Employment outlook: 1994–2005

Occupational employment to 2005

The economy is expected to continue generating jobs for workers at all levels of education and training, although average growth will be greater for occupations requiring a bachelor's degree or more education than for those requiring less training

George T. Silvestri

Total employment in the U.S. economy is projected to increase by 17.7 million jobs between 1994 and 2005, rising from 127.0 million to 144.7 million, according to the moderate alternative projection of the Bureau of Labor Statistics. The projected 14-percent rate of employment growth is considerably slower than the 24-percent increase attained during the previous 11-year period, 1983–94, during which the economy added 24.6 million jobs. The faster rate of growth in the recent past reflects the entry of baby-boomers to the labor force well into the 1980's.[1]

Growth rates are projected to be very different among the major occupational groups, resulting in a change in the structure of employment from 1994 to 2005.[2] In general, occupations that require a bachelor's degree or other post-secondary education or training are projected to have faster than average rates of employment growth. However, many occupations requiring less formal education or training also are projected to have above average growth.

In addition to the growth rate, employment size is an important factor in determining the numerical change in an occupation. Many slower growing occupations, some requiring little education and training and others having considerable educational requirements, are expected to add significant numbers of jobs primarily because of their large employment bases. As a result, the economy is projected to continue generating jobs for workers at all levels of education and training.

This article compares 1994–2005 projected changes in the structure of employment at the major occupational group level with the changes that occurred over the previous 11-year period, 1983–1994. It also discusses the detailed occupations that are projected to grow the most rapidly in percentage terms, those with the largest numerical increases, and those with the largest employment declines. Finally, it presents the total number of job openings that are expected to occur during the projections period because of growth in the economy and the net loss resulting from workers who leave the labor force or transfer to other occupations. Of the three sets of occupational projections developed by BLS, this article focuses on the moderate alternative that is tied to the moderate economic and industry employment projections alternative.[3] The major occupational differences among the three alternatives are shown at the end of the article.

Major occupational groups

Among the major occupational groups, employment in professional specialty occupations is projected to increase the fastest, and by the greatest

George T. Silvestri is an economist in the Office of Employment Projections, Bureau of Labor Statistics.

number, between 1994 and 2005. (See table 1.) This is the only group that is expected to add more jobs over the projections period than were added from 1983 to 1994. Professional specialty workers is expected to be the third largest occupational group, as it was in 1994. The group with the second fastest growth rate and the second largest number of jobs added is service occupations. Professional specialty occupations and service occupations, which are on opposite ends of the educational attainment and earnings spectrum, are expected to provide more than half of total job growth between 1994 and 2005. Executive, administrative, and managerial occupations; technicians and related support occupations; and marketing and salesworkers also are expected to have faster than average employment growth.

Employment in precision production, craft, and repair occupations; the operators, fabicators, and laborers group; and administrative support occupations, including clerical is expected to increase, but at a slower rate than total employment. The number of agriculture, forestry, fishing, and related occupations is projected to decline slightly. It is especially noteworthy that employment in administrative support occupations, including clerical, which expanded by 4.3 million workers from 1983 to 1994, is projected to grow by only 994,000 workers through 2005, and to fall from first to second place in size behind employment of service workers. Office automation is expected to have a large impact on many of the individual occupations in this group. The projected 1994–2005 increase of 1.6 million jobs for blue-collar workers—precision production, craft, and repair occupations and operators, fabricators, and laborers—is substantially less than the 3.1 million gain over the 1983–94 period. The smaller projected increase reflects the expected impact of technological change on these occupations and the continuing decline in manufacturing employment through 2005.

As a result of the different growth rates among the major occupational groups, the structure of total employment is projected to change by the year 2005. Executive, administrative, and managerial occupations; professional specialty occupations; technicians and related support occupations; marketing and sales occupations; and service occupations are all projected to increase their shares of total employment. All of these groups had increased their employment shares from 1983 to 1994 as well. Professional specialty occupations, which registered the largest increase in share in the recent past, is expected to do so again over the projections period. On the other hand, administrative support occupations, including clerical; agriculture, forestry, fishing, and related occupations; precision production, craft, and repair occupations; and operators, fabricators, and laborers are expected to decline as a proportion of total employment. This represents a continuation of the 1983–94 trends for these groups, with the exception of administrative support occupations, including clerical, which, rather than declining, had maintained a virtually constant share of total employment over the earlier period.

The number of *executive, administrative, and managerial workers* is projected to increase by 17 percent, or 2.2 million, from 1994 to 2005. This rate of growth is half that achieved over the 1983–94 period, during which the occupational group added more than 3.3 million jobs. Further, while managers had the second fastest growth rate among the major occupational groups in the earlier period, they are expected to have only the fifth fastest 1994–2005 growth rate. The result will be just a slight increase in the share of total employment represented by these workers.

Table 1. Employment by major occupational group, 1983, 1994, and projected 2005, moderate alternative

[Numbers in thousands]

Occupation	1983		1994		2005		Employment change			
							1983–94		1994–2005	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, all occupations	102,404	100.0	127,014	100.0	144,708	100.0	24,610	24.0	17,694	13.9
Executive, administrative, and managerial occupations	9,591	9.4	12,903	10.2	15,071	10.4	3,312	34.5	2,168	16.8
Professional specialty occupations	12,639	12.3	17,314	13.6	22,387	15.5	4,675	37.0	5,073	29.3
Technicians and related support occupations	3,409	3.3	4,439	3.5	5,316	3.7	1,030	30.2	876	19.7
Marketing and sales occupations	10,497	10.3	13,990	11.0	16,502	11.4	3,493	33.3	2,512	18.0
Administrative support occupations, including clerical	18,874	18.4	23,178	18.2	24,172	16.7	4,304	22.8	994	4.3
Service occupations	15,577	15.2	20,239	15.9	24,832	17.2	4,662	29.9	4,593	22.7
Agriculture, forestry, fishing, and related occupations	3,712	3.6	3,762	3.0	3,650	2.5	50	1.3	–112	–3.0
Precision production, craft, and repair occupations	12,731	12.4	14,047	11.1	14,880	10.3	1,316	10.3	833	5.9
Operators, fabricators, and laborers	15,374	15.0	17,142	13.5	17,898	12.4	1,768	11.5	757	4.4

Part of the reason for the expected slowdown in job growth for this group is the trend toward job restructuring. Although employment in many different fields may be affected by restructuring, the use of middle managers in the future is expected to be reduced to a greater extent than that of many other occupations. This is especially true in manufacturing, where employment in this group is projected to decline by 67,000 jobs through 2005, after having increased by 171,000 jobs between 1983 and 1994, a period during which total manufacturing employment declined.

In industries other than manufacturing, the overall occupational category of executive, administrative, and managerial workers is expected to grow substantially. The services industry division is expected to account for more than 6 out of 10 of the additional jobs for managers, with very large gains registered in engineering and management services and in business services.[4] Other industries with significant projected employment increases for managers are wholesale and retail trade and finance, insurance, and real estate.

Employment in *professional specialty occupations* is projected to grow the fastest and to increase more—by 5 million workers—than any other major group. This group also posted the fastest rate of increase and largest job growth from 1983 to 1994. Professional specialty occupations are expected to experience the largest increase in share of total employment, rising from 13.5 percent in 1994 to 15.4 percent by 2005. The largest 1994–2005 numerical increases are expected among teachers, librarians, and counselors (1.6 million jobs); health assessment and treating occupations (731,000 jobs); and computer engineers, scientists, and systems analysts (755,000 jobs). These professional specialty occupational subgroups also registered the largest job gains during the 1980's.

Employment in professional specialty occupations is expected to increase in all major industrial sectors in the economy. Even in manufacturing, which is projected to decline by 1.3 million workers by 2005, employment of professional workers is expected to increase by 100,000 jobs, mainly for computer engineers, scientists, and systems analysts. Despite the widespread growth of the professional specialty occupations, nearly 90 percent of the projected increase in employment for these workers is in the services industry division, led by educational services and health services. Other service industries that are expected to contribute significantly to the growth of professional jobs are social services; business services; and engineering and management services. Federal, State, and local government jobs for professional specialty workers are projected to grow by nearly 150,000, but this is less than half the increase that occurred from 1983 to 1994.

Employment of *technicians and related support workers* is projected to grow by 876,000 jobs by 2005, about 150,000 fewer jobs than during the 1983–94 period. The 20-percent rate of increase is considerably slower than the 30-percent rate attained in the earlier period. The proportion of total employment in this group was just 3.5 percent in 1994 and is expected to be about the same in 2005. The occupational subgroup, health technicians and technologists, is expected to increase by 618,000 jobs during 1994–2005 and to account for 70 percent of the growth in the total number of technicians. Virtually all of the job growth in the major group is expected in the services industries. During the 1983–94 period, by contrast, much of the job increase was in transportation, communications, and public utilities; wholesale and retail trade; finance, insurance, and real estate; and government. Within services, about half of the jobs for technicians are expected to be in the large and rapidly growing health services industry. Other industries that also are expected to provide large numbers of new jobs for technicians by 2005 are engineering and management services and business services.

Employment in the *marketing and sales* occupational group is projected to increase by 2.5 million workers from 1994 to 2005, or by 18 percent. By contrast, this group grew by 3.5 million workers, or by 33 percent, from 1983 to 1994. The group's share of total employment will increase slightly through 2005.

In part, this group's reduced pace of job growth is attributable to the smaller employment increase in wholesale and retail trade, which employs the majority of marketing and salesworkers. This slowing of employment growth in wholesale trade is based partly on the expectation that manufacturers will increasingly use new warehouse management systems and distribute their products directly to retailers as they take advantage of reductions in the cost of shipping goods. Both wholesale trade and the much larger retail sector are expected to experience increased productivity as the result of computerized inventory control, which will lessen the overall demand for labor. Employment growth of marketing and salesworkers also is expected in the services industry division and in finance, insurance, and real estate.

The number of workers in *administrative support occupations, including clerical,* the largest occupational group in 1983 and 1994, is projected to increase by only 994,000 jobs through 2005, and to grow by 4 percent. This is in marked contrast to the previous 11-year period, during which this group grew as fast as the average for all occupations and added 4.3 million jobs. Consequently, the share of total employment represented by administrative support workers, which held steady during the 1983–94 period, is projected to decline significantly from 18.2 percent in 1994 to 16.7 percent in the target year.

Many detailed occupations in this group also are expected to decline through 2005 instead of expanding as they did over the historical period. Among them are computer and peripheral equipment operators; mail clerks and messengers; file

clerks; and bookkeeping, accounting, and auditing clerks, all of which are expected to be impacted by continued technological change and further developments in office automation. Occupations that involve a great deal of contact with people, and therefore are not affected significantly by expected changes in technology, are projected to have average or higher than average rates of growth. Among these occupations are hotel desk clerks; receptionists and information clerks; and teacher aides and educational assistants. The very substantial job growth for administrative support occupations, including clerical of 1.8 million workers in the services industry division is expected to be partially offset by projected declines in virtually every other major industry division, the largest of which are in government and manufacturing.

Employment in *service occupations* is projected to increase by 4.6 million and to grow by 23 percent, the second largest numerical gain and rate of growth among the major occupational groups. Employment in this group increased by about the same amount from 1983 to 1994. The proportion of total employment represented by these workers is expected to continue increasing significantly, as it has been since 1983, and to account for the largest share of total employment in 2005—17.2 percent. Nearly 7 in 10 of the additional jobs projected in 2005 are in the very rapidly growing services industry division, led by health services, social services, and business services.

Health service occupations, which grew by 270,000 workers between 1983 and 1994, are projected to increase by a very substantial 759,000 by 2005. In addition, retail trade, with large numbers of food preparation and service workers, is projected to add more than 1 million jobs for service workers, and State and local governments, with substantial numbers of law enforcement and firefighting occupations, are projected to contribute a combined total of more than 370,000 additional service jobs.

Agriculture, forestry, fishing, and related occupations are projected to decline by 112,000 jobs, after having increased by 50,000 between 1983 and 1994. Within this major group, job losses for farm managers; farm workers; and forestry and logging occupations are expected to be partially offset by job gains for gardening, nursery, greenhouse, and lawn service occupations, which are largely found in the rapidly growing segment of agricultural services that provides nursery products and gardening and lawn services. The share of total employment represented by agriculture, forestry, fishing, and related occupations is expected to continue to decline and to account for only 2.5 percent of all jobs by 2005.

