Occupational employment projections: the 1984–95 outlook

The occupational structure of the economy
is estimated to change through the mid-1990's
as employment growth rates for many occupations
depart from historical trends

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According to the most recent projections of the Bureau of Labor Statistics, occupational employment growth trends over the 1984–95 period are expected to depart from the recent past for some broad occupational groups and for many detailed occupations. Some occupations, especially in the clerical group, are expected to slow their rate of growth considerably, while others, mainly blue-collar occupations, that grew in the past are expected to decline. These changes result from a projected slowing of total employment growth, from changes in industry growth trends, and from technological change affecting the occupational structure of industries. Many occupations that expanded rapidly from the early 1970's to the mid-1980's will still grow faster than average, although they are expected to have slower growth rates through the mid-1990's. Despite the slowing of total employment growth, from 23 percent to 15 percent, a few occupations are expected to grow faster over the 1984–95 period than over the previous 11 years.

Broad occupational structure

Insights into the changing occupational structure of the United States, implied by the Bureau's projections, can be obtained by viewing the data in several different ways. The first approach presented here is a comparison of past and projected growth for the 10 major occupational groups that include all the detailed occupations found in the economy. (See table 1.)

Over the 1984–95 period, the three major occupational groups having the largest proportion of workers with a college education or specialized post-secondary technical training are expected to increase faster than the average for all occupations (that is, the projected growth rate for total employment). The first of these three major groups, executive, administrative, and managerial workers, is projected to increase by 22 percent, compared with the 15-percent growth rate for total employment. The demand for salaried managers is expected to increase rapidly as firms increasingly depend on trained management specialists. The projected rate of growth for professional specialties is 22 percent, with an increase of 2.8 million jobs. Many occupations in this group are expected to surge, including computer-related occupations, engineering, and health specialties. The ranks of technicians and related support workers, with a 29-percent increase, are projected to grow the fastest of all the major occupational groups. This group also had the fastest rate of growth from 1973 to 1984. The rate of expansion of all three groups, while faster than average, will be slower than in the past.

The number of salesworkers is projected to increase faster than average from 1984 to 1995, adding about 2.2 million jobs. The projected increase of 20 percent, however, is about half of the growth rate experienced from 1973 to 1984.

Administrative support workers, including clerical, which grew about as fast as average during the 1973–84 period,

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Table 1. Total civilian employment by broad occupational group, actual 1984 and projected 1995, and percent change in employment, 1973–84 and 1984–95

[Numbers in thousands]

Occupation	1984		1995		Percent change in employment	
	Number	Percent	Number	Percent	1973–84	1984–95
Total employment	106,843	100.0	122,760	100.0	23.4	14.9
Executive, administrative, and managerial workers	11,274	10.6	13,762	11.2	48.4	22.1
Professional workers	12,805	12.0	15,578	12.7	46.2	21.7
Technicians and related support workers	3,206	3.0	4,119	3.4	58.3	28.7
Salesworkers	11,173	10.5	13,393	10.9	41.5	19.9
Administrative support workers, including clerical	18,716	17.5	20,499	16.7	24.7	9.5
Private household workers	993	.9	811	.7	−27.0	−18.3
Service workers, except private household workers	15,589	14.6	18,917	15.4	37.6	21.3
Precision production, craft, and repair workers	12,176	11.4	13,601	11.1	20.2	11.7
Operators, fabricators, and laborers	17,357	16.2	18,634	15.2	−7.2	7.3
Farming, forestry, and fishing workers	3,554	3.3	3,447	2.8	−5.9	−3.0

NOTE: Estimates of 1984 employment, the base year for the 1995 projections, were derived from data collected in the Occupational Employment Statistics (OES) Surveys. The 1973–84 change was derived from Current Population Survey (CPS) data because OES Surveys for 1973 were not available. The occupational groups in this table conform to the CPS classification and do not match the OES classification found in table 2.

are projected to grow more slowly than average through the mid-1990's. This group is expected to add 1.8 million jobs during the 1984–95 period, however, and remain the largest group, with 20.5 million workers in 1995. Workers in this occupational group are not concentrated in any specific industry sector; they are found in virtually every industry in the economy. Therefore, differences in employment growth trends among industries will have less of an impact on clerical workers than on most other broad groups. What is already having an effect on the employment of clerical workers and should be more pronounced through the mid-1990's is the rapid spread of computerized office equipment and other related office automation. The automation of clerical tasks will slow the growth of many detailed occupations, including secretaries and typists and cause others, such as payroll and timekeeping clerks, to decline. As a result, the share of total employment accounted for by the administrative support group, is projected to decline from 17.5 percent in 1984 to 16.7 percent in 1995.

Private household workers are expected to continue their long-term employment decline. However, the rate of decline is projected to be considerably slower than the rate of decline from 1973 to 1984.

Service workers, except private household workers, are projected to continue to grow faster than total employment, despite a significant slowing of the growth rate from 38 percent during the 1973–84 period to 21 percent for the 1984–95 period. This occupational group is expected to account for more job growth than any other broad group and to account for 3.3 million of the 16 million jobs expected to be added from 1984 to 1995. In contrast, during the 1973–84 period, three other occupational groups, managers, professional workers, and clerical workers, each added more jobs than service workers. The large number of new jobs expected to be added by service workers is a result of the continued shift of the economy from goods production to services production. As in the recent past, employment in services-producing industries, particularly those in which

service workers are concentrated, is expected to continue to increase faster than goods-producing industries and account for a much greater share of total employment.

Precision production, craft, and repair occupations are projected to grow by nearly 12 percent—somewhat more slowly than total employment. Their percent of total employment is expected to decline slightly from 11.4 to 11.1 percent. The increase of these workers is heavily tied to the growth of the construction and manufacturing industries in which they are concentrated; manufacturing is projected to grow slowly, while construction is projected to have average growth, thereby slowing the growth of the precision production, craft, and repair occupations.

Operators, fabricators, and laborers are projected to increase by only 7 percent from 1984 to 1995. Nevertheless, this represents a change from the 1973–84 period when the rate for these workers declined. However, during the 1973–84 period, employment declined in many manufacturing industries in which these workers are concentrated because the effects of the 1980–82 recession period were still felt in many industries in 1984. Over the 1984–95 period, manufacturing is projected to grow slowly. Many detailed occupations in this major occupational group, including machine operators, assemblers, and inspectors, are expected to be affected by the new technologies in manufacturing, such as computer-aided manufacturing and robotics. However, technological change is expected to have less of an impact on transportation and material moving occupations in this group, such as truck drivers, bus drivers and airplane pilots.

