6
Shoe sewing machine operators and tenders	27	18	-32.1
Station installers and repairers, telephone	58	40	-31.8
Chemical equipment controllers, operators and tenders	73	52	-29.7
Chemical plant and system operators	33	23	-29.6
Stenographers	178	128	-28.2
Farmers	1,182	850	-28.1
Statistical clerks	71	52	-26.4
Textile draw-out and winding machine operators and tenders	219	164	-25.2
Central office and pax installers and repairers	74	57	-23.1
Farm workers	940	750	-20.3
Coil winders, tapers, and finishers	34	28	-18.5
Central office operators	42	34	-17.9
Directory assistance operators	32	27	-17.7
Compositors, typesetters, and arrangers, precision	30	25	-17.1

Table 7. Occupational employment distribution, 1986 and projected to 2000

Occupation	1986	Projected, 2000		
		Low	Moderate	High
Total, all occupations	100.0	100.0	100.0	100.0
Managerial and management-related workers	9.5	10.2	10.2	10.3
Engineers, architects, and surveyors	1.4	1.6	1.6	1.6
Natural scientists and computer specialists	0.7	0.8	0.8	0.8
Teachers, librarians, and counselors	4.4	4.4	4.3	4.3
Health-diagnosing and treating specialists	2.3	2.8	2.8	2.8
Other professional specialists	3.3	3.5	3.5	3.5
Technicians	3.3	3.8	3.8	3.8
Marketing and salesworkers	11.3	12.3	12.3	12.2
Administrative support, including clerical	17.8	16.6	16.6	16.6
Service workers	15.7	17.3	17.2	17.1
Agriculture, forestry, and fishing workers	3.2	2.6	2.6	2.5
Blue-collar worker supervisors	1.6	1.5	1.5	1.5
Construction trades and extractive workers	3.6	3.6	3.5	3.6
Mechanics and repairers	4.2	4.0	4.0	4.0
Precision production and plant systems occupations	2.7	2.4	2.4	2.4
Machine setters and operators	4.4	3.5	3.6	3.6
Assemblers and other hand workers	2.4	1.9	1.9	2.0
Transportation and material moving workers	4.3	4.0	4.0	4.0
Helpers and laborers	3.8	3.4	3.4	3.4

patterns were used for all alternatives. Total employment in the moderate trend projections varies by only about 4 percent from the high alternative and about 6 percent from the low alternative. Therefore, the greatest numerical differences for specific occupations exist between the low alternative projected employment and the moderate trend employment; the following text tabulation shows these differences:

Occupation	Employment difference
Salespersons, retail	216,000
Secretaries	188,000
General managers and top executives	145,000
Truck drivers, light and heavy	138,000
Janitors and cleaners	136,000
General office clerks	136,000
Cashiers	125,000
Bookkeeping, accounting, and auditing clerks	123,000
Blue-collar worker supervisors	113,000
Waiters and waitresses	94,000

Uses and implications

BLS occupational projections are used extensively for career guidance and provide the background for analyses of future employment opportunities in the BLS *Occupational Outlook Handbook*. Job outlook discussions in the 1988–89 edition of the *Handbook*, scheduled for release in the spring of 1988, will use the projections presented in this article. These projections also provide information for analyzing a variety of issues, including the relation of education and training to job opportunities and labor market conditions for minority groups.

Educational attainment. Much has been written to indicate that the changing occupational structure of employment

implies the need for a more highly educated work force. To see if the 1986–2000 occupational projections substantiate this view, the occupational clusters discussed previously were divided into three groups. Group I includes the clusters in which at least two-thirds of the workers in 1986 had 1 or more years of college. Group II includes the clusters in which the median years of school completed was greater than 12 and the proportion of those workers with less than a high school education was relatively low. Group III includes occupational clusters where the proportion of workers having less than a high school education was relatively high—more than 30 percent. Given that workers in any occupational cluster have a broad range of educational background, these three groups can only be based on the educational level of the majority of workers. Obviously, workers are employed in each of the groups at each of the educational levels.

The distribution of total employment in 1986 and projected 2000 employment for these three groups of educational attainment is shown in table 8. These data indicate that employment in the occupations requiring the most education, group I, is projected to increase as a proportion of total employment, while employment in the other two groups in which workers had less education will decline as a proportion of total employment. The proportion of total employment is expected to decline the most in group III, the group which requires the least amount of education. It should be noted that the service workers group—the only occupational cluster in the educational attainment group III with median school years completed above 12 years—is increasing as a proportion of total employment. All other occupational clusters in this group are declining (some by very significant amounts). Conversely, in group I, all the

Table 8. Employment in broad occupational clusters by level of educational attainment, 1986 and projected to 2000, moderate alternative

[In percent]

Occupation	1986	2000
Total, all groups	100.0	100.0
Group I, total	25.1	27.3
Management and management-related occupations	9.5	10.2
Engineers, architects, and surveyors	1.4	1.5
Natural scientists and computer specialists	.7	.8
Teachers, librarians, and counselors	4.4	4.3
Health diagnosing and treating	2.3	2.8
Other professional specialists	3.5	3.7
Technicians	3.3	4.0
Group II, total	40.8	40.0
Salesworkers	11.3	12.3
Administrative support, including clerical	17.8	16.7
Blue-collar worker supervisors	1.6	1.5
Construction trades and extractive workers	3.4	3.3
Mechanics and repairers	4.2	4.0
Precision production and plant systems workers	2.5	2.2
Group III, total	34.0	32.7
Service workers	15.7	17.2
Agriculture, forestry, and fishing workers	3.3	2.6
Machine setters and operators	4.5	3.6
Hand workers	2.4	1.9
Transportation and material moving workers	4.3	4.0
Helpers and laborers	3.8	3.4