Employment in *precision production, craft, and repair occupations* is projected to increase by 833,000 jobs and to grow at a rate of 6 percent from 1994 to 2005. This much slower than average growth rate is a continuation of the trend over the 1983–94 period, during which this group expanded by 10 percent and added 1.3 million jobs. These workers are expected to account for 10.3 percent of total employment in 2005—down from 11.1 percent in 1994.

Most of the job growth within the major occupational group is projected to occur among blue-collar worker supervisors; construction trades workers; and mechanics, installers, and repairers. These job categories also registered large increases during the 1980's. The precision production occupations, which are highly concentrated in manufacturing, are expected to decline by about 150,000 jobs due to continuing advances in technology, changes in production methods, and the overall decline in manufacturing employment. The large overall projected job losses for precision production, craft, and repair occupations in manufacturing are expected to be offset primarily by the very significant gain in services.

The number of *operators, fabricators, and laborers* is expected to increase by 757,000 workers, or by just 4 percent, from 1994 to 2005. During the previous 11-year period, this group of workers grew by 1.8 million workers. Over the longer period 1983–2005, the proportion of total employment represented by these workers is projected to decline very substantially from 15.0 percent to 12.4 percent—the largest drop for a major occupational group.

The manufacturing sector is expected to lose more than 700,000 jobs for operators, fabricators, and laborers as a result of the continuing automation of their duties and the overall projected decline in manufacturing employment. However, the decline in this sector is expected to be more than offset by gains in services, transportation, and construction. It is also noteworthy that jobs for these workers in wholesale and retail trade, which increased by 452,000 from 1983 to 1994, are projected to decline slightly between 1994 and 2005, largely as a result of the increased use of automated material moving equipment that will curtail employment of freight, stock, and material movers, hand.

Detailed occupations

The Bureau has developed projections for more than 500 detailed occupations. The growth rates range from an increase of 119 percent for personal and home care aides to a decline of 71 percent for letterpress operators. (See table 2.) In the following discussion, employment change is analyzed from two perspectives, the projected rate of change and the size of the numerical change in employment among the occupations. The reason is that the rate of growth for an occupation may be misleading if it has little employment in 1994. The employment of occupational therapy assistants and aides, for example, is projected to grow very rapidly by 82 percent between 1994 and 2005, but will increase by just 13,000 jobs. In contrast, the employment of secretaries, which is expected to grow by only 12 percent, will increase by 390,000 jobs. In

(Text continues on page 79)

Table 2. Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Total, all occupations	127,014	140,261	144,708	150,212	10	14	18	17,694	49,631
Executive, administrative, and managerial occupations	12,903	14,621	15,071	15,638	13	17	21	2,168	4,844
Managerial and administrative occupations	9,058	10,267	10,575	10,965	13	17	21	1,517	3,467
Administrative services managers	279	296	307	320	6	10	15	28	87
Communication, transportation, and utilities operations managers	154	129	135	141	–16	–12	–8	–19	32
Construction managers	197	240	253	274	21	28	39	56	97
Education administrators	393	431	459	491	10	17	25	66	176
Engineering, mathematical, and natural science managers	337	415	432	453	23	28	35	95	165
Financial managers	768	919	950	988	20	24	29	182	324
Food service and lodging managers	579	776	771	769	34	33	33	192	313
Funeral directors and morticians	26	28	29	29	9	11	13	3	8
General managers and top executives	3,046	3,403	3,512	3,641	12	15	20	466	1,104
Government chief executives and legislators	91	86	94	104	–5	4	14	4	26
Industrial production managers	206	183	191	202	–11	–7	–2	–15	43
Marketing, advertising, and public relations managers	461	558	575	595	21	25	29	114	211
Personnel, training, and labor relations managers	206	243	252	262	18	22	27	46	104
Property and real estate managers	261	281	298	321	8	14	23	37	81
Purchasing managers	226	228	235	244	1	4	8	9	55
All other managers and administrators	1,829	2,051	2,081	2,129	12	14	16	252	639
Management support occupations	3,845	4,354	4,496	4,673	13	17	22	651	1,377
Accountants and auditors	962	1,056	1,083	1,119	10	13	16	121	312
Budget analysts	66	71	74	78	8	12	17	8	19
Claims examiners, property and casualty insurance	56	64	65	66	13	15	18	9	14
Construction and building inspectors	64	74	79	84	15	22	31	14	28
Cost estimators	179	199	210	225	12	17	26	31	48
Credit analysts	39	47	48	49	21	24	27	9	16
Employment interviewers, private or public employment service	77	102	104	107	33	36	39	27	43
Inspectors and compliance officers, except construction	157	165	175	186	6	12	18	18	50
Loan officers and counselors	214	258	264	269	21	23	26	50	85
Management analysts	231	308	312	319	33	35	38	82	109
Personnel, training, and labor relations specialists	307	360	374	391	17	22	27	67	129
Purchasing agents, except wholesale, retail, and farm products	215	218	226	238	2	5	11	12	64
Tax examiners, collectors, and revenue agents	63	60	63	66	–5	0	6	0	14
Underwriters	96	101	103	105	5	7	9	7	25
Wholesale and retail buyers, except farm products	180	173	178	183	–4	–2	1	–3	50
All other management support workers	940	1,098	1,138	1,188	17	21	26	198	371
Professional specialty occupations	17,314	21,430	22,387	23,540	24	29	36	5,073	8,376
Engineers	1,327	1,516	1,573	1,658	14	19	25	246	581
Aeronautical and astronautical engineers	56	57	59	62	2	6	12	3	16
Chemical engineers	50	56	57	59	10	13	16	7	21
Civil engineers, including traffic engineers	184	209	219	231	13	19	25	34	90
Electrical and electronics engineers	349	402	417	439	15	20	26	69	157
Industrial engineers, except safety engineers	115	125	131	139	8	13	21	15	47
Mechanical engineers	231	266	276	290	15	19	26	45	98

See footnote at end of table.

Table 2. **Continued—Employment by occupation, 1994 and projected 2005**

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Metallurgists and metallurgical, ceramic, and materials engineers	19	19	20	20	2	5	10	1	6
Mining engineers, including mine safety engineers	3	3	3	3	–22	–18	–12	–1	1
Nuclear engineers	15	15	15	16	1	4	8	1	5
Petroleum engineers	14	12	11	13	–11	–21	–8	–3	4
All other engineers	292	353	367	387	21	26	33	75	136
Architects and surveyors	200	209	215	222	4	7	11	14	70
Architects, except landscape and marine	91	104	106	109	14	17	20	15	35
Landscape architects	14	16	16	16	16	17	18	2	5
Surveyors	96	89	92	97	–7	–3	1	–3	30
Life scientists	186	222	230	239	20	24	29	44	94
Agricultural and food scientists	26	30	31	31	16	19	22	5	12
Biological scientists	82	100	103	107	21	25	30	21	43
Foresters and conservation scientists	41	47	49	50	15	18	22	8	18
Medical scientists	36	45	47	49	25	31	38	11	21
All other life scientists	1	1	1	1	0	1	2	0	0
Computer, mathematical, and operations research occupations	917	1,629	1,696	1,781	78	85	94	779	863
Actuaries	17	18	18	18	2	4	6	1	4
Computer systems analysts, engineers, and scientists	828	1,519	1,583	1,663	84	91	101	755	819
Computer engineers and scientists	345	626	655	691	82	90	101	310	338
Computer engineers	195	355	372	394	82	90	102	177	191
All other computer scientists	149	271	283	297	81	89	99	134	147
Systems analysts	483	893	928	972	85	92	101	445	481
Statisticians	14	14	15	15	1	3	5	0	3
Mathematicians and all other mathematical scientists	14	14	15	15	1	5	10	1	3
Operations research analysts	44	65	67	69	46	50	56	22	35
Physical scientists	209	245	250	257	17	19	23	41	104
Chemists	97	112	115	118	15	19	22	18	45
Geologists, geophysicists, and oceanographers	46	54	54	57	17	17	22	8	24
Meteorologists	7	7	7	7	4	7	10	0	2
Physicists and astronomers	20	18	18	19	–12	–9	–6	–2	5
All other physical scientists	40	55	56	57	39	41	43	16	27
Social scientists	259	309	318	329	19	23	27	59	103
Economists	48	59	59	61	23	25	28	12	30
Psychologists	144	173	177	183	20	23	27	33	45
Urban and regional planners	29	33	35	38	15	24	34	7	13
All other social scientists	38	44	45	47	16	19	23	7	15
Social, recreational, and religious workers	1,387	1,836	1,924	2,010	32	39	45	536	810
Clergy	195	216	234	249	11	20	27	38	77
Directors, religious activities and education	81	89	96	102	10	19	27	15	31
Human services workers	168	284	293	303	69	75	80	125	170
Recreation workers	222	251	266	283	13	20	28	45	86
Residential counselors	165	284	290	295	73	76	79	126	158
Social workers	557	712	744	778	28	34	40	187	288
Lawyers and judicial workers	735	899	918	940	22	25	28	183	279
Judges, magistrates, and other judicial workers	79	75	79	84	-5	1	7	1	11
Lawyers	656	824	839	856	26	28	31	183	268
Teachers, librarians, and counselors	6,246	7,311	7,849	8,464	17	26	36	1,603	2,886

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Teachers, preschool and kindergarten	462	588	602	620	27	30	34	140	215
Teachers, elementary	1,419	1,509	1,639	1,787	6	16	26	220	511
Teachers, secondary school	1,340	1,585	1,726	1,885	18	29	41	386	782
Teachers, special education	388	545	593	648	41	53	67	206	262
College and university faculty	823	893	972	1,062	9	18	29	150	395
Other teachers and instructors	886	1,100	1,151	1,210	24	30	37	265	331
Farm and home management advisors	14	13	14	15	–9	–1	8	0	1
Instructors and coaches, sports and physical training	282	365	381	399	29	35	41	98	119
Adult and vocational education teachers	590	723	757	796	23	28	35	167	211
Instructors, adult (nonvocational) education	290	366	376	387	26	29	33	85	107
Teachers and instructors, vocational education and training	299	356	381	409	19	27	37	81	104
All other teachers and instructors	596	720	769	826	21	29	38	173	251
Librarians, archivists, curators, and related workers	168	169	182	196	1	8	17	14	56
Curators, archivists, museum technicians, and restorers	19	22	23	24	14	19	24	4	9
Librarians, professional	148	147	159	172	–1	7	16	10	47
Counselors	165	202	215	230	23	31	40	50	83
Health diagnosing occupations	850	1,005	1,003	1,004	18	18	18	153	312
Chiropractors	42	54	54	53	30	29	28	12	20
Dentists	164	174	173	172	6	5	4	9	54
Optometrists	37	42	42	41	12	12	11	4	12
Physicians	539	659	659	661	22	22	23	120	205
Podiatrists	13	15	15	15	16	15	15	2	5
Veterinarians and veterinary inspectors	56	62	62	62	11	11	11	6	17
Health assessment and treating occupations	2,563	3,212	3,294	3,425	25	29	34	731	1,101
Dietitians and nutritionists	53	62	63	65	17	19	23	10	24
Pharmacists	168	190	196	203	14	17	21	28	54
Physician assistants	56	69	69	70	23	23	24	13	22
Registered nurses	1,906	2,318	2,379	2,481	22	25	30	473	740
Therapists	380	573	586	606	51	54	60	207	262
Occupational therapists	54	91	93	95	69	72	77	39	47
Physical therapists	102	182	183	185	79	80	82	81	96
Recreational therapists	31	37	37	39	20	22	27	7	11
Respiratory therapists	73	96	99	104	32	36	44	26	37
Speech-language pathologists and audiologists	85	120	125	130	40	46	53	39	52
All other therapists	36	48	50	52	34	39	45	14	19
Writers, artists, and entertainers	1,612	1,938	1,975	2,016	20	22	25	363	680
Artists and commercial artists	273	336	336	339	23	23	24	64	117
Athletes, coaches, umpires, and related workers	38	46	46	46	20	20	21	8	19
Dancers and choreographers	24	30	30	30	24	24	24	6	11
Designers	301	377	384	393	25	28	31	84	130
Designers, except interior designers	238	308	314	322	29	32	35	76	113
Interior designers	63	69	70	71	11	12	14	8	17
Musicians	256	304	317	329	19	24	29	62	105
Photographers and camera operators	139	173	172	173	24	24	25	34	61
Camera operators, television, motion picture, video	18	19	19	19	5	6	6	1	5
Photographers	121	154	153	154	27	27	27	32	57

See footnotes at end of table.