Farming, forestry, and fishing workers are expected to continue to decline because of productivity growth in agriculture. The projected decline for these workers, about 3 percent, however, is expected to be about half that in the recent past.

Methodological approach

The Bureau's method of developing occupational projections provides a method for Bureau analysts to account for

the effects of the wide variety of factors that are expected to cause changes in employment for specific occupations. An industry-occupation matrix is the primary statistical tool used for developing occupational projections. The matrix for 1984 presents, in percentage terms, the distribution of more than 500 occupations in 378 industries based on recent surveys of occupational employment by industry.[1] The occupational structure for each industry was projected to 1995 through analyses of the factors that are expected to change the structure. The projected structure was applied to the projected total industry employment derived from the Bureau's economic model, which captures expected changes in the structure of demand among industries, changes in labor requirements per unit of output, and other factors as specified in the accompanying articles.

The complex factors that affect the employment growth for detailed occupations can be classified into two categories—the expansion of detailed industries and the changing occupational structure of industries. The growth of specific industries has a significant bearing on the growth of occupations because occupations account for widely different proportions of employment in different industries. For example, the growth of health-related occupations is closely tied to the growth of the health services industry, but the growth of the banking industry has little direct impact on health occupations.

The main causes of occupational structure changes within industries are: (a) technological change, (b) changes in business practices and methods of operation, and (c) product demand changes. Technological innovations may increase or reduce labor requirements for an occupation. For example, the growing use of computer technology is expected to increase the requirements for systems analysts and computer programmers and in nearly all industries these workers are expected to account for an increasing share of total employment during the 1984–95 period. However, requirements for typists are expected to be reduced because of the spreading use of word processing equipment and the amount of these workers is projected to decline as a proportion of employment in virtually all industries. Nevertheless, in many industries, employment of typists is expected to rise as the increase in total industry employment overrides the impact of technology.

In addition to technological innovations, changes in business practices and methods of operation affect the occupational structure of an industry. For example, the growing tendency of businesses to contract out building cleaning services will reduce the proportion of employment accounted for by janitors and cleaners in most industries. However, the negative effect on employment of janitors of this trend will be offset by significant employment gains in the building cleaning services industry.

Changes in the demand for goods and services provided by an industry level will also affect its occupational structure. For example, the educational services industry will have an increase in demand for elementary schoolteachers as the number of elementary school age children rises, but a decline in demand for college teachers as the number of college age students declines. Therefore, the occupational structure of the educational services industry in 1995 is projected to have a larger proportion of elementary schoolteachers than in 1984 but to also have a smaller proportion of college teachers.

It is important to remember that occupational structure changes and industry employment shifts do not operate in isolation. The factors interact with one another and it is usually not possible to attribute an occupational employment change solely to one factor. Computer programmers, for example, are generally increasing as a proportion of employment in most industries, but overall employment growth for this occupation is also affected by increasing total employment within most industries that are large employers of these computer-related occupations.

The Bureau has developed three sets of occupational projections with each set tied to one of the economic and industry employment alternatives presented elsewhere in this issue of the *Review*. The projected staffing patterns of industries used to translate industry employment into occupational employment were identical for all alternatives. The different growth rates for occupations among the alternatives, therefore, reflect the assumptions and analyses that underlie the alternative industry employment projections.

The basic changes in the occupational structure of the economy from 1984 to 1995 among the three alternatives are similar. Thus, although this article focuses on the moderate scenario, the discussion would be very similar if either of the other scenarios were highlighted. The major differences in trends among the alternatives are discussed later in this article. Differences in the occupational projections among the three alternatives should not be considered as the potential range within which projected 1995 employment will fall. The potential range is wider because most occupations are sensitive to a much wider variety of assumptions than those that were considered in the alternatives that are presented.

Detailed occupational employment trends

Projections for detailed occupations having 25,000 or more workers in 1984 are presented in table 2.[2] The job market over the 1984–95 period implied by these projections can be viewed from a variety of perspectives. One view indicates occupations that are expected to provide the largest numerical growth. Another view presents occupations that are expected to have the most rapid growth or the largest percentage declines. It is also useful to view occupations from the perspective of job clusters that contain occupations concentrated in specific industrial sectors of the economy or which perform related types of activities. Within each cluster, occupations generally have wide ranges of skill or training requirements.

Table 2. Civilian employment in occupations with 25,000 workers or more, actual 1984 and projected 1995