Table 9. Projected 1986–2000 growth rate and percent of total employment in 1986 accounted for by blacks, Hispanics, and women, moderate alternative¹

Occupation	Projected percent change, 1986–2000	Percent of total employment in 1986		
		Black	Hispanic	Women
Total, all occupations	19	10	7	44
Natural scientists and computer specialists	46	6	3	31
Health diagnosing and treating occupations	42	6	3	67
Technicians	38	8	4	47
Engineers, architects, and surveyors	32	4	3	7
Service workers	31	17	9	61
Marketing and salesworkers	30	6	5	48
Managerial and management-related workers	29	6	4	43
Other professional workers	26	7	4	43
Construction trades and extractive workers	18	7	8	2
Teachers, librarians, and counselors	16	9	3	68
Mechanics and repairers	15	7	7	3
Administrative, support, including clerical	11	11	6	80
Transportation and material moving workers	10	14	8	9
Helpers and laborers	6	17	11	16
Precision production and plant systems occupations	4	9	9	23
Machine setters and operators	-4	16	13	42
Assemblers and other handwork occupations	-4	13	11	38
Agriculture, forestry, and fishing workers	-5	7	10	16

¹ Does not include supervisors in construction trades and extractive workers; mechanics and repairers; precision production and plant system occupations; or assemblers and other handwork occupations.

clusters are increasing as a percent of total employment except for the teachers, librarians, and counselors occupation.

Minority groups. Job opportunities for individuals or groups of workers are determined by a multitude of factors relating to the job market and the characteristics of workers. Consequently, in developing projections of employment by industry and occupation, BLS does not develop projections of the demographic composition of those jobs. However, data on the current demographic composition of jobs can be used in conjunction with projected change in employment to determine the implications of the employment projections. For example, projections can be used to see if future job growth is consistent with the labor market pattern for jobs currently held by blacks and Hispanics.

Blacks and Hispanics accounted for about 10 percent and 7 percent of employment in 1986, respectively. Although members of these two groups were employed in virtually every occupation, they were more heavily concentrated in certain occupational clusters. These occupational clusters are listed in decreasing order by projected growth rate in table 9. In general, the data show that both blacks and Hispanics account for a greater proportion of persons employed in the occupations that are projected to decline or grow more slowly than in those occupations that are projected to increase rapidly. It should be pointed out that the occupational clusters projected to decline or grow slowly are generally those requiring the least amount of education and training and those projected to grow the fastest require the most education and training. The only exception is the service workers cluster, which, as discussed previously, is growing rapidly.

In general, occupations having the fastest growth rates can be assumed to have the better opportunities for employment. For blacks and Hispanics to improve their labor market situation, they must be able to take advantage of those opportunities. The labor force projections discussed in the article by Howard Fullerton, pp. 19–29, indicate that blacks and Hispanics will make up 17.4 percent and 28.7 percent of the total labor force growth, respectively. Because, as noted earlier, the fastest growing occupations are those in which a high percentage of workers currently have post-secondary education, the data imply that improvements in educational attainment are important if blacks and Hispanics are to take advantage of the favorable job opportunities associated with these rapidly growing occupations.

The proportion of women employed in certain occupational clusters varies among the clusters. In general,

however, women account for relatively high proportions of employment in the faster growing occupations with two exceptions. For natural scientists and computer specialists, the women's share of employment currently is low and the proportion of women employed as engineers, architects, and surveyors is very low (7 percent). Women tend to account for smaller proportions in the occupations projected to decline or grow slowly, except for the proportion of women employed as machine setters and operators.

In summary, occupations requiring the most education and training are projected to grow more rapidly than total employment. Women currently represent larger proportions of employment in those occupations than blacks and Hispanics. Therefore, among the three minority groups, employment opportunities for women are expected to be the most favorable.

———FOOTNOTES———

¹ Data from the 1983, 1984, and 1985 Occupational Employment Statistics (OES) surveys, the most current for each industry in the economy when the projections were developed, were used to develop 1986 occupational staffing patterns for industries covered by the matrix. Staffing patterns for other industries were derived from the 1986 Current Population Survey. For more information concerning the development of the National Industry-Occupation Matrix, see *Employment Projections for 1995: Data and Methods*, Bulletin 2253 (Bureau of Labor Statistics, 1986). For more information concerning the OES survey program, see *BLS Handbook of Methods*, Bulletin 2134-1 (Bureau of Labor Statistics, December 1982).

² The 1986 and projected 2000 occupational distributions in each of the 258 detailed matrix industries were multiplied by estimates of total wage and salary worker employment in each year. Estimates of self-employed and unpaid family workers by occupation for 1986 and projected 2000 were developed at the total (all industry) level based on data in the Current Population Survey. They were added to the sum of wage and salary worker employment to derive estimates of 1986 and projected 2000 total employment by occupation for the economy.

³ In the National Industry-Occupation Matrix, State and local government workers in education and health service industries are included in the services industry division, not in government.