Table 2. **Continued—Employment by occupation, 1994 and projected 2005**

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Producers, directors, actors, and entertainers	93	120	121	121	30	30	30	28	47
Public relations specialists and publicity writers	107	123	128	133	16	20	24	21	44
Radio and TV announcers and newscasters	50	49	51	52	–3	1	4	0	21
Reporters and correspondents	59	55	57	58	–6	–4	–1	–2	13
Writers and editors, including technical writers	272	324	332	340	19	22	25	59	111
All other professional workers	822	1,097	1,142	1,194	33	39	45	319	494
Technicians and related support occupations	4,439	5,161	5,316	5,526	16	20	24	876	1,798
Health technicians and technologists	2,197	2,754	2,815	2,905	25	28	32	618	1,024
Cardiology technologists	14	17	17	18	18	22	29	3	6
Clinical laboratory technologists and technicians	274	300	307	317	10	12	16	33	86
Dental hygienists	127	182	180	178	43	42	40	53	74
Electroneurodiagnostic technologists	6	8	8	9	25	28	34	2	3
EKG technicians	16	11	11	12	–31	–30	–27	–5	3
Emergency medical technicians	138	178	187	197	29	36	43	49	72
Licensed practical nurses	702	882	899	927	26	28	32	197	341
Medical records technicians	81	125	126	130	54	56	60	45	59
Nuclear medicine technologists	13	16	16	17	22	26	32	3	5
Opticians, dispensing and measuring	63	75	76	76	20	21	22	13	28
Pharmacy technicians	81	98	101	104	21	24	28	20	33
Psychiatric technicians	72	78	80	84	8	11	16	8	18
Radiologic technologists and technicians	167	222	226	232	33	35	39	59	82
Surgical technologists	46	64	65	68	39	43	49	19	27
Veterinary technicians and technologists	22	26	26	26	17	18	17	4	8
All other health professionals and paraprofessionals	374	472	488	510	26	30	36	114	179
Engineering and science technicians and technologists	1,220	1,265	1,312	1,376	4	8	13	92	357
Engineering technicians	685	718	746	786	5	9	15	61	207
Electrical and electronic technicians and technologists	314	336	349	367	7	11	17	35	108
All other engineering technicians and technologists	371	382	397	419	3	7	13	26	99
Drafters	304	294	304	318	–3	0	5	1	70
Science and mathematics technicians	231	254	262	272	10	13	18	31	79
Technicians, except health and engineering and science	1,023	1,142	1,189	1,245	12	16	22	167	418
Aircraft pilots and flight engineers	91	93	97	101	3	8	12	7	32
Air traffic controllers and airplane dispatchers	29	29	29	29	0	0	1	0	6
Broadcast technicians	42	39	40	41	–6	–4	–2	–2	9
Computer programmers	537	577	601	631	7	12	18	65	228
Legal assistants and technicians, except clerical	219	291	301	311	33	38	42	82	103
Paralegals	110	170	175	179	54	58	62	64	74
Title examiners and searchers	28	27	28	29	–3	0	5	0	3
All other legal assistants, including law clerks	80	94	98	103	17	22	28	18	27
Programmers, numerical, tool, and process control	7	6	6	7	–13	–9	–2	–1	2
Technical assistants, library	75	84	91	99	11	21	31	16	32
All other technicians	24	22	24	25	–5	0	6	0	5
Marketing and sales occupations	13,990	16,107	16,502	16,944	15	18	21	2,512	6,706
Cashiers	3,005	3,493	3,567	3,645	16	19	21	562	1,772
Counter and rental clerks	341	438	451	464	28	32	36	109	203

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Insurance sales workers	418	432	436	441	3	4	6	18	88
Marketing and sales worker supervisors	2,293	2,628	2,673	2,728	15	17	19	380	788
Real estate agents, brokers, and appraisers	374	395	407	426	6	9	14	33	113
Brokers, real estate	67	72	75	79	8	12	18	8	22
Real estate appraisers	47	50	53	58	6	13	22	6	16
Sales agents, real estate	260	273	279	289	5	7	11	19	75
Salespersons, retail	3,842	4,244	4,374	4,508	10	14	17	532	1,821
Securities and financial services sales workers	246	328	335	343	34	37	40	90	126
Travel agents	122	141	150	159	16	23	30	28	55
All other sales and related workers	3,349	4,008	4,109	4,230	20	23	26	760	1,741
Administrative support occupations, including clerical	23,178	23,332	24,172	25,147	1	4	8	994	6,991
Adjusters, investigators, and collectors	1,229	1,465	1,507	1,553	19	23	26	277	399
Adjustment clerks	373	505	521	540	35	40	45	148	175
Bill and account collectors	250	334	342	351	33	36	40	91	112
Insurance claims and policy processing occupations	461	487	495	503	6	8	9	35	92
Insurance adjusters, examiners, and investigators	162	189	192	196	17	19	21	30	45
Insurance claims clerks	119	133	135	137	12	13	15	16	27
Insurance policy processing clerks	179	165	168	171	–8	–6	–5	–12	20
Welfare eligibility workers and interviewers	104	101	108	116	–3	4	12	4	16
All other adjusters and investigators	41	38	40	43	–6	–1	6	0	4
Communications equipment operators	319	259	266	275	–19	–17	–14	–53	83
Telephone operators	310	253	260	268	–18	–16	–14	–50	81
Central office operators	48	14	14	15	–71	–70	–69	–34	12
Directory assistance operators	33	10	10	10	–71	–70	–69	–24	8
Switchboard operators	228	230	236	243	1	3	6	7	62
All other communications equipment operators	9	6	6	6	–33	–31	–30	–3	2
Computer operators and peripheral equipment operators	289	169	175	182	–41	–39	–37	–114	62
Computer operators, except peripheral equipment	259	157	162	168	–40	–38	–35	–98	56
Peripheral EDP equipment operators	30	13	13	14	–57	–55	–52	–16	6
Information clerks	1,477	1,790	1,832	1,879	21	24	27	355	699
Hotel desk clerks	136	161	163	165	18	20	22	27	84
Interviewing clerks, except personnel and social welfare	69	80	83	87	16	20	26	14	36
New accounts clerks, banking	114	112	116	121	–2	2	6	2	40
Receptionists and information clerks	1,019	1,311	1,337	–367	29	31	34	318	508
Reservation and transportation ticket agents and travel clerks	139	126	133	139	–9	–4	0	–6	31
Mail clerks and messengers	260	249	256	265	–4	–1	2	–4	70
Mail clerks, except mail machine operators and postal service	127	113	116	120	–11	–8	–5	–10	35
Messengers	133	136	140	145	2	5	8	7	35
Postal clerks and mail carriers	474	459	481	504	–3	1	6	7	126
Postal mail carriers	320	305	320	335	–5	0	5	–1	85
Postal service clerks	154	154	161	169	0	5	10	7	41
Material recording, scheduling, dispatching, and distributing occupations	3,556	3,559	3,688	3,836	0	4	8	132	863
Dispatchers	224	244	258	273	9	15	22	34	65
Dispatchers, except police, fire, and ambulance	141	162	168	175	14	19	24	27	46

See footnotes at end of table.

Table 2. **Continued—Employment by occupation, 1994 and projected 2005**

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Dispatchers, police, fire, and ambulance	83	83	90	98	0	8	18	7	18
Meter readers, utilities	57	43	46	50	–25	–19	–13	–11	13
Order fillers, wholesale and retail sales	215	225	231	239	5	8	11	16	63
Procurement clerks	57	50	52	54	–12	–9	–6	–5	13
Production, planning, and expediting clerks	239	241	251	263	1	5	10	12	56
Stock clerks	1,759	1,743	1,800	1,863	–1	2	6	41	443
Traffic, shipping, and receiving clerks	798	798	827	861	0	4	8	29	150
Weighers, measurers, checkers, and samplers, recordkeeping	45	44	46	48	-2	3	7	1	12
All other material recording, scheduling, and distribution workers	161	171	177	184	6	10	14	16	47
Records processing occupations	3,733	3,338	3,438	3,559	–11	–8	–5	–294	877
Advertising clerks	17	18	18	19	2	5	8	1	5
Brokerage clerks	73	71	73	75	–2	1	4	1	9
Correspondence clerks	29	26	27	28	–10	–8	–5	–2	6
File clerks	278	232	236	241	–17	–15	–13	–42	102
Financial records processing occupations	2,757	2,438	2,506	2,591	–12	–9	–6	–250	573
Billing, cost, and rate clerks	323	321	328	336	0	2	4	5	98
Billing, posting, and calculating machine operators	96	32	32	33	–67	–67	–66	–64	40
Bookkeeping, accounting, and auditing clerks	2,181	1,946	2,003	2,073	–11	–8	–5	–178	400
Payroll and timekeeping clerks	157	139	144	150	–12	–9	–5	–14	35
Library assistants and bookmobile drivers	121	117	127	139	–3	5	15	7	57
Order clerks, materials, merchandise, and service	310	327	337	348	6	9	12	27	95
Personnel clerks, except payroll and timekeeping	123	95	98	101	–23	–21	–18	–26	27
Statement clerks	25	15	16	16	–40	–38	–35	–9	3
Secretaries, stenographers, and typists	4,100	4,123	4,276	4,457	1	4	9	175	1,230
Secretaries	3,349	3,605	3,739	3,898	8	12	16	390	1,102
Legal secretaries	281	341	350	358	21	24	27	68	128
Medical secretaries	226	280	281	282	24	24	25	55	103
Secretaries, except legal and medical	2,842	2,983	3,109	3,258	5	9	15	267	871
Stenographers	105	99	102	107	–6	–3	1	–3	22
Typists and word processors	646	418	434	452	–35	–33	–30	–212	106
Other clerical and administrative support workers	7,740	7,921	8,253	8,638	2	7	12	513	2,582
Bank tellers	559	391	407	423	–30	–27	–24	–152	244
Clerical supervisors and managers	1,340	1,550	1,600	1,658	16	19	24	261	613
Court clerks	51	54	59	64	5	15	26	8	12
Credit authorizers, credit checkers, and loan and credit clerks	258	261	267	274	1	4	6	9	49
Credit authorizers	15	18	19	19	21	24	28	4	5
Credit checkers	40	34	35	36	–16	–14	–12	–6	3
Loan and credit clerks	187	192	196	201	3	5	8	10	37
Loan interviewers	16	17	17	18	7	10	12	2	4
Customer service representatives, utilities	150	171	179	187	14	19	24	29	61
Data entry keyers, except composing	395	359	370	383	–9	–6	–3	–25	17
Data entry keyers, composing	19	6	6	7	–68	–67	–65	–13	1
Duplicating, mail, and other office machine operators	222	160	166	172	–28	–25	–23	–56	99
General office clerks	2,946	2,959	3,071	3,204	0	4	9	126	908
Municipal clerks	22	19	21	23	–11	–3	7	–1	2
Proofreaders and copy markers	26	20	20	21	–23	–20	–18	–5	7