Occupation	Total employment (in thousands) 1984	1995 Low trend	1995 Moderate trend	1995 High trend	1984–95 employment change Numbers in thousands Low trend	Numbers in thousands Moderate trend	Numbers in thousands High trend	Percent Low trend	Percent Moderate trend	Percent High trend
Total, all occupations	106,843	117,268	122,760	127,718	10,425	15,918	20,875	10	15	20
Managerial and management related occupations	11,274	13,139	13,762	14,310	1,865	2,487	3,035	17	22	27
Managerial and administrative occupations	8,833	10,247	10,739	11,176	1,414	1,906	2,344	16	22	27
Elementary and secondary school principals and assistant principals	125	133	137	142	9	12	17	7	10	14
Food service and lodging managers	657	711	746	778	55	89	121	8	14	18
Public administrators, chief executives, legislators, and general administrators	141	154	158	162	13	17	21	9	12	15
Management support occupations	2,441	2,892	3,022	3,133	451	581	692	18	24	28
Accountants and auditors	882	1,135	1,189	1,235	253	307	353	29	35	40
Compliance and enforcement inspectors, except construction	122	129	131	134	7	10	12	6	8	10
Construction and building inspectors	55	58	59	61	2	4	6	4	7	10
Cost estimators	114	130	136	140	15	21	26	13	19	23
Personnel specialists and related workers	319	365	381	394	46	62	75	14	19	23
Employment interviewers, private or public employment service	72	90	95	98	19	23	26	26	32	37
Personnel, training, and labor relations specialists	198	223	232	240	25	34	42	13	17	21
Special agents, insurance	26	29	31	32	3	5	6	12	18	23
Purchasing agents and buyers	418	460	482	500	43	64	83	10	15	20
Purchasing agents, except wholesale, retail, and farm products	189	216	225	232	28	36	43	15	19	23
Wholesale and retail buyers, except farm products	229	244	258	269	15	28	39	6	12	17
Tax examiners, collectors, and revenue agents	52	50	51	51	-2	-1	-1	-3	-3	-2
Underwriters	78	90	95	100	12	17	21	15	22	27
Engineers, architects, and surveyors	1,468	1,896	1,980	2,051	427	511	582	29	35	40
Engineers	1,331	1,734	1,811	1,877	403	480	546	30	36	41
Aeronautical and astronautical engineers	48	60	62	64	12	14	16	25	30	33
Chemical engineers	56	66	69	72	10	13	16	18	24	29
Civil engineers, including traffic engineers	175	214	222	229	39	46	53	22	27	30
Electrical and electronics engineers	390	571	597	617	181	206	227	46	53	58
Industrial engineers, except safety engineers	125	154	162	168	29	37	43	23	29	35
Mechanical engineers	237	303	317	329	66	81	93	28	34	39
Architects, including landscape architects	93	113	118	122	20	25	29	21	27	31
Surveyors	44	48	50	52	4	6	8	10	14	17
Natural, computer, and mathematical scientists	658	886	921	951	229	263	293	35	40	45
Computer systems analysts, electronic data processing	308	498	520	539	190	212	231	62	69	75
Life scientists	113	126	129	132	13	16	19	12	14	17
Biological scientists	54	62	64	65	8	9	11	14	17	20
Foresters and conservation scientists	25	27	27	27	2	2	2	6	7	8
Mathematical scientists	51	61	63	65	10	12	13	19	23	26
Physical scientists	186	202	209	216	16	24	30	9	13	16
Chemists	85	90	94	97	5	9	12	5	10	14
Geologists, geophysicists, and oceanographers	46	51	53	55	5	7	8	11	15	18
Social scientists	186	212	219	226	26	33	40	14	18	21
Economists	38	44	45	47	6	7	8	16	19	22
Psychologists	97	113	118	122	16	21	25	17	22	26
Social, recreational, and religious workers	789	878	910	946	89	121	157	11	15	20
Clergy	296	303	315	328	7	19	32	2	6	11
Directors, religious activities and education	34	35	36	38	1	2	4	2	6	11
Recreation workers	123	144	149	155	21	26	32	17	21	26
Social workers	335	396	410	425	61	75	90	18	22	27
Lawyers and judges	524	674	705	732	151	181	208	29	35	40
Judges, magistrates, and other judicial workers	33	39	40	41	6	7	8	18	21	24
Lawyers	490	635	665	691	145	174	200	30	36	41
Teachers, librarians, and counselors	4,510	4,815	4,965	5,131	305	456	621	7	10	14
Teachers, preschool, kindergarten, and elementary	1,660	1,922	1,981	2,047	262	321	387	16	19	23
Teachers, preschool	278	307	319	330	29	41	52	10	15	19
Teachers, kindergarten and elementary	1,381	1,615	1,662	1,716	234	281	335	17	20	24
Teachers, secondary school	1,045	1,062	1,093	1,129	17	48	83	2	5	8
College and university faculty	731	636	654	675	-96	-77	-56	-13	-11	-8
Other teachers and instructors	747	833	864	894	86	117	147	12	16	20
Farm and home management advisors	27	23	24	25	-3	-3	-2	-12	-10	-7
Graduate assistants, teaching	145	134	137	142	-12	-8	-4	-8	-6	-2
Instructors, adult (nonvocational) education	132	161	166	171	29	34	39	22	26	30
Teachers and instructors, vocational education and training	124	134	138	143	9	14	19	8	11	15
Librarians, archivists, curators, and related workers	174	186	192	198	12	18	24	7	10	14
Librarians	155	166	171	177	11	16	22	7	10	14
Counselors	152	176	182	188	23	29	36	15	19	23
Health diagnosing and treating occupations	2,610	3,203	3,349	3,489	594	739	879	23	28	34
Chiropractors	31	39	40	42	8	9	11	24	29	34
Dentists	156	185	195	203	28	39	47	18	25	30
Dietitians and nutritionists	48	58	60	62	10	12	15	21	26	31
Opticians, dispensing and measuring	42	49	51	54	7	10	12	18	23	29
Optometrists	29	35	36	38	6	8	10	20	27	34
Pharmacists	151	158	166	173	7	15	22	5	10	14
Physicians assistants	25	33	35	37	8	10	12	33	40	46

Table 2. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1984 and projected 1995