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Real estate clerks	24	22	25	28	–5	5	20	1	8
Statistical clerks	75	65	68	72	–13	–10	–5	–7	11
Teacher aides and educational assistants	932	1,211	1,296	1,393	30	39	49	364	480
All other clerical and administrative support workers	721	672	698	729	–7	–3	1	–23	69
Service occupations	20,239	24,465	24,832	25,318	21	23	25	4,593	9,813
Cleaning and building service occupations, except private household	3,450	3,935	4,071	4,235	14	18	23	621	1,293
Institutional cleaning supervisors	125	144	147	151	16	18	21	22	58
Janitors and cleaners, including maids and housekeeping cleaners	3,043	3,483	3,602	3,745	14	18	23	559	1,140
Pest controllers and assistants	56	75	76	78	33	36	39	20	31
All other cleaning and building service workers	226	232	245	261	3	8	15	19	63
Food preparation and service occupations	7,964	9,094	9,057	9,037	14	14	13	1,093	3,498
Chefs, cooks, and other kitchen workers	3,237	3,737	3,739	3,751	15	16	16	502	1,102
Cooks, except short order	1,286	1,484	1,492	1,503	15	16	17	206	524
Bakers, bread and pastry	170	226	230	235	33	35	38	60	102
Cooks, institution or cafeteria	412	419	435	454	2	6	10	23	125
Cooks, restaurant	704	839	827	815	19	17	16	123	297
Cooks, short order and fast food	760	884	869	855	16	14	12	109	297
Food preparation workers	1,190	1,368	1,378	1,393	15	16	17	187	282
Food and beverage service occupations	4,514	5,098	5,051	5,009	13	12	11	537	2,263
Bartenders	373	348	347	346	–7	–7	–7	–25	138
Dining room and cafeteria attendants and bar helpers	416	415	416	419	0	0	1	0	157
Food counter, fountain, and related workers	1,630	1,680	1,669	1,661	3	2	2	40	463
Hosts and hostesses, restaurant, lounge, or coffee shop	248	293	292	292	18	18	18	44	114
Waiters and waitresses	1,847	2,361	2,326	2,291	28	26	24	479	1,390
All other food preparation and service workers	213	259	267	278	21	25	30	54	132
Health service occupations	2,086	2,807	2,846	2,919	35	36	40	759	1,131
Ambulance drivers and attendants, except EMTs	18	20	21	21	10	15	20	3	8
Dental assistants	190	271	269	266	43	42	40	79	137
Medical assistants	206	329	327	324	60	59	58	121	155
Nursing aides and psychiatric aides	1,370	1,737	1,770	1,834	27	29	34	400	594
Nursing aides, orderlies, and attendants	1,265	1,624	1,652	1,709	28	31	35	387	566
Psychiatric aides	105	113	118	126	7	12	19	13	28
Occupational therapy assistants and aides	16	28	29	29	80	82	86	13	16
Pharmacy assistants	52	62	64	68	20	23	29	12	22
Physical and corrective therapy assistants and aides	78	141	142	143	82	83	85	64	87
All other health service workers	157	218	224	233	39	43	49	67	112
Personal service occupations	2,530	3,682	3,719	3,761	45	47	49	1,189	1,670
Amusement and recreation attendants	267	398	406	414	49	52	55	139	211
Baggage porters and bellhops	35	44	44	45	24	26	29	9	16
Barbers	64	60	60	60	–6	–6	–6	–4	20
Child care workers	757	1,009	1,005	1,006	33	33	33	248	321
Cosmetologists and related workers	645	751	754	757	16	17	17	109	273
Hairdressers, hairstylists, and cosmetologists	595	675	677	680	13	14	14	82	233

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Manicurists	38	63	64	64	69	69	70	26	36
Shampooers	12	13	13	13	7	8	8	1	4
Flight attendants	105	128	135	141	23	28	34	30	49
Homemaker-home health aides	598	1,214	1,238	1,260	103	107	111	640	747
Home health aides	420	832	848	863	98	102	106	428	488
Personal and home care aides	179	382	391	397	114	119	122	212	259
Ushers, lobby attendants, and ticket takers	59	77	77	77	30	29	29	17	33
Private household workers	808	697	682	664	–14	–16	–18	–126	245
Child care workers, private household	283	284	278	270	0	–2	–4	–5	139
Cleaners and servants, private household	496	396	387	378	–20	–22	–24	–108	100
Cooks, private household	9	5	5	4	–48	–49	–51	–4	2
Housekeepers and butlers	20	13	12	12	–36	–37	–39	–7	4
Protective service occupations	2,381	3,017	3,199	3,410	27	34	43	818	1,514
Firefighting occupations	284	301	328	359	6	16	27	44	169
Fire fighters	219	237	258	283	8	18	29	40	138
Fire fighting and prevention supervisors	52	51	56	61	–2	7	18	4	24
Fire inspection occupations	13	13	14	15	–2	7	18	1	6
Law enforcement occupations	992	1,210	1,316	1,439	22	33	45	324	610
Correction officers	310	430	468	513	39	51	65	158	194
Police and detectives	682	780	848	927	14	24	36	166	416
Police and detective supervisors	87	86	93	102	–1	7	16	6	45
Police detectives and investigators	66	75	80	85	13	20	29	13	40
Police patrol officers	400	469	511	560	17	28	40	112	271
Sheriffs and deputy sheriffs	86	101	110	121	18	29	41	25	42
Other law enforcement occupations	43	49	54	59	15	25	37	11	19
Other protective service workers	1,106	1,506	1,554	1,612	36	41	46	449	735
Detectives, except public	55	77	79	80	42	44	47	24	35
Guards	867	1,248	1,282	1,322	44	48	53	415	580
Crossing guards	58	55	60	66	–5	3	13	2	17
All other protective service workers	126	125	133	143	–1	6	14	8	104
All other service workers	1,020	1,234	1,259	1,290	21	23	27	240	462
Agriculture, forestry, fishing, and related occupations	3,762	3,635	3,650	3,676	–3	–3	–2	–112	988
Animal breeders and trainers	16	15	15	15	–5	–5	–5	–1	3
Animal caretakers, except farm	125	157	158	160	26	26	28	33	62
Farm workers	906	871	870	868	–4	–4	–4	–36	263
Gardening, nursery, and greenhouse and lawn service occupations	844	971	986	1,006	15	17	19	142	271
Gardeners and groundskeepers, *except farm*	569	609	623	641	7	9	13	54	128
Lawn maintenance workers	96	127	127	127	32	32	32	31	43
Lawn service managers	36	48	47	47	33	33	33	12	18
Nursery and greenhouse managers	19	26	26	26	38	37	37	7	11
Nursery workers	83	107	109	111	29	31	34	26	50
Pruners	26	34	34	34	32	32	32	8	14
Sprayers/applicators	15	20	20	20	32	32	32	5	7
Farm operators and managers	1,327	1,057	1,050	1,048	–20	–21	–21	–277	221
Farmers	1,276	1,011	1,003	1,002	–21	–21	–21	–273	211
Farm managers	51	47	46	46	–9	–9	–9	–5	10
Fishers, hunters, and trappers	49	48	47	47	–3	–4	–5	–2	11
Captains and other officers, fishing *vessels*	7	6	6	6	–10	–11	–12	–1	2
Fishers, hunters, and trappers	42	41	41	41	–2	–3	–4	–1	9
Forestry and logging occupations	124	116	118	120	–6	–5	–3	–6	34
Forest and conservation workers	42	41	42	44	–1	1	4	1	12

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Timber cutting and logging occupations	82	75	76	77	–9	–8	–7	–7	22
Fallers and buckers	29	27	27	27	–9	–9	–9	–3	8
Logging tractor operators	20	20	20	20	–3	–1	0	0	4
Log handling equipment operators	16	14	15	15	–11	–9	–6	–1	5
All other timber cutting and related logging workers	17	14	15	15	–14	–13	–12	–2	5
Supervisors, farming, forestry, and agricultural related occupations	85	90	91	92	6	7	8	6	22
Veterinary assistants	31	36	37	36	19	19	19	6	13
All other agricultural, forestry, fishing, and related workers	255	273	278	283	7	9	11	23	87
Precision production, craft, and repair occupations	14,047	14,312	14,880	15,659	2	6	11	833	4,489
Blue-collar worker supervisors	1,884	1,822	1,894	1,990	–3	1	6	11	480
Construction trades	3,616	3,806	3,956	4,182	5	9	16	340	1,183
Bricklayers and stone masons	147	155	162	171	6	10	17	15	43
Carpenters	992	1,044	1,074	1,122	5	8	13	82	290
Carpet installers	66	72	72	73	9	9	11	6	28
Ceiling tile installers and acoustical carpenters	16	14	14	16	–15	–10	–2	–2	3
Concrete and terrazzo finishers	126	134	141	151	6	12	20	15	41
Drywall installers and finishers	133	138	143	151	3	7	13	9	50
Electricians	528	529	554	591	0	5	12	25	152
Glaziers	34	33	34	36	–2	2	8	1	9
Hard tile setters	27	27	28	29	–2	1	6	0	7
Highway maintenance workers	167	167	182	199	0	9	20	15	62
Insulation workers	64	73	77	83	14	20	29	13	34
Painters and paperhangers, construction and maintenance	439	497	509	529	13	16	21	70	174
Paving, surfacing, and tamping equipment operators	73	87	93	101	19	26	37	19	37
Pipelayers and pipelaying fitters	57	60	63	69	6	12	21	7	23
Plasterers	30	32	33	36	7	11	19	3	11
Plumbers, pipefitters, and steamfitters	375	374	390	413	0	4	10	15	92
Roofers	126	138	143	151	9	13	19	17	42
Structural and reinforcing metal workers	61	60	64	69	–1	5	14	3	19
All other construction trades workers	155	174	181	191	12	17	24	26	68
Extractive and related workers, including blasters	220	196	204	226	–11	–7	2	–16	59
Oil and gas extraction occupations	66	39	39	49	–41	–41	–25	–27	12
Roustabouts	28	13	13	16	–54	–55	–44	–16	5
All other oil and gas extraction occupations	38	26	26	33	–31	–30	–12	–11	7
Mining, quarrying, and tunneling occupations	18	11	12	13	–40	–34	–28	–6	3
All other extraction and related workers	136	146	153	163	7	12	20	17	43
Mechanics, installers, and repairers	5,012	5,372	5,586	5,842	7	11	17	574	1,950
Communications equipment mechanics, installers, and repairers	118	75	78	80	–37	–34	–32	–41	26
Central office and PBX installers and repairers	84	50	51	53	–41	–39	–37	–33	17
Radio mechanics	7	6	6	6	–18	–16	–14	–1	2
All other communications equipment mechanics, installers, and repairers	27	19	20	21	–28	–25	–22	–7	6
Electrical and electronic equipment mechanics, installers, and repairers	554	534	555	581	–4	0	5	1	175

See footnotes at end of table.

Table 2. **Continued—Employment by occupation, 1994 and projected 2005**

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Data processing equipment repairers	75	100	104	108	33	38	44	29	49
Electrical powerline installers and repairers	112	117	123	130	5	10	17	11	37
Electronic home entertainment equipment repairers	34	30	30	31	–11	–10	–8	–3	9
Electronics repairers, commercial and industrial equipment	66	66	68	70	0	2	5	1	20
Station installers and repairers, telephone	37	10	11	11	–71	–70	–69	–26	7
Telephone and cable TV line installers and repairers	191	174	181	191	–9	–5	0	–9	43
All other electrical and electronic equipment mechanics, installers, and repairers	39	37	38	39	–7	–3	0	–1	10
Machinery and related mechanics, installers, and repairers	1,815	1,974	2,072	2,196	9	14	21	258	700
Industrial machinery mechanics	464	480	502	529	3	8	14	38	173
Maintenance repairers, general utility	1,273	1,431	1,505	1,597	12	18	25	231	508
Millwrights	77	63	66	70	–19	–15	–9	–11	20
Vehicle and mobile equipment mechanics and repairers	1,502	1,685	1,736	1,788	12	16	19	234	655
Aircraft mechanics, including engine specialists	119	129	134	140	8	13	18	15	49
Aircraft engine specialists	23	24	25	26	3	8	13	2	8
Aircraft mechanics	96	105	109	114	9	14	19	13	40
Automotive body and related repairers	209	237	243	248	14	17	19	35	92
Automotive mechanics	736	840	862	882	14	17	20	126	347
Bus and truck mechanics and diesel engine specialists	250	281	293	306	12	17	22	42	100
Farm equipment mechanics	41	46	47	48	11	14	17	6	17
Mobile heavy equipment mechanics	101	106	110	115	5	9	14	9	37
Motorcycle, boat, and small engine mechanics	46	47	48	49	2	4	6	2	14
Motorcycle repairers	11	11	12	12	2	4	6	0	4
Small engine specialists	35	36	36	37	2	4	6	1	11
Other mechanics, installers, and repairers	1,023	1,105	1,145	1,197	8	12	17	122	394
Bicycle repairers	40	44	44	44	10	10	11	4	13
Camera and photographic equipment repairers	11	12	12	12	10	9	9	1	4
Coin and vending machine servicers and repairers	19	16	17	17	–16	–14	–12	–3	4
Electric meter installers and repairers	12	9	10	11	–23	–18	–12	–2	3
Electromedical and biomedical equipment repairers	10	11	11	12	14	17	23	2	4
Elevator installers and repairers	24	26	28	30	10	15	24	4	10
Heat, air conditioning, and refrigeration mechanics and installers	233	286	299	319	23	29	37	66	125
Home appliance and power tool repairers	70	64	66	68	–8	–6	–3	–4	19
Locksmiths and safe repairers	20	21	21	22	7	10	13	2	7
Musical instrument repairers and tuners	10	11	11	11	14	15	16	1	4
Office machine and cash register servicers	59	61	63	64	4	6	10	4	29
Precision instrument repairers	40	38	40	41	–3	0	4	0	10
Riggers	11	10	11	11	–8	–4	1	0	2
Tire repairers and changers	89	92	95	98	4	7	10	6	42
Watchmakers	6	5	5	5	–16	–15	–14	–1	2