Occupation	Total employment (in thousands)				1984–95 employment change					
	1984	1995			Numbers in thousands			Percent		
		Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend
Physicians and surgeons	476	556	585	607	81	109	131	17	23	28
Registered nurses	1,377	1,753	1,829	1,908	376	452	532	27	33	39
Therapists	225	276	287	299	51	62	74	23	28	33
Occupational therapists	25	32	33	35	7	8	9	27	31	37
Physical therapists	58	79	83	86	21	25	28	36	42	48
Respiratory therapists	55	63	66	69	9	11	15	16	21	27
Speech pathologists and audiologists	47	54	55	57	6	8	10	14	17	21
Veterinarians and veterinary inspectors	40	47	48	50	7	9	10	18	22	26
Writers, artists, entertainers, and athletes	1,192	1,406	1,473	1,530	214	281	337	18	24	28
Artists and commercial artists	204	252	264	274	48	60	70	23	29	34
Designers, except interior designers	205	239	251	261	34	46	56	17	22	27
Musicians	192	208	217	226	16	26	35	8	13	18
Photographers and camera operators	101	123	129	134	23	29	34	23	29	33
Producers, directors, actors, and entertainers	50	58	61	63	9	11	14	17	23	27
Public relations specialists and publicity writers	95	119	125	130	24	30	35	26	32	36
Radio and TV announcers and newscasters	56	60	62	65	4	6	9	7	11	16
Reporters and correspondents	69	79	82	86	10	13	17	14	19	24
Writers and editors, including technical writers	191	234	245	254	42	54	63	22	28	33
Technician occupations	3,049	3,770	3,935	4,088	720	886	1,039	24	29	34
Health technicians and technologists	1,188	1,329	1,388	1,447	140	199	259	12	17	22
Dental hygienists	76	92	98	102	16	22	26	21	29	34
Emergency medical technicians	47	49	50	52	2	3	5	4	7	11
Licensed practical nurses	602	680	708	739	78	106	137	13	18	23
Medical and clinical laboratory technologists and technicians	236	243	254	265	6	18	28	3	7	12
Medical records technicians and technologists	33	42	44	46	9	10	12	26	31	37
Radiologic technicians and technologists	115	135	141	148	20	27	33	18	23	29
Surgical technicians	36	40	41	43	3	5	7	9	14	20
Engineering and science technicians and technologists	1,314	1,615	1,686	1,747	301	371	433	23	28	33
Engineering technicians	730	978	1,022	1,059	248	292	329	34	40	45
Civil engineering technicians and technologists	58	71	74	77	13	16	19	23	28	32
Electrical and electronics technicians and technologists	404	579	607	629	175	202	225	43	50	56
Industrial engineering technicians and technologists	27	32	34	35	5	7	8	20	26	31
Mechanical engineering technicians and technologists	55	71	75	78	16	20	23	30	37	42
Drafters	345	366	384	400	21	39	55	6	11	16
Physical and life science technicians and technologists	239	270	279	288	31	40	49	13	17	20
Technicians, except health, engineering, and science	546	826	862	894	279	315	347	51	58	64
Broadcast technicians	25	29	30	31	4	5	6	16	21	25
Computer programmers	341	559	586	609	218	245	268	64	72	79
Paralegal personnel	53	100	104	108	47	51	55	90	98	105
Technical assistants, library	42	45	46	47	3	4	5	6	9	12
Marketing and sales occupations	11,173	12,697	13,393	13,990	1,525	2,220	2,817	14	20	25
Cashiers	1,902	2,343	2,469	2,579	441	566	677	23	30	36
Counter and rental clerks	96	93	98	101	−3	2	5	−3	2	6
Insurance salesworkers	371	384	405	422	13	34	51	3	9	14
Manufacturing salesworkers	¹547	¹569	¹598	¹623	22	51	75	4	9	14
Real estate agents and brokers	363	396	415	432	33	52	69	9	14	18
Brokers, real estate	43	48	50	52	5	7	9	12	16	21
Sales agents, real estate	320	348	365	380	28	45	60	9	14	19
Real estate appraisers	38	42	45	46	5	7	8	13	19	22
Salespersons, retail	2,732	2,916	3,075	3,213	184	343	480	7	13	18
Securities and financial services salesworkers	81	107	113	118	26	32	36	32	39	45
Stock clerks, sales floor	574	607	641	670	33	67	96	6	12	17
Travel agents	72	98	103	108	26	32	36	37	44	50
Wholesale trade salesworkers	¹1,248	¹1,536	¹1,617	¹1,688	288	369	440	23	30	35
Administrative support occupations, including clerical	18,716	19,572	20,499	21,332	856	1,783	2,616	5	10	14
Adjusters and investigators	530	603	632	655	74	102	125	14	19	24
Adjustment clerks	65	74	78	81	9	13	17	14	21	26
Bill and account collectors	115	137	144	150	22	28	34	19	25	30
Insurance adjusters, examiners, and investigators	134	158	166	171	24	32	38	18	24	28
Insurance claims and policy processing clerks	125	132	138	143	7	13	18	6	11	15
Welfare eligibility workers and interviewers	59	68	69	71	8	10	12	14	17	20
Communications equipment operators	472	535	561	585	62	89	113	13	19	24
Telephone operators	456	519	545	568	63	89	112	14	19	25
Central office operators	77	64	68	71	−12	−9	−6	−16	−11	−7
Directory assistance operators	32	28	30	31	−4	−2	−1	−12	−7	−3
Switchboard operators	347	426	447	466	79	100	118	23	29	34
Computer operators and peripheral equipment operators	311	434	454	472	122	143	161	39	46	52
Computer operators, except peripheral equipment	241	337	353	366	96	111	125	40	46	52
Peripheral EDP equipment operators	70	97	102	106	27	32	36	38	45	51
Duplicating, mail, and other office machine operators	153	170	178	185	17	25	32	11	17	21
Financial records processing occupations	2,629	2,676	2,812	2,929	47	183	300	2	7	11
Billing, cost, and rate clerks	216	240	254	265	25	38	49	11	18	23
Billing, posting, and calculating machine operators	234	258	272	283	25	38	50	11	16	21
Bookkeeping, accounting, and auditing clerks	1,973	1,990	2,091	2,178	17	118	205	1	6	10
Payroll and timekeeping clerks	207	188	196	204	−20	−11	−4	−10	−5	−2
Information clerks	737	810	855	894	72	117	157	10	16	21
Hotel desk clerks	99	109	116	122	10	17	23	10	17	23