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
All other mechanics, installers, and repairers	371	397	412	432	7	11	16	42	116
Production occupations, precision	2,986	2,796	2,906	3,066	–6	–3	3	–80	730
Assemblers, precision	324	300	315	340	–7	–3	5	–9	91
Aircraft assemblers, precision	20	17	19	20	–14	–8	1	–2	4
Electrical and electronic equipment assemblers, precision	144	121	127	138	–16	–12	–5	–17	36
Electromechanical equipment assemblers, precision	47	42	44	48	–10	–6	2	–3	12
Fitters, structural metal, precision	14	9	9	10	–38	–35	–29	–5	3
Machine builders and other precision machine assemblers	58	62	65	69	6	11	19	6	18
All other precision assemblers	40	48	50	54	21	26	36	11	18
Food workers, precision	292	278	282	285	–5	–4	–2	–11	81
Bakers, manufacturing	36	40	40	40	12	12	11	4	12
Butchers and meatcutters	219	198	202	206	–9	–8	–6	–17	58
All other precision food and tobacco workers	38	39	39	39	4	4	4	2	11
Inspectors, testers, and graders, precision	654	602	629	663	–8	–4	1	–25	138
Metal workers, precision	885	788	824	878	–11	–7	–1	–61	190
Boilermakers	20	19	19	20	–8	–4	2	–1	4
Jewelers and silversmiths	30	32	32	33	5	6	8	2	8
Machinists	369	335	349	372	–9	–5	1	–20	79
Sheet metal workers and duct installers	222	194	205	220	–12	–8	–1	–17	45
Shipfitters	12	10	11	11	–17	–10	–4	–1	2
Tool and die makers	142	121	127	136	–15	–11	–4	–15	34
All other precision metal workers	90	78	82	86	–13	–9	–4	–8	18
Printing workers, precision	150	152	157	162	1	4	8	7	53
Bookbinders	6	6	6	6	–7	–4	–1	0	1
Prepress printing workers, precision	131	128	132	136	–2	1	4	1	43
Compositors and typesetters, precision	11	8	8	8	–24	–23	–21	–2	2
Job printers	14	10	11	11	–29	–27	–24	–4	3
Paste-up workers	22	16	16	17	–30	–28	–26	–6	4
Electronic pagination systems workers	18	32	33	34	77	83	88	15	19
Photoengravers	7	5	5	5	–22	–20	–17	–1	1
Camera operators	15	13	14	14	–9	–6	–3	–1	3
Strippers, printing	31	33	34	35	6	9	12	3	9
Platemakers	13	11	11	12	–18	–15	–13	–2	2
All other printing workers, precision	13	19	19	20	40	44	48	6	8
Textile, apparel, and furnishings workers, precision	240	211	219	229	–12	–9	–4	–21	40
Custom tailors and sewers	84	63	63	64	–25	–25	–24	–21	10
Patternmakers and layout workers, fabric and apparel	17	21	23	25	22	31	41	5	7
Shoe and leather workers and repairers, precision	24	16	17	19	–34	–28	–19	–7	2
Upholsterers	63	62	64	69	–2	1	8	1	9
All other precision textile, apparel, and furnishings workers	51	49	51	53	–4	0	3	0	11
Woodworkers, precision	241	266	277	297	10	15	23	36	86
Cabinetmakers and bench carpenters	131	145	151	161	11	15	23	20	45
Furniture finishers	38	39	40	43	3	6	13	2	12
Wood machinists	50	56	59	65	13	19	30	10	19
All other precision woodworkers	22	25	26	28	13	19	28	4	10

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Other precision workers	199	198	204	211	–1	2	6	5	52
Dental laboratory technicians, precision	49	47	47	47	–5	–5	–4	–2	11
Optical goods workers, precision	19	21	22	22	8	12	16	2	7
Photographic process workers, precision	14	16	16	16	15	15	15	2	6
All other precision workers	117	114	119	125	–2	2	7	3	28
Plant and system occupations	330	321	334	354	–3	1	7	4	87
Chemical plant and system operators	37	35	36	37	–6	–3	–2	–1	8
Electric power generating plant operators, distributors, and dispatchers	43	39	42	44	–9	–3	3	–1	10
Power distributors and dispatchers	18	15	15	16	–17	–14	–10	–2	4
Power generating and reactor plant operators	26	25	26	28	–3	4	11	1	6
Gas and petroleum plant and system occupations	31	30	28	29	–4	–10	–6	–3	7
Stationary engineers	30	26	27	28	–14	–10	–6	–3	7
Water and liquid waste treatment plant and system operators	95	96	104	114	1	9	19	9	30
All other plant and system operators	93	94	97	102	1	5	10	4	25
Operators, fabricators, and laborers	17,142	17,197	17,898	18,764	0	4	9	757	5,626
Machine setters, set-up operators, operators, and tenders	4,779	4,304	4,505	4,749	–10	–6	–1	–274	1,353
Numerical control machine tool operators and tenders, metal and plastic	75	90	94	103	20	26	38	20	34
Combination machine tool setters, set-up operators, operators, and tenders	106	116	123	133	10	16	26	17	38
Machine tool cut and form setters, operators, and tenders, metal and plastic	709	563	593	638	–21	–16	–10	–116	175
Drilling and boring machine tool setters and set-up operators, metal and plastic	45	28	30	32	–38	–35	–30	–16	9
Grinding machine setters and set-up operators, metal and plastic	64	50	52	56	–22	–18	–12	–12	13
Lathe and turning machine tool setters and set-up operators, metal and plastic	71	47	50	54	–34	–31	–25	–22	14
Machine forming operators and tenders, metal and plastic	171	144	151	161	–15	–11	–6	–19	58
Machine tool cutting operators and tenders, metal and plastic	119	80	85	92	–33	–29	–23	–34	23
Punching machine setters and set-up operators, metal and plastic	48	35	37	41	–25	–21	–15	–10	12
All other machine tool cutting and forming	191	178	188	202	–6	–1	6	–2	46
Metal fabricating machine setters, operators, and related workers	157	130	138	150	–17	–12	–5	–19	39
Metal fabricators, structural metal products	44	41	43	47	–8	–3	5	–1	9
Soldering and brazing machine operators and tenders	10	8	8	9	–21	–17	–10	–2	3
Welding machine setters, operators, and tenders	103	82	87	94	–20	–16	–8	–16	28
Metal and plastic processing machine setters, operators, and related workers	425	420	444	477	–1	4	12	19	152

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Electrolytic plating machine operators and tenders, setters and set-up operators, metal and plastic	42	43	45	48	1	6	14	2	14
Foundry mold assembly and shakeout workers	10	8	8	9	–27	–23	–18	–2	4
Furnace operators and tenders	20	18	19	20	–13	–8	–3	–2	4
Heat treating machine operators and tenders, metal and plastic	20	17	17	19	–15	–12	–6	–2	5
Metal molding machine operators and tenders, setters and set-up operators	40	38	40	44	–5	0	9	0	14
Plastic molding machine operators and tenders, setters and set-up operators	165	167	177	190	1	7	15	12	68
All other metal and plastic machine setters, operators, and related workers	127	130	137	148	2	8	16	10	44
Printing, binding, and related workers	384	373	387	401	–3	1	4	3	108
Bindery machine operators and set-up operators	72	75	77	79	3	7	10	5	18
Prepress printing workers, production	25	9	9	9	–65	–64	–63	–16	5
Photoengraving and lithographic machine operators and tenders	5	3	3	3	–34	–32	–30	–2	1
Typesetting and composing machine operators and tenders	20	6	6	6	–72	–71	–70	–14	4
Printing press operators	218	215	223	230	–1	2	6	5	62
Letterpress operators	14	4	4	4	–72	–71	–71	–10	3
Offset lithographic press operators	79	82	84	87	3	7	10	5	22
Printing press machine setters, operators and tenders	113	115	119	124	2	6	10	6	31
All other printing press setters and set-up operators	13	15	16	16	22	24	27	3	6
Screen printing machine setters and set-up operators	26	29	30	32	9	16	22	4	10
All other printing, binding, and related workers	43	46	48	50	5	10	15	5	13
Textile and related setters, operators, and related workers	1,018	778	829	878	–24	–19	–14	–188	222
Extruding and forming machine operators and tenders, synthetic or glass fibers	22	27	28	29	23	28	32	6	11
Pressing machine operators and tenders, textile, garment, and related materials	77	74	76	78	–5	–1	1	–1	19
Sewing machine operators, garment	531	367	391	412	–31	–26	–22	–140	106
Sewing machine operators, nongarment	129	111	117	127	–14	–9	–2	–12	26
Textile bleaching and dyeing machine operators and tenders	30	34	37	39	13	24	32	7	14
Textile draw-out and winding machine operators and tenders	190	132	143	153	–31	–25	–20	–47	38
Textile machine setters and set-up operators	39	33	36	39	–14	–6	0	–2	8
Woodworking machine setters, operators, and other related workers	126	92	97	105	–27	–23	–17	–29	32
Head sawyers and sawing machine operators and tenders, setters and set-up operators	62	45	47	51	–28	–24	–18	–15	16
Woodworking machine operators and tenders, setters and set-up operators	64	48	50	54	–26	–22	–15	–14	16

See footnotes at end of table.

Table 2. **Continued—Employment by occupation, 1994 and projected 2005**

[Numbers in thousands]

Occupation	Total employment				Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
	1994	Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
Other machine setters, set-up operators, operators, and tenders	1,779	1,741	1,799	1,865	–2	1	5	20	554
Boiler operators and tenders, low pressure	18	12	12	13	–35	–32	–29	–6	4
Cement and gluing machine operators and tenders	36	24	25	27	–34	–30	–25	–11	9
Chemical equipment controllers, operators and tenders	75	65	67	68	–13	–11	–9	–8	28
Cooking and roasting machine operators and tenders, food and tobacco	28	30	30	30	8	8	7	2	9
Crushing and mixing machine operators and tenders	137	131	136	141	–4	–1	3	–1	36
Cutting and slicing machine setters, operators and tenders	92	99	103	108	7	12	17	11	29
Dairy processing equipment operators, including setters	14	14	14	14	–2	–1	–1	0	5
Electronic semiconductor processors	33	32	34	38	–2	4	16	1	10
Extruding and forming machine setters, operators, and tenders	102	91	95	99	–11	–8	–3	–8	27
Furnace, kiln, or kettle operators and tenders	28	23	24	25	–17	–13	–8	–4	5
Laundry and drycleaning machine operators and tenders, except pressing	175	195	198	203	11	13	15	23	68
Motion picture projectionists	8	4	4	4	–46	–47	–48	–4	2
Packaging and filling machine operators and tenders	329	351	359	367	7	9	12	30	119
Painting and coating machine operators	155	151	159	169	–3	2	9	3	47
Coating, painting, and spraying machine operators, tenders, setters, and set-up operators	111	104	110	119	–6	–1	7	–1	31
Painters, transportation equipment	45	47	49	50	5	9	13	4	16
Paper goods machine setters and set-up operators	51	40	42	44	–20	–16	–14	–8	13
Photographic processing machine operators and tenders	43	49	49	50	13	15	16	6	17
Separating and still machine operators and tenders	20	19	19	19	–8	–6	–4	–1	8
Shoe sewing machine operators and tenders	14	4	5	7	–71	–64	–54	–9	2
Tire building machine operators	14	13	13	14	–9	–6	–2	–1	4
All other machine operators, tenders, setters, and set-up operators	407	395	409	427	–3	1	5	2	111
Hand workers, including assemblers and fabricators	2,605	2,557	2,665	2,819	–2	2	8	60	784
Cannery workers	73	81	82	83	10	12	13	9	29
Coil winders, tapers, and finishers	21	15	15	16	–28	–26	–21	–5	5
Cutters and trimmers, hand	51	44	47	50	–13	–8	0	–4	14
Electrical and electronic assemblers	212	173	182	197	–18	–14	–7	–30	52
Grinders and polishers, hand	74	66	70	75	–11	–6	1	–4	21
Machine assemblers	51	52	55	60	3	8	17	4	17
Meat, poultry, and fish cutters and trimmers, hand	132	168	168	168	27	28	27	36	74
Painting, coating, and decorating workers, hand	33	35	36	38	6	10	15	3	13
Pressers, hand	16	15	15	16	–8	–4	–2	–1	5
Sewers, hand	19	16	17	18	–14	–9	–5	–2	2
Solderers and brazers	27	30	31	33	13	17	23	5	12
Welders and cutters	314	303	316	335	–3	1	7	3	88

See footnotes at end of table.