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New accounts clerks, banking	72	78	82	85	6	10	14	9	14	19
Receptionists and information clerks	458	512	542	566	54	83	108	12	18	24
Reservation and transportation ticket agents and travel clerks	109	111	116	121	3	7	12	2	6	11
Mail and message distribution workers	802	757	796	842	−45	−5	40	−6	−1	5
Mail clerks, except mailing machine operators and postal service	136	135	140	144	−2	3	8	−1	3	6
Messengers	67	74	78	81	7	10	14	10	16	20
Postal mail carriers	281	273	389	308	−8	8	27	−3	3	10
Postal service clerks	317	274	290	309	−43	−27	−8	−13	−9	−3
Material recording, scheduling, dispatching, and distributing occupations	2,417	2,426	2,545	2,650	10	128	234	0	5	10
Dispatchers	203	225	235	243	22	32	40	11	16	20
Dispatchers, except police, fire, and ambulance	144	161	169	176	17	25	32	12	17	22
Dispatchers, police, fire, and ambulance	59	63	65	67	5	6	8	8	11	14
Meter readers, utilities	50	51	53	55	1	3	5	1	6	10
Order fillers, wholesale and retail sales	226	208	219	229	−18	−7	3	−8	−3	1
Procurement clerks	53	56	58	60	3	5	7	6	10	14
Production, planning, and expediting clerks	214	222	233	242	9	19	29	4	9	13
Stock clerks, stockroom, warehouse, or yard	788	734	772	805	−54	−16	17	−7	−2	2
Traffic, shipping, and receiving clerks	651	676	711	742	26	61	91	4	9	14
Weighers, measurers, checkers, and samplers, recordkeeping	37	37	39	41	0	2	4	0	5	10
Records processing occupations, except financial	893	957	1,001	1,040	63	107	146	7	12	16
Brokerage clerks	29	33	35	37	4	6	7	13	20	25
File clerks	289	282	296	308	−7	7	19	−2	2	7
Library assistants and bookmobile drivers	122	130	134	139	9	12	17	7	10	14
Order clerks, material, merchandise, and service	297	337	355	370	40	57	73	13	19	25
Personnel clerks, except payroll and timekeeping	108	123	127	131	14	19	22	13	17	21
Statement clerks	37	39	41	42	2	4	6	6	11	16
Secretaries, stenographers, and typists	4,027	4,027	4,209	4,372	0	182	345	0	5	9
Secretaries	2,797	2,928	3,064	3,186	131	268	389	5	10	14
Stenographers	239	138	143	148	−102	−96	−92	−42	−40	−38
Typists	991	962	1,002	1,038	−29	11	47	−3	1	5
Other clerical and administrative support workers	5,744	6,177	6,455	6,707	433	711	963	8	12	17
Court clerks	33	40	41	42	6	7	9	19	23	26
Credit checkers	34	41	43	44	7	9	10	21	26	31
Customer service representatives, utilities	92	103	108	113	11	16	21	12	18	23
Data entry keyers, except composing	324	319	334	347	−5	10	23	−2	3	7
General office clerks	2,398	2,511	2,629	2,734	113	231	336	5	10	14
Loan and credit clerks	123	137	144	150	14	21	27	11	17	22
Statistical clerks	93	78	81	84	−15	−12	−9	−16	−13	−9
Teacher aides and educational assistants	479	548	566	586	70	88	107	15	18	22
Tellers	493	492	517	539	−1	24	47	0	5	9
Service occupations	16,582	18,891	19,728	20,548	2,309	3,147	3,966	14	19	24
Building service occupations	2,981	3,274	3,425	3,566	293	444	584	10	15	20
Janitors and cleaners, including maids and housekeeping cleaners	2,940	3,233	3,383	3,522	293	443	582	10	15	20
Pest controllers and assistants	41	41	42	44	0	1	3	−1	3	7
Food and beverage preparers and service occupations	6,637	7,772	8,130	8,490	1,135	1,493	1,853	17	23	28
Bakers, bread and pastry	68	76	80	84	9	13	17	13	19	25
Bartenders	400	489	512	535	89	112	135	22	28	34
Cooks, except short order	884	1,050	1,095	1,140	165	210	256	19	24	29
Cooks, institutional or cafeteria	421	478	494	512	57	73	91	13	17	22
Cooks, restaurant	463	572	601	628	109	138	164	23	30	36
Cooks, short order and specialty fast food	425	476	499	521	51	74	96	12	17	23
Dining room and cafeteria attendants and barroom helpers	307	364	381	399	56	74	91	18	24	30
Food preparation and service workers, fast food	1,201	1,354	1,417	1,481	152	215	279	13	18	23
Food preparation workers, except fast food	987	1,155	1,205	1,258	169	219	271	17	22	28
Hosts and hostesses, restaurant, lounge, and coffee shop	132	160	168	176	29	36	44	22	28	34
Waiters and waitresses	1,625	1,953	2,049	2,142	329	424	517	20	26	32
Health service and related occupations	1,666	2,080	2,164	2,259	415	498	593	25	30	36
Dental assistants	169	204	217	226	35	48	57	20	28	34
Medical assistants	128	195	207	216	67	79	88	53	62	69
Nursing aides and psychiatric aides	1,268	1,567	1,621	1,693	299	353	424	24	28	33
Nursing aides, orderlies, and attendants	1,204	1,501	1,552	1,621	297	348	416	25	29	35
Psychiatric aides	64	66	69	72	2	5	8	3	8	13
Pharmacy assistants	37	42	43	45	4	6	8	12	17	22
Physical and correctional therapy assistants and aides	33	40	42	44	7	9	11	23	28	35
Personal service occupations	1,574	1,782	1,870	1,950	208	295	375	13	19	24
Amusement and recreation attendants	149	181	189	196	32	39	46	21	26	31
Baggage porters and bellhops	31	31	33	35	0	2	4	1	7	12
Barbers	94	94	98	104	0	4	9	0	4	10
Child care workers	572	596	626	651	24	55	80	4	10	14
Cosmetologists and related workers	524	639	674	704	116	150	180	22	29	34
Flight attendants	64	74	77	81	10	13	17	15	20	26
Social welfare service aides	98	122	126	132	24	28	33	24	29	34
Ushers, lobby attendants, and ticket takers	42	44	46	48	2	4	6	5	9	13
Private household workers	993	778	811	840	−215	−182	−153	−22	−18	−15

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Table 2. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1984 and projected 1995