Table 2. Continued—Employment by occupation, 1994 and projected 2005

[Numbers in thousands]

Occupation	1994	Total employment			Change, 1994–2005				Total job openings due to growth and net replacements, 1994–2005, moderate alternative[1]
		Projected, 2005			Percent			Number, moderate	
		Low	Moderate	High	Low	Moderate	High		
All other assemblers, fabricators, and hand workers	1,583	1,558	1,630	1,731	–2	3	9	46	453
Transportation and material moving machine and vehicle operators	4,959	5,259	5,459	5,694	6	10	15	500	1,434
Motor vehicle operators	3,620	3,906	4,045	4,200	8	12	16	425	1,066
Bus drivers	568	623	663	704	10	17	24	95	193
Bus drivers, except school	165	184	193	201	12	17	22	29	57
Bus drivers, school	404	439	470	503	9	16	25	66	136
Taxi drivers and chauffeurs	129	156	157	159	20	22	23	28	43
Truckdrivers	2,897	3,099	3,196	3,307	7	10	14	299	823
Driver/sales workers	331	355	359	364	7	8	10	28	122
Truckdrivers, light and heavy	2,565	2,744	2,837	2,944	7	11	15	271	701
All other motor vehicle operators	26	28	29	29	9	11	13	3	8
Rail transportation workers	86	70	75	81	–18	–12	–6	–10	15
Locomotive engineers	22	18	19	20	–20	–14	–8	–3	3
Railroad brake, signal, and switch operators	19	12	13	14	–36	–31	–26	–6	3
Railroad conductors and yardmasters	26	23	25	26	–13	–6	0	–2	4
Rail yard engineers, dinkey operators, and hostlers	6	3	4	4	–44	–40	–37	–2	1
Subway and streetcar operators	12	14	15	17	13	23	34	3	5
Water transportation and related workers	48	46	48	51	–4	0	6	0	10
Able seamen, ordinary seamen, and marine oilers	20	19	20	21	–7	–3	3	–1	4
Captains and pilots, ship	13	12	13	13	–4	0	6	0	3
Mates, ship, boat, and barge	7	7	8	8	1	6	12	0	2
Ship engineers	8	8	8	8	–1	3	9	0	2
Material moving equipment operators	1,061	1,084	1,129	1,193	2	6	12	69	298
Crane and tower operators	45	40	42	45	–10	–6	0	–3	11
Excavation and loading machine operators	88	95	100	107	8	13	21	11	31
Grader, dozer, and scraper operators	108	107	113	122	0	5	14	6	27
Hoist and winch operators	9	8	9	9	–9	–5	2	0	2
Industrial truck and tractor operators	464	474	493	515	2	6	11	29	132
Operating engineers	146	145	154	165	–1	5	13	7	37
All other material moving equipment operators	201	214	219	229	7	9	14	18	59
All other transportation and material moving equipment operators	145	154	161	170	6	11	17	16	44
Helpers, laborers, and material movers, hand	4,799	5,078	5,270	5,502	6	10	15	471	2,056
Freight, stock, and material movers, hand	765	707	728	754	–8	–5	–1	–36	306
Hand packers and packagers	942	1,070	1,102	1,137	14	17	21	160	429
Helpers, construction trades	513	549	581	630	7	13	23	68	240
Machine feeders and offbearers	262	232	242	253	–11	–8	–3	–20	80
Parking lot attendants	64	75	76	77	18	20	21	13	25
Refuse collectors	111	107	115	123	–3	4	12	4	31
Service station attendants	167	143	148	151	–15	–12	–10	–20	67
Vehicle washers and equipment cleaners	249	290	299	306	16	20	23	50	133
All other helpers, laborers, and material movers, hand	1,727	1,905	1,980	2,070	10	15	20	253	744

[1] Total job openings represent the sum of employment increases and net replacements. If employment change is negative, job openings due to growth are zero and total job openings equal net replacements.

addition to numerical change, employment size of an occupation is a major factor in the number of future job openings because of the need to replace workers who leave the labor force or transfer to other occupations.

Fastest growing occupations. Most of the occupations with the fastest projected employment growth are concentrated in one or more of the rapidly growing industries. A large number of the 30 occupations with the fastest projected growth rates are concentrated in the health services sector, which is expected to expand more than twice as fast as the economy as a whole.[5] (See table 3.) Health service occupations also dominated this list in the 1983–94 period.

Employment in the two occupations projected to grow the most rapidly from 1994 to 2005—personal and home care aides and home health aides—is concentrated in the home health care services and individual and miscellaneous social services industries. These occupations also grew the fastest during 1983–94. Home health aides provide personal and physical care for an increasing number of elderly people and for patients who are recovering from surgery and other serious health conditions. Personal and home care aides perform a variety of light housekeeping tasks for those in need of home care.

Table 3. Fastest growing occupations, 1994–2005, moderate alternative projection

[Numbers in thousands]

Occupation	Employment		Numerical change	Percent change
	1994	2005		
Personal and home care aides	179	391	212	119
Home health aides	420	848	428	102
Systems analysts	483	928	445	92
Computer engineers	195	372	177	90
Physical and corrective therapy assistants and aides	78	142	64	83
Electronic pagination systems workers	18	33	15	83
Occupational therapy assistants and aides	16	29	13	82
Physical therapists	102	183	81	80
Residential counselors	165	290	126	76
Human services workers	168	293	125	75
Occupational therapists	54	93	39	72
Manicurists	38	64	26	69
Medical assistants	206	327	121	59
Paralegals	110	175	64	58
Medical records technicians	81	126	45	56
Teachers, special education	388	593	206	53
Amusement and recreation attendants	267	406	139	52
Correction officers	310	468	158	51
Operations research analysts	44	67	22	50
Guards	867	1,282	415	48
Speech-language pathologists and audiologists	85	125	39	46
Detectives, except public	55	79	24	44
Surgical technologists	46	65	19	43
Dental hygienists	127	180	53	42
Dental assistants	190	269	79	42
Adjustment clerks	373	521	148	40
Teacher aides and educational assistants	932	1,296	364	39
Data processing equipment repairers	75	104	29	38
Nursery and greenhouse managers	19	26	7	37
Securities and financial services sales workers	246	335	90	37

The number of physical therapists and physical and corrective therapy assistants and aides is expected to grow rapidly as a result of new treatments for life-threatening and disabling conditions that involve therapy. Another factor is the growing elderly population, whose members are particularly vulnerable to chronic and debilitating conditions that will require more therapeutic services. The number of occupational therapists and occupational therapy assistants and aides also is expected to increase due to medical advances that make it possible for more patients with critical problems to survive. These workers help individuals with mentally, physically, developmentally, or emotionally disabling conditions to develop, recover, or maintain daily living and work skills. Employment of medical records technicians is projected to expand rapidly, despite considerably slower than average growth for the hospital industry, which employs the majority of these workers. These jobs will be added in response to the need to maintain records for an increasing number of medical tests, treatments, and procedures that will undergo increasing scrutiny by third-party payers, courts, and consumers. Employment of medical assistants is expected to be driven by an increase in the number of group and other health care practices that use support personnel. These workers are employed primarily in outpatient settings, which are projected to grow rapidly. The demand for dental hygienists and dental assistants is expected to be spurred by growth in the population and greater awareness of the need for preventive dental care. The number of dental hygienists is projected to grow somewhat more slowly than during the previous 11-year period, 1983–94. The number of dental assistants, on the other hand, is expected to grow significantly faster than in the past. Other occupations in the health field that are projected to grow rapidly include human services workers (large numbers of which also are found in social services and in State and local governments); surgical technologists; and speech-language pathologists and audiologists.

Robust growth is projected in some computer-related oc-

cupations, because of the continuing spread of computer technology. Employment of computer engineers and systems analysts is expected to increase rapidly to satisfy expanding needs for scientific research and applications of computer technology in business and industry. These occupations also are included in table 4, which shows the list of occupations with the largest projected job growth through 2005. They experienced very fast rates of growth and large numerical increases in employment from 1983 to 1994, as well. Expanding use of operations research to improve productivity and reduce costs is expected to increase the demand for operations research analysts. The number of electronic pagination systems workers is projected to grow very rapidly in the printing and publishing industry, as more page layout and design is performed electronically by computer. More data processing equipment repairers will be needed to install, maintain, and repair the growing number of computers in use. One computer occupation that one might expect to find on the list of fastest growing occupations is conspicuous by its absence. The computer programmers group, which grew much faster than the average for all occupations during the 1980's, is projected to increase more slowly than average through 2005 due to improved software and programming techniques that simplify or eliminate some programming tasks.

Paralegals are expected to be in great demand in legal and related fields, reflecting efforts to provide more cost effective legal services to the public. This occupation was among the top 10 fastest growing occupations over the period 1983–94. The number of special education teachers is expected to grow due to legislation requiring training and employment for individuals with disabilities and to growing public interest in people with special needs. Jobs for correction officers are projected to increase quickly in response to the need to supervise and counsel a rapidly expanding inmate population. Increased concern about crime, vandalism, and terrorism is expected to result in a larger number of guards and detectives, except public. The majority of residential counselors are employed in the very rapidly growing residential care industry, which provides social and personal care for children, the aged, and others with limited ability for self-care. Finally, the expanding agricultural services (except animal services) industry is projected to provide numerous jobs for nursery and greenhouse managers.

Occupations with the largest job growth. Most of the occupations with the largest increases in numbers of jobs are concentrated in three industries that are expected to provide nearly half of the total growth in wage and salary jobs from 1994 to 2005—retail trade; health services; and educational services. (See table 4.) Within retail trade, employment of salespersons, retail; cashiers; waiters and waitresses; food preparation workers; marketing and salesworker supervisors; and food service and lodging managers is expected to grow substantially. All of these occupations also had large employment increases from 1983 to 1994.

The health services sector is expected to provide numerous opportunities for registered nurses; licensed practical nurses; nursing aides, orderlies, and attendants; home health aides; and personal and home care aides. (The last two also are on the list of the fastest growing occupations.) Of the occupations in this group, only registered nurses and home health aides were also on the list of the 30 occupations with the largest job growth between 1983 and 1994. The public and private education industry is projected to provide large employment increases for elementary school teachers; secondary school teachers; teacher aides and educational assistants; and special education teachers.

The remaining occupations listed in table 4 are found in a wide variety of industries throughout the economy and their growth, as a consequence, is dependent upon many factors. More than 6 out of 10 new jobs for general managers and top executives in 2005 will be in the services sector. As mentioned in the previous section, employment for systems analysts is expected to grow with the continued spread of computer technology. Jobs for receptionists and information clerks are projected to increase significantly because such workers interact a great deal with people and their duties are difficult to automate. The number of child care workers, who experienced a very large employment increase during the 1980's, is expected to continue to expand significantly through 2005 as a result of anticipated growth in the number of young children and a change in the type of child care arrangements parents choose. The switch from informal arrangements with family or friends to formal institutional child care is projected to continue. Other very large and slower growing occupations that are expected to provide numerous additional jobs are truckdrivers, light and heavy; janitors and cleaners; maintenance repairers, general utility; and secretaries, except legal and medical.

An interesting contrast exists between the total increase in employment from those occupations that are projected as the fastest growing (table 3) and the increase from those projected to account for the largest numerical increases (table 4). The first group accounts for 18 percent of the projected overall growth in employment, while the second accounts for almost 55 percent (several occupations are included in both of the groups).

Educational requirements and earnings of growth jobs. Educational requirements and median weekly earnings of workers vary widely among the 30 occupations that are projected to grow the most rapidly and the 30 occupations with the largest numerical increases. About one-half of the occupations on both lists require education or training beyond high school. Occupations that generally require a bachelor's degree or more education are concentrated in the professional

specialty group, and all had median weekly earnings in 1994 that were higher than the average for all full-time wage and salary wage workers. Examples of occupations in this category include computer engineers; systems analysts; operations research analysts; physical therapists; occupational therapists; and elementary and secondary school teachers.