Occupation	Total employment (in thousands)				1984–95 employment change					
	1984	1995			Numbers in thousands			Percent		
		Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend
Protective service occupations	1,924	2,227	2,306	2,379	303	382	455	16	20	24
Correction officers and jailers	130	171	175	180	41	45	50	31	35	38
Firefighting occupations	308	347	356	365	39	48	57	13	16	19
Firefighters	243	273	280	287	31	38	45	13	16	18
Firefighting and prevention supervisors	57	64	66	68	8	9	11	13	16	20
Police and detectives	520	572	586	600	51	66	80	10	13	15
Police and detective supervisors	104	113	116	118	9	12	15	9	11	14
Police detectives and investigators	64	69	70	71	5	6	7	8	10	11
Police patrol officers	353	390	400	411	37	48	58	10	13	17
Crossing guards	75	80	82	84	4	7	9	6	9	12
Guards	733	879	921	958	146	188	225	20	26	31
Agriculture, forestry, fishing, and related occupations	3,554	3,291	3,447	3,567	−264	−108	12	−7	−3	0
Supervisors, farming, forestry, and agriculture related occupations	82	75	78	81	−7	−4	−1	−8	−5	−2
Agriculture related occupations	740	798	830	857	58	90	117	8	12	16
Animal caretakers, except farm	69	78	81	83	9	12	14	13	17	20
Gardeners and groundskeepers, except farm	650	699	727	752	49	77	102	8	12	16
Farm workers	1,079	911	958	988	−168	−121	−91	−16	−11	−8
Farmers and farm managers	1,442	1,315	1,380	1,432	−127	−62	−11	−9	−4	−1
Fishers, hunters, and trappers	46	42	44	47	−4	−2	1	−9	−4	2
Forestry and logging occupations	135	119	125	131	−16	−10	−4	−12	−7	−3
Blue-collar worker supervisors	1,470	1,481	1,555	1,622	11	85	152	1	6	10
Construction trades	3,347	3,583	3,743	3,877	236	396	530	7	12	16
Bricklayers and stone masons	140	148	155	161	8	15	20	5	11	15
Carpenters	944	998	1,046	1,085	54	101	140	6	11	15
Carpet installers	71	78	82	86	8	11	15	11	16	21
Ceiling tile installers and acoustical carpenters	25	28	29	29	3	4	5	11	15	18
Concrete and terrazzo finishers	106	118	123	127	12	17	21	12	16	20
Drywall installers and finishers	106	112	117	121	6	11	15	6	11	14
Drywall installers	62	65	69	71	4	7	10	6	12	16
Tapers	31	33	34	35	2	3	4	8	11	14
Electricians	545	606	633	657	61	88	112	11	16	20
Glaziers	37	43	45	46	6	8	9	15	21	25
Hard tile setters	25	27	28	29	2	3	4	9	12	14
Highway maintenance workers	143	147	151	155	4	8	12	3	6	9
Insulation workers	52	57	59	61	5	7	9	9	14	17
Painters and paperhangers	378	378	395	409	0	17	31	0	4	8
Pipelayers and pipelaying fitters	48	54	56	58	5	7	9	11	15	19
Plumbers, pipefitters, and steamfitters	395	436	455	472	42	61	77	11	15	20
Roofers	122	132	138	143	10	16	21	8	13	17
Structural and reinforcing metal workers	86	98	102	106	12	16	19	14	18	22
Reinforcing metal workers	35	39	41	42	5	7	8	14	19	22
Structural metal workers	52	59	61	63	7	9	12	13	18	22
Extractive and related workers, including blasterers	175	170	178	184	−5	2	8	−3	1	5
Roustabouts	81	77	81	84	−4	0	3	−5	0	3
Mechanics, installers, and repairers	4,391	4,806	5,038	5,247	414	647	855	9	15	19
Communications equipment mechanics, installation, and repair	73	72	76	79	−1	3	6	−2	4	8
Central office and PBX installers and repairers	39	42	44	46	3	5	7	7	13	18
Electrical and electronic equipment mechanics, installers, and repairers	503	530	557	580	27	53	76	5	11	15
Data processing equipment repairers	50	74	78	81	24	28	31	49	56	63
Electric motor, transformer, and related repairers	25	28	30	31	4	5	6	15	21	25
Electronic home entertainment equipment repairers	52	56	59	62	4	7	10	7	13	19
Electronics repairers, commercial and industrial equipment	56	62	64	65	6	8	10	11	14	18
Station installers and repairers, telephone	111	87	92	96	−24	−19	−15	−22	−17	−14
Telephone and cable TV line installers and repairers	183	193	202	211	10	20	28	5	11	15
Machinery and related mechanics, installers, and repairers	1,452	1,559	1,632	1,702	106	179	250	7	12	17
Industrial machinery mechanics	430	443	464	483	13	34	54	3	8	12
Machinery maintenance mechanics, marine equipment	27	29	30	31	2	3	4	6	11	15
Machinery maintenance mechanics, textile machine	26	21	22	23	−5	−4	−3	−19	−15	−10
Machinery maintenance mechanics, water and power plant	32	34	36	37	2	3	5	5	10	15
Machinery maintenance workers	61	61	64	67	0	3	6	1	5	10
Maintenance repairers, general utility	878	970	1,015	1,057	92	137	179	10	16	20
Millwrights	84	85	89	95	1	6	11	1	7	13
Vehicle and mobile equipment mechanics and repairers	1,577	1,786	1,874	1,951	209	297	374	13	19	24
Aircraft mechanics and engine specialists	106	122	125	128	15	18	22	14	17	21
Automotive body and related repairers	183	204	215	224	21	32	41	11	18	22
Automotive and motorcycle mechanics	922	1,052	1,107	1,154	131	185	232	14	20	25
Bus and truck mechanics and diesel engine specialists	211	246	259	270	36	48	59	17	23	28
Mobile heavy equipment mechanics, except engines	77	86	89	92	9	12	15	12	15	19
Rail car repairers	27	20	21	22	−7	−6	−5	−25	−22	−18
Small engine specialists	33	36	38	40	4	6	8	12	17	23
Other mechanics, installers, and repairers	786	859	899	935	73	114	150	9	14	19
Coin and vending machine servicers and repairers	33	36	38	40	3	5	7	9	15	20
Heating, air conditioning, and refrigeration mechanics and installers	173	194	203	210	20	29	37	12	17	21
Home appliance and power tool repairers	83	87	92	97	4	9	14	5	11	16

Table 2. Continued—Civilian employment in occupations with 25,000 workers or more, actual 1984 and projected 1995