Several occupations require specific formal training obtained in public and private institutions, including community and junior colleges, which offer occupationally oriented training programs. About half of these occupations had higher than average earnings, including registered nurses; paralegals; medical records technicians; surgical technicians; and dental hygienists. A few occupations, such as maintenance repairers, general utility, most often require skills obtained through employer training programs.

The remainder of the occupations require high school graduation or less education. Examples include home health aides; human services workers; personal and home care aides; salespersons, retail; cashiers; truckdrivers; correction officers; and clerical supervisors and managers. Very few of the occupations in this group had average or higher than average earnings in 1994. Some occupations, such as secretaries, except legal and medical, may require high school vocational training, but many others have no specific formal training requirements, and job skills in these occupations generally are learned on the job in a relatively short time.

Table 4. **Occupations with the largest job growth, 1994–2005, moderate alternative projection**

[Numbers in thousands]

Occupation	Employment		Numerical change	Percent change
	1994	2005		
Cashiers	3,005	3,567	562	19
Janitors and cleaners, including maids and housekeeping cleaners	3,043	3,602	559	18
Salespersons, retail	3,842	4,374	532	14
Waiters and waitresses	1,847	2,326	479	26
Registered nurses	1,906	2,379	473	25
General managers and top executives	3,046	3,512	466	15
Systems analysts	483	928	445	92
Home health aides	420	848	428	102
Guards	867	1,282	415	48
Nursing aides, orderlies, and attendants	1,265	1,652	387	31
Teachers, secondary school	1,340	1,726	386	29
Marketing and sales worker supervisors	2,293	2,673	380	17
Teacher aides and educational assistants	932	1,296	364	39
Receptionists and information clerks	1,019	1,337	318	31
Truckdrivers light and heavy	2,565	2,837	271	11
Secretaries, except legal and medical	2,842	3,109	267	9
Clerical supervisors and managers	1,340	1,600	261	19
Child care workers	757	1,005	248	33
Maintenance repairers, general utility	1,273	1,505	231	18
Teachers, elementary	1,419	1,639	220	16
Personal and home care aides	179	391	212	119
Teachers, special education	388	593	206	53
Licensed practical nurses	702	899	197	28
Food service and lodging managers	579	771	192	33
Food preparation workers	1,190	1,378	187	16
Social workers	557	744	187	34
Lawyers	656	839	183	28
Financial managers	768	950	182	24
Computer engineers	195	372	177	90
Hand packers and packagers	942	1,102	160	17

The two lists of growth occupations show that employers will continue to require workers at all levels of education and training. Nevertheless, the fact remains that workers with higher levels of education or training usually will have more options in the job market and better prospects for obtaining the higher paying jobs.

Declining occupations. Decreases in industry employment and changes in occupational staffing patterns are expected to reduce the demand for workers in several occupations over the 1994–2005 period. (See table 5.) This section of the article focuses on those occupations with the largest job declines rather than on those with the fastest rates of decline. Many detailed occupations in the latter category are very small and, consequently, the resulting employment losses are not very significant.

Industry employment change is the major cause of projected employment decreases for farmers; sewing machine operators, garment; textile draw-out and winding machine operators and tenders; electrical and electronic assemblers; and cleaners and servants, private households. Declining occupations that are expected to be affected almost equally by industry employment changes and by occupational structure changes include farmworkers; central office and PBX installers and repairers; central office operators; station installers and repairers; and directory assistance operators.

Most of the other declining occupations are affected more by occupational structure changes, which are the result of technological advances, organizational changes, and other factors that affect the use of workers, rather than industry employment changes. The large drop in employment for bartenders in the eating and drinking places industry is attributable to the projected decline in the consumption of alcoholic beverages outside of the home. Employment of typists and word processors is expected to decrease substantially, by 212,000 jobs across all industries, because of productivity

improvements resulting from office automation and the increased use of word processing equipment by professional and managerial employees. Jobs for these workers declined by 173,000 during 1983–94. Data entry keyers, except composing and personnel clerks, except payroll and timekeeping also are expected to continue their long-run employment losses through 2005. Several other occupations, all of which registered employment increases during the 1980's, are projected to decline through 2005 due to a much greater impact of office automation; among these are bookkeeping, accounting, and auditing clerks; duplicating, mail, and other office machine operators; billing, posting, and calculating machine operators; and file clerks. The demand for computer operators, except peripheral equipment, which increased modestly from 1983 to 1994, is expected to fall because these employees work mainly with large computer systems—the part of the overall computer market that is projected to slow down. Employment for bank tellers is expected to decline because of increased use of automated teller machines, terminals, and other electronic equipment for customer fund transactions.

Table 5. **Occupations with the largest job decline, 1994–2005, moderate alternative projection**

[Numbers in thousands]

Occupation	Employment		Numerical change	Percent change
	1994	2005		
Farmers	1,276	1,003	-273	-21
Typists and word processors	646	434	-212	-33
Bookkeeping, accounting, and auditing clerks	2,181	2,003	-178	-8
Bank tellers	559	407	-152	-27
Sewing machine operators, garment	531	391	-140	-26
Cleaners and servants, private household	496	387	-108	-22
Computer operators, except peripheral equipment	259	162	-98	-38
Billing, posting, and calculating machine operators	96	32	-64	-67
Duplicating, mail, and other office machine operators	222	166	-56	-25
Textile draw-out and winding machine operators and tenders	190	143	-47	-25
File clerks	278	236	-42	-15
Freight, stock, and material movers, hand	765	728	-36	-5
Farm workers	906	870	-36	-4
Machine tool cutting operators and tenders, metal and plastic	119	85	-34	-29
Central office operators	48	14	-34	-70
Central office and PBX installers and repairers	84	51	-33	-39
Electrical and electronic assemblers	212	182	-30	-14
Station installers and repairers, telephone	37	11	-26	-70
Personnel clerks, except payroll and timekeeping	123	98	-26	-21
Data entry keyers, except composing	395	370	-25	-6
Bartenders	373	347	-25	-7
Inspectors, testers, and graders, precision	654	629	-25	-4
Directory assistance operators	33	10	-24	-70
Lathe and turning machine tool setters and set-up operators, metal and plastic	71	50	-22	-31
Custom tailors and sewers	84	63	-21	-25
Machine feeders and offbearers	262	242	-20	-8
Machinists	369	349	-20	-5
Service station attendants	167	148	-20	-12
Machine forming operators and tenders, metal and plastic	171	151	-19	-11
Communication, transportation, and utilities operations managers	154	135	-19	-12

Several blue-collar occupations in manufacturing are expected to contract because of changes in the occupational structure of many of the detailed industries in that sector. For example, the installation of computer-controlled technology, including advanced systems that combine production tasks and link machines, will reduce the demand for machine forming operators and tenders, metal and plastic and for machine tool cutting operators and tenders, metal and plastic. Laser inspection devices and other automated inspection equipment are expected to reduce the demand for inspectors, testers, and graders, precision, an occupation for which employment also decreased during the 1980's. Automated material moving equipment will reduce employment for freight, stock, and material movers, hand. Similarly, the number of machine feeders and offbearers is projected to decline as a result of the introduction of more computer-controlled equipment and machinery that loads and unloads products automatically. Greater use of computer-controlled machine tools and changes in production methods is expected to lessen demand for lathe and turning machine tool setters and set-up operators, metal and plastic.

A few occupations are expected to be adversely affected by changes in business practices and other factors. For example, the number of service station attendants will continue to decline because most gas stations no longer provide automobile maintenance services. Also, the demand for station installers and repairers, telephone will fall due to a continuation of the trend toward customer installation of telephones.

Total job openings

In addition to occupational employment growth, another aspect of the demand for workers is the need to replace workers

who leave their jobs to enter other occupations, retire, or leave the labor force for other reasons. Job openings resulting from replacement needs are very important because, in most occupations, they exceed those resulting from employment growth. Even occupations that are projected to decline provide some job openings. (See table 2.)

The measurement of replacement needs is very complex because there is a continuous movement of workers into and out of occupations. The measure used in this article is based on the net change in employment (entrants minus separations) in each age cohort over the projection period. Consequently, net replacements do not measure all workers who leave an occupation, nor do they represent the total number of jobs that will be filled due to the need to replace workers. These net replacements understate the total number of job openings in an occupation because they relate only to the difference between the number of experienced workers who enter and the number who leave that occupation. However, net replacements are used in this article because the measure best represents the job openings for new labor force entrants over the projection period.[6]

Over the 1994–2005 period, more job openings are expected to result from replacement needs (31.9 million) than from employment growth in the economy (17.7 million). However, this pattern differs for professional specialty occupations, which has the fastest rate of growth among the major occupational groups, and for many detailed occupations that are projected to grow faster than the average. In contrast, for the major occupational groups that are projected to grow more slowly than average—administrative support occupations, including clerical; precision production, craft, and repair occupations; operators, fabricators, and laborers; and farming, forestry, and fishing occupations—the numbers of job openings attributable to net replacements are expected to greatly exceed those due to growth.

Table 6. **Percent distribution of employment by occupation, 1994 and projected 2005 alternatives**

Occupation	1994	2005		
		Low	Moderate	High
Total, all occupations	100.0	100.0	100.0	100.0
Executive, administrative, and managerial occupations	10.2	10.4	10.4	10.4
Professional specialty occupations	13.6	15.3	15.5	15.7
Technicians and related support occupations	3.5	3.7	3.7	3.7
Marketing and sales occupations	11.0	11.5	11.4	11.3
Administrative support occupations, including clerical	18.2	16.6	16.7	16.7
Service occupations	15.9	17.4	17.2	16.9
Agriculture, forestry, fishing, and related occupations	3.0	2.6	2.5	2.4
Precision production, craft, and repair occupations	11.1	10.2	10.3	10.4
Operators, fabricators, and laborers	13.5	12.3	12.4	12.5

Table 7. **Employment in detailed occupations for 1994 and projected to 2005 in the moderate trend alternativeand difference between employment in the low- to high-trend alternative**

Occupation	Employment, moderate trend (in thousands)		Employment difference, low- to high-trend
	1994	2005	
Teachers, secondary school	1,340	1,726	299
Teachers, elementary	1,419	1,639	278
Secretaries, except legal and medical	2,842	3,109	275
Salespersons, retail	3,842	4,374	265
Janitors and cleaners, including maids and housekeeping cleaner	3,043	3,602	262
General office clerks	2,946	3,071	245
General managers and top executives	3,046	3,512	239
Truckdrivers light and heavy	2,565	2,837	200
Teacher aides and educational assistants	932	1,296	182
College and university faculty	823	972	169

The number of job openings for service occupations from 1994 to 2005 is projected to be 9.8 million, and to exceed the number for professional occupations, the next largest group, by 1.4 million. Accounting for 21 percent of total job openings, numerous openings for service workers are expected to result from both net replacements and employment growth. A large number of replacements is expected to result from the movement of young workers in food preparation and service occupations to other occupations.

Alternative projections

The discussion of occupational employment projections through the year 2005 thus far has focused on the moderate alternative of the three sets of projections developed by BLS. This section presents a brief analysis of the employment differences at the major occupational group level between the moderate-trend projections and the low-trend and high-trend alternatives. Compared with a projected growth rate of 14 percent for total employment in the moderate projection, increases are expected to be 10 percent in the low-trend and 18 percent in the high-trend alternative. (See table 2.)

The distribution of total employment by major occupational group varies little among the three sets of projections alternatives for 2005 because of offsetting changes among the detailed occupations within each of the major groups. (See table 6.) Among the detailed occupations, however, significant numerical differences exist between each of the alternatives. In fact, even the direction of projected employment

change for an occupation from 1994 to 2005 can differ among the alternatives. For example, employment for metal fabricators is projected to decline in both the low-trend and moderate alternatives, but is projected to increase in the high-trend alternative. The differences in projected occupational employment among the alternatives are caused only by differences in the projected levels of industry employment, because the same set of occupational staffing patterns by industry was used in all three projections alternatives.

In the high-trend alternative, total employment in 2005 is 10 million higher than in the low-trend alternative. Therefore, the range in projected employment for detailed occupations can be very wide, particularly for occupations of large size, as shown in table 7.

THE OCCUPATIONAL PROJECTIONS presented in this article provide information to those interested in labor market issues. They also provide the background for analyses of future employment opportunities described in the BLS publication, *Occupational Outlook Handbook*. Job outlook information in the 1996–97 edition of the *Handbook*, scheduled for release in the spring of 1996, will use the projections presented in each of the articles that make up *Employment Outlook: 1994–2005*. □

Footnotes

[1] See Howard N Fullerton, Jr., "The 2005 labor force: growing, but slowly," elsewhere in this issue.

[2] The 1994 employment estimates described in this article are derived from the Bureau's industry-occupation employment matrix, which includes data for more than 500 detailed occupations and 250 detailed industries. The main sources of data used in the matrix are Current Employment Statistics (CES) estimates for total wage and salary jobs by industry and Occupational Employment Statistics (OES) data for employment by occupation within detailed industries. Total employment and occupational staffing patterns of wage and salary workers in agriculture (except agricultural services), forestry, fishing, hunting, and trapping, and in private households are derived from the Current Population Survey (CPS). Economy-wide data on self-employed and unpaid family workers by occupation are also derived from the CPS. The estimates derived from the CES and OES differ from those obtained from the CPS in a number of important ways. For example, employed persons who hold more than one job are included twice in the CES and OES estimates, but only once in the CPS data, which excludes the secondary jobs of workers.

[3] See Norman C. Saunders, "The U.S. economy to 2005," and James C. Franklin, "Industry output and employment to 2005," elsewhere in this issue.

[4] The services industry division in this article includes State and local government hospitals and education. In the article on industry employment by James C. Franklin, workers in State and local government hospitals and education are included in the estimates of government employment.

[5] This analysis excludes miscellaneous residual occupational groups.

[6] See the discussion on the uses of replacement needs information developed in *Occupational Projections and Training Data* (Bureau of Labor Statistics, 1992).

APPENDIX: Employment projections methodology

Bureau of Labor Statistics projections of industrial and occupational employment are developed in a series of six interrelated steps, each of which is based on a different procedure or model and related assumptions: labor force, aggregate economy, final demand (GDP) by consuming sector and product, industrial activity, employment by industry, and employment by occupation. The results produced by each step are key inputs to following steps, and the sequence may be repeated multiple times to allow feedback and to insure consistency.

Labor force

Labor force projections depend on assumptions of the future size and composition of the current population, as well as on the trends in labor force participation rates of different population groups. Projections are made for 136 separate age-sex-race or Hispanic-origin groups.

The Bureau of the Census prepares the population projections; BLS develops participation rates, using data from the Current Population Survey (CPS), conducted for BLS by the Bureau of the Census. The size and composition of the population are affected by the interaction of three variables: births, deaths, and net immigration. The Bureau of the Census makes three assumptions for each variable—preparing nine combinations of these assumptions and also preparing additional projections assuming zero net immigration.

For this latest round of projections, BLS selected the middle and high net immigration population scenarios as bases for the labor force and other projections. The size and composition of the population affect not only the labor force projections, but the projected composition of GDP and of the levels of employment in some occupations.

Three separate projections of the labor force were prepared. The moderate growth labor force scenario was based on the middle population projections and assumes labor force participation growth comparable to past years. The high growth labor force scenario assumes higher participation rates and uses the Bureau of the Census high net immigration population projection. The low growth scenario used the middle population projection and assumes lower labor force participation rates.

BLS currently disaggregates white non-Hispanics, blacks, Hispanics, and Asian and others (Asians and Pacific Islanders, native Americans and Alaskan natives) into 5-year age groups by sex. Participation rates for these groups were smoothed, using a robust-resistant nonlinear filter and then transformed into logits. After transformation, they were extrapolated linearly by regressing the logit of the participation rate against time and then extending the fitted series to or beyond the target year. When the series are transformed back into participation rates, the projected path is nonlinear.

After the labor force participation rates have been projected, they are reviewed from the perspectives of the time path, the cross section in the target year, and cohort patterns of participation. The labor force level resulting from the projection is compared with the labor force derived from an econometric model that projects only the total civilian labor force. When the basic scenario is completed, high and low alternatives are projected using the confidence interval on the slope (or change) coefficient from the original regression.

The projected participation rate for each age-sex-race group was then multiplied by the corresponding population projection to obtain the labor force projection for that group. The groups were then summed to obtain the total civilian labor force.

Aggregate economic projections

The aggregate economic projections are developed using a commercially provided econometric model of the U.S. economy—the Data Resources, Inc. Comprehensive Quarterly Macroeconomic Model of the U.S. Economy (DRI model). The DRI model comprises 340 behavioral equations, 668 identities, and 283 exogenous variables, for a total of almost 1,300 variables which describe all facets of aggregate economic performance. Estimates for exogenous variables are provided to the model and a solution of the behavioral and identity equations generated. Finally, the results are evaluated with regard to previously formulated targets for various key indicators of economic behavior.

The principal exogenous assumptions underlying the DRI model fall into the categories of demographic, fiscal and monetary policy, energy prices and supply, and foreign economic activity. Primary targets, or variables used to assess the behavior of a given set of projections, include the rate of growth and demand composition of real GDP, the labor productivity rate of growth, inflation, the unemployment rate, and aggregate establishment employment necessary to produce the given GDP. Many solution rounds may be necessary to arrive at a balanced set of assumptions which yield a believable and defensible set of results. Nonetheless, there are always those who will disagree, sometimes strongly, with the major assumptions underlying the projections. Thus, to provide a range of possible future growth possibilities, moderate, high, and low growth alternatives are developed which focus on those aggregate assumptions which were judged to be the most uncertain.

Final demand projections

Personal consumption expenditure was projected in the DRI model for eighteen major product groups: new autos, trucks, other automotive, computers, furniture, and other durables; food, clothing and shoes, gasoline and oil, fuel oil and coal, and other nondurables; housing services, electricity consumption, natural gas consumption, and other household operations; transportation, medical services, and other consumer services. Consumption expenditures for the 80 national income and product account categories were estimated for the 1995–2005 period by regressing each of the 80 categories against time and disposable income. These 80 category estimates were then aggregated to the level of the macro model controls and adjusted as necessary to insure consistency between the controls and the detailed estimates. In some cases, the macro model controls themselves were modified in response to analysis of the more detailed results. A bridge table then was used to distribute consumption spending within the 80 categories among the 183 producing industries for the 1995–2005 period.

Gross private domestic investment was initially projected by the DRI model for six categories of nonresidential producers' durable equipment, three categories of nonresidential structures, residential investment, and business inventories. These projections were further disaggregated by regressing more detailed investment categories on time. In all, projections were made for 23 categories of nonresidential producers' durable equipment, 9 categories of nonresidential structures, 6 categories of residential investment, and the change in business inventories. The estimates were then aggregated to the level of the macro model controls and adjusted as necessary to insure consistency between the controls and the detailed estimates. They were then distributed to producing sectors using projected bridge tables.

Foreign trade was initially projected by the DRI macro model for eight major end-use categories of exports and nine major end-use categories of imports. These values were then distributed across the industries using a bridge table. The trade projections were mainly based on analysis of past trends, existing and expected shares of the domestic market, expected world economic conditions, and known trade agreements.

The projections were made using two approaches. The primary approach was to develop the 1993 current-dollar end-use bridge table for both exports and imports from Bureau of the Census raw data. These end-use estimates were summed and compared to the national income and product account end-use controls. Purchases by services were allocated among industries based on the 1987 standard industrial classification. These current-dollar merchandise and service bridge tables for exports and imports were deflated and served as a basis for 2005.

The second approach was to extrapolate a growth rate over the 1987–93 period. The projected bills of goods from the two approaches were analyzed and adjusted incorporating estimates from the second approach where appropriate. Final adjustments were made based on detailed analyses and special industry studies conducted by the staff. When necessary, the DRI model controls were modified to reflect these more finely estimated bills of goods.

Government demand was projected by the DRI model for three major government categories: Federal defense, Federal nondefense, and State and local government. Projections for each major category included estimates for structures, compensation, and all other expenditures. These were further disaggregated based upon past trends and expected government political and policy changes. For defense, projections were made for seven categories of military procurement. For State and local government, expenditures were subdivided between education and noneducation functions. Finally, each expenditure category was allocated to the appropriate industry sector or sectors.

Industrial activity

The projection of detailed commodity demand developed in the preceding step was converted to industry output levels by means of projected input-output tables. A projected direct requirements table for the year 2005 was derived based on trend analysis of coefficients over the 1977–93 period. To do this, balanced historical tables were estimated for 1977, 1987 and 1993. A 1993 market shares table was used as a first approximation for the year 2005.

Employment by industry

The initial projections of industry employment were developed according to the following procedure implemented for each industry:

1. The demand for wage and salary hours in millions was projected using an estimated regression equation derived from the first order conditions of a constant elasticity of substitution production function modified to include a time variable. The time variable is meant to capture disembodied technical change or shifts in the production function arising from long term increased efficiencies in the use of inputs.
2. Annual average weekly wage and salary hours were estimated as a function of time and the unemployment rate. The same technique was also used to estimate annual average weekly self-employed and unpaid family worker hours.
3. The number of wage and salary jobs in thousands was then derived from the estimation of hours using the estimated annual average weekly wage and salary hours:

   [Jobs = (Hours/AWH)/0.052],

   where AWH = average weekly hours
4. The number of self-employed and unpaid family workers was derived by first extrapolating the logit of the ratio of self-employed and unpaid family workers to the total for each industry as a function of time and the unemployment rate. The extrapolated ratio was then used to derive the level of self-employed and unpaid family workers from the number of wage and salary jobs by first calculating the total number of jobs and then subtracting the number of wage and salary jobs from the total:

   [SEUFW = (WS/(1-SEUFWRatio) – WS)],

   where

   SEUFW = self-employed and unpaid family workers, and
   WS = wage and salary jobs.
5. The hours for self-employed and unemployed family workers were then calculated by applying the estimated annual average weekly self-employed and unpaid family workers hours to the self-employed and unpaid family workers levels:

   [SEHrs = SEUFW * SEAWH*.052],

   where

   SEHrs = self-employed and unpaid family worker hours,
   SEUFW = self-employed and unpaid family workers, and
   SEAWH= self-employed and unpaid family workers average weekly hours.
6. Finally, total hours for each industry were derived by summing wage and salary and self-employed and unpaid family workers hours.

The results produced by these procedures were then reviewed together with industry output and labor productivity to insure consistency with historical trends. At the same time attempts were made to identify industries which may be expected to deviate from past behavior because of changes in technology, demand or other factors. Where appropriate, changes to the initial employment estimates were made either by modifying the employment demand relationships themselves or by modifying results from earlier steps of the projections process.

Employment by occupation

An industry-occupation matrix is used to project employment for wage and salary workers. The matrix shows occupational staffing patterns—each occupation as a percent of the work force in every industry. It includes 260 detailed industries and 513 detailed occupations. Data for current staffing patterns in the matrix come primarily from the BLS Occupational Employment Statistics surveys, which collect data from employers on a 3-year cycle.

The occupational staffing patterns for each industry were projected based on anticipated changes in the way goods and services are produced, then applied to projected industry employment, and the resulting employment summed across industries to get total wage and salary employment by occupation. Using this method, employment is projected to grow faster than average in those occupations concentrated in fast-growing industries and more slowly in slow-growing industries. For example, health care workers are expected to grow rapidly, as the health care industries grow rapidly.

Employment in an occupation also may grow or decline as a result of many other factors. For example, rapid growth is expected among teachers' aides and educational assistants as increasing attention to the quality of education leads schools to hire more support staff. Rapid growth is also expected among computer systems analysts as technology advances and organizations place more emphasis on network applications and maximizing the efficiency of their computer systems. On the contrary, automation, the expanding use of computers, and developments in computer software enhance productivity and will result in slower than average growth among clerical workers, machine operators, and assemblers—thus lowering their proportion of the labor force. The projected-year matrix incorporates these expected changes.

Data on self-employed workers and unpaid family workers in each occupation come from the Current Population Survey. Self-employed workers and unpaid family workers for each occupation were projected separately for the economy as a whole rather than by industry, and were added to the projections of wage and salary workers to obtain total projected employment for each occupation.

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I certify that the statements made by me above are correct and complete.

(Signed) Richard M. Devens, Jr., Executive Editor