Occupation	Total employment (in thousands)				1984–95 employment change					
		1995			Numbers in thousands			Percent		
	1984	Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend
Office machine and cash register servicers	53	65	68	71	13	16	19	24	30	35
Precision instrument repairers	57	63	65	68	5	8	11	9	14	19
Tire repairers and changers	85	91	96	100	6	11	15	7	13	18
Precision production occupations	2.854	2.992	3.140	3.266	138	287	412	5	10	14
Precision food workers	302	280	293	304	−22	−9	2	−7	−3	1
Bakers, manufacturing	48	47	50	52	−1	2	4	−1	3	7
Butchers and meatcutters	222	203	213	220	−18	−9	−1	−8	−4	−1
Precision metal workers	944	995	1.044	1.084	52	100	141	5	11	15
Boilermakers	38	40	41	43	2	4	6	6	10	15
Jewelers and silversmiths	32	33	35	37	1	3	5	2	8	14
Machinists	354	372	391	407	18	37	53	5	10	15
Sheet metal workers	232	254	265	274	22	33	41	9	14	18
Tool and die makers	165	172	181	188	8	16	23	5	10	14
Precision printing workers	113	125	129	134	12	16	21	10	14	18
Compositors, typesetters, and arrangers, precision	37	39	41	42	2	4	5	7	10	14
Lithography and photoengraving workers, precision	45	51	53	55	6	7	9	12	17	21
Precision textile, apparel, and furnishings workers	266	259	273	284	−7	7	18	−3	3	7
Custom tailors and sewers	127	133	141	146	6	13	19	5	10	15
Shoe and leather workers and repairers, precision	43	34	35	37	−10	−8	−7	−23	−19	−15
Upholsterers	63	66	69	72	3	6	9	5	10	14
Precision woodworkers	199	219	231	241	20	32	41	10	16	21
Cabinetmakers and bench carpenters	99	113	118	123	13	19	24	13	19	24
Furniture finishers	34	35	37	39	1	4	5	4	10	16
Wood machinists	45	49	52	54	4	7	9	9	15	19
Inspectors and related occupations	689	732	769	802	43	80	113	6	12	16
Inspectors, testers, and graders, precision	254	288	302	315	34	49	61	14	19	24
Other production inspectors, testers, graders, and sorters	435	444	467	487	9	31	52	2	7	12
Other precision workers	340	381	401	417	41	60	77	12	18	23
Dental laboratory technicians, precision	51	57	61	64	6	10	13	11	19	25
Photographic process workers, precision	25	30	32	33	5	7	8	21	27	32
Machine setters, set-up operators, operators and tenders	5.553	5.472	5.748	5.996	−81	196	443	−1	4	8
Numerical control machine tool operators and tenders, metal and plastic	57	70	74	77	14	17	20	24	30	35
Combination machine tool setters, set-up operators, operators, and tenders	108	131	136	141	23	29	33	22	27	31
Machine tool cutting and forming setters, operators, and tenders, metal and plastic	846	779	820	857	−66	−26	12	−8	−3	1
Drilling machine tool setters and set-up operators, metal and plastic	64	61	64	67	−3	0	2	−5	0	4
Extruding and drawing machine setters and set-up operators, metal and plastic	28	24	25	27	−4	−3	−1	−14	−9	−2
Grinding machine setters and set-up operators, metal and plastic	95	89	94	98	−5	0	3	−5	−1	3
Lathe machine tool setters and set-up operators, metal and plastic	98	93	98	102	−5	0	4	−5	0	4
Machine forming operators and tenders, metal and plastic	171	157	165	173	−15	−7	1	−9	−4	1
Machine tool cutting operators and tenders, metal and plastic	170	155	163	170	−16	−8	−1	−9	−4	0
Milling machine setters and set-up operators, metal and plastic	35	34	35	37	−2	0	1	−5	0	4
Press machine setters and set-up operators, metal and plastic	48	45	47	49	−4	−2	0	−8	−3	1
Punching machine setters and set-up operators, metal and plastic	63	58	61	64	−5	−2	1	−8	−3	1
Metal fabricating machine setters, operators, and related workers	192	220	231	240	28	39	49	15	20	25
Metal fabricators, structural metal products	44	51	53	55	7	10	11	17	22	26
Welding machine operators, tenders, setters, and set-up operators	130	149	157	163	19	26	33	14	20	25
Metal and plastic process machine setters, operators, and related workers	304	342	362	382	39	58	79	13	19	26
Electric plating machine operators, tenders, setters, and set-up operators, metal and plastic	48	55	58	60	6	9	12	13	19	25
Metal molding machine operators, tenders, setters, and set-up operators	37	38	40	42	0	3	5	1	7	12
Plastic molding machine operators, tenders, setters, and set-up operators	144	175	185	195	31	42	52	22	29	36
Printing, binding, and related workers	407	443	461	478	36	54	71	9	13	18
Bindery machine operators, setters, and set-up operators	70	79	82	86	9	13	16	14	18	23
Printing press operators	222	239	248	257	17	26	35	7	12	16
Offset lithographic press setters and set-up operators	69	76	78	81	6	9	12	9	13	17
Printing press machine operators and tenders	113	123	128	133	10	15	20	9	14	18
Typesetting and composing machine operators and tenders	36	38	39	41	2	4	5	6	10	14
Textile and related setters, operators, and related workers	1.422	1.190	1.253	1.310	−232	−169	−113	−16	−12	−8
Laundry and drycleaning machine operators and tenders, except pressers	125	134	141	148	9	16	23	7	13	18
Pressing machine operators and tenders, textile, garment, and related	116	101	106	110	−15	−10	−6	−13	−9	−5
Sewing machine operators, garment	676	534	563	586	−141	−113	−89	−21	−17	−13
Sewing machine operators, nongarment	136	128	135	142	−7	−1	6	−5	0	4
Shoe sewing machine operators and tenders	33	21	22	24	−12	−10	−9	−36	−32	−28

Table 2.   Continued—Civilian employment in occupations with 25,000 workers or more, actual 1984 and projected 1995

Occupation	Total employment (in thousands)				1984–95 employment change					
	1984	1995			Numbers in thousands			Percent		
		Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend	Low trend	Moderate trend	High trend
Textile machine operators, tenders, setters, and set-up operators, winding	279	223	235	247	−55	−44	−32	−20	−16	−11
Woodworking machine setters, operators, and other related workers	145	149	157	162	4	12	17	3	8	12
Sawing machine operators, tenders, setters, and set-up operators	63	65	68	70	2	5	8	3	9	12
Woodworking machine operators, tenders, setters, and set-up operators	73	75	79	81	3	6	9	4	9	12
Other machine setters, set-up operators, operators, and tenders	1,978	2,045	2,147	2,236	67	169	258	3	9	13
Boiler operators and tenders, low pressure	44	45	47	49	1	3	5	3	7	10
Cementing and gluing machine operators and tenders	45	42	45	46	−2	0	2	−5	0	4
Chemical equipment controllers, operators, and tenders	77	75	79	83	−2	2	6	−2	3	7
Crushing and mixing machine operators and tenders	122	119	125	131	−3	3	9	−3	2	7
Cutting and slicing machine operators and tenders	61	59	62	64	−2	0	3	−4	1	5
Electronic semiconductor processors	30	36	38	40	6	8	9	19	25	30
Extruding and forming machine operators and tenders	71	72	76	79	1	5	8	2	7	12
Furnace, kiln, or kettle operators and tenders	63	47	50	52	−16	−13	−11	−25	−21	−17
Packaging and filling machine operators and tenders	369	382	402	419	13	33	50	3	9	14
Painting machine operators and tenders	69	72	76	79	3	7	11	5	10	15
Painters, transportation equipment	60	66	69	72	6	9	12	10	15	20
Paper goods machine setters and set-up operators	60	59	63	65	−1	2	4	−2	3	7
Photographic processing machine operators and tenders	26	32	33	35	5	7	8	21	27	32
Hand working occupations, including assemblers and fabricators	2,624	2,755	2,893	3,015	131	269	391	5	10	15
Precision assemblers	353	399	419	434	46	66	82	13	19	23
Electrical and electronic equipment assemblers, precision	176	196	205	213	20	29	37	11	17	21
Electromechanical equipment assemblers, precision	61	72	75	78	10	14	17	17	23	28
Machine builders and other precision machine assemblers	52	60	64	66	8	11	14	16	22	27
Other hand workers, including assemblers and fabricators	2,271	2,356	2,475	2,581	85	203	309	4	9	14
Cannery workers	77	68	72	74	−9	−5	−3	−12	−7	−3
Cutters and trimmers, hand	49	44	46	48	−6	−3	−1	−12	−7	−3
Electrical and electronic assemblers	259	288	302	313	28	42	54	11	16	21
Machine assemblers	51	59	62	64	7	10	13	14	20	24
Meat, poultry, and fish cutters and trimmers, hand	98	90	93	95	−8	−5	−3	−8	−5	−3
Painting, coating, and decorating workers, hand	41	43	45	47	2	4	7	5	11	17
Welders and cutters	308	333	349	364	25	41	56	8	13	18
Plant and system occupations	275	285	297	309	10	22	34	4	8	12
Chemical plant and system operators	35	35	36	38	0	1	3	−1	4	9
Power distributors and dispatchers	26	29	30	32	3	4	6	10	16	21
Stationary engineers	54	56	58	61	2	4	6	3	7	11
Water and liquid waste treatment plant and system operators	82	88	91	94	7	9	12	8	11	15
Transportation and material moving machine and vehicle operators	4,678	4,969	5,206	5,418	291	528	740	6	11	16
Aircraft pilots and flight engineers	79	94	97	101	15	18	22	19	23	28
Motor vehicle operators	3,061	3,422	3,586	3,729	361	525	668	12	17	22
Busdrivers	459	522	536	552	63	77	93	14	17	20
Busdrivers, local and intercity	131	145	149	153	14	18	22	11	14	17
Busdrivers, school	328	377	387	399	49	59	71	15	18	22
Tax drivers and chauffeurs	118	132	138	143	13	20	25	11	17	21
Truck drivers	2,484	2,768	2,911	3,033	284	428	549	11	17	22
Rail transportation workers	113	84	88	93	−29	−25	−20	−25	−22	−18
Railroad brake, signal, and switch operators	48	33	35	37	−14	−13	−11	−30	−26	−22
Water transportation and related workers	56	57	60	62	1	3	6	2	6	10
Parking lot attendants	40	39	42	44	−1	1	3	−2	3	8
Service station attendants	303	281	297	310	−21	−6	7	−7	−2	2
Material moving equipment operators	928	896	938	976	−32	9	48	−3	1	5
Conveyor operators and tenders	38	37	39	41	−1	1	3	−2	3	8
Hoist, winch, and crane operators	103	110	115	122	6	12	19	6	12	18
Industrial truck and tractor operators	389	326	342	357	−63	−46	−31	−16	−12	−8
Operating engineers	357	385	400	413	27	43	56	8	12	16
Helpers, laborers, and material movers, hand	4,166	4,231	4,436	4,615	64	269	448	2	6	11
Helpers, construction trades	443	449	470	486	6	27	43	1	6	10
Helpers, extractive workers	29	30	31	32	1	2	3	3	7	11
Machine feeders and offbearers	278	281	296	309	3	18	31	1	6	11
Refuse collectors	99	112	116	120	14	17	22	14	18	22
Hand packers and packagers	325	327	344	358	3	19	33	1	6	10
Vehicle washers and equipment cleaners	144	145	153	160	1	9	16	1	6	11

[1]Wage and salary workers only.

Occupations adding largest number of jobs. Thirty-seven of the 500 detailed occupations for which projections were developed account for about one-half of the projected total job growth between 1984 and 1995. (See table 3.) About one-fourth of the occupations generally require a college degree, roughly the same proportion found among all jobs in the economy. In general, these occupations are numerically large (only two had less than 300,000 workers in 1984). Some of these occupations have projected rates of growth that are average or higher. However, others are projected to grow more slowly than average, but because of their employment size they will add significant numbers of new jobs over the 1984–95 period. Collectively, these 37 occupations accounted for 36 percent of total employment in 1984, and this proportion is expected to increase only to 39 percent by 1995.

The detailed occupations in table 3 do not include what are called residual categories for the major occupational groups. The residual categories are often very large because they contain a wide range of job titles and therefore account for much of the group's employment growth. For instance, the residual category, "all other managers and administrators," is projected to grow by more than 1.8 million workers

out of a total growth of 1.9 million workers in the major occupational group, managerial and administrative workers.

Fastest growing and fastest declining occupations. The fastest growing occupations provide a different perspective to future occupational employment changes. (See table 4.) It is important to note that some of these occupations are increasing rapidly from relatively small employment levels and, therefore, are not found on the list of occupations that will add the most new jobs. Notable exceptions are computer programmers, computer systems analysts, electrical and electronics engineers, and electrical and electronics technicians and technologists. These technologically oriented occupations, however, collectively do not account for a large portion of jobs projected to be added in 1995. Almost half of the 20 fastest growing occupations are in the computer field or health field, which will continue to be among those with the strongest future growth.

Table 5 shows the 20 most rapidly declining occupations. Most are concentrated in industries that have recently contracted and are expected to continue to do so. Several are in the apparel and textile industries, both of which have suffered employment losses because of foreign competition

Table 3. Occupations with the largest job growth, 1984–95

[Numbers in thousands]

Occupation	Employment		Change in employment 1984–95		Percent of total job growth 1984–95
	1984	1995	Number	Percent	
Cashiers	1,902	2,469	556	29.8	3.6
Registered nurses	1,377	1,829	452	32.8	2.8
Janitors and cleaners, including maid and housekeeping cleaners	2,940	3,383	443	15.1	2.8
Truck drivers	2,484	2,911	428	17.2	2.7
Waiters and waitresses	1,625	2,049	424	26.1	2.7
Wholesale trade salesworkers	1,248	1,617	369	29.6	2.3
Nursing aides, orderlies, and attendants	1,204	1,552	348	28.9	2.2
Salespersons, retail	2,732	3,075	343	12.6	2.2
Accountants and auditors	882	1,189	307	34.8	1.9
Teachers, kindergarten and elementary	1,381	1,662	281	20.3	1.9
Secretaries	2,797	3,064	268	9.6	1.7
Computer programmers	341	586	245	71.7	1.5
General office clerks	2,398	2,629	231	9.6	1.4
Food preparation workers, excluding fast food	987	1,205	219	22.1	1.4
Food preparation and service workers, fast food	1,201	1,417	215	17.9	1.4
Computer systems analysts, electronic data processing	308	520	212	68.7	1.3
Electrical and electronics engineers	390	597	206	52.8	1.3
Electrical and electronics technicians and technologists	404	607	202	50.0	1.3
Guards	733	921	188	25.6	1.2
Automotive and motorcycle mechanics	922	1,107	185	20.1	1.2
Lawyers	490	665	174	35.5	1.1
Cosmetologists and related workers	524	674	150	28.7	.9
Cooks, restaurant	463	601	138	29.7	.9
Maintenance repairers, general utility	878	1,015	137	15.6	.9
Bookkeeping, accounting, and auditing clerks	1,973	2,091	118	6.0	.7
Bartenders	400	512	112	27.9	.7
Computer operators, excluding peripheral equipment	241	353	111	46.1	.7
Physicians and surgeons	476	585	109	23.0	.7
Licensed practical nurses	602	708	106	17.6	.7
Carpenters	944	1,046	101	10.7	.6
Switchboard operators	347	447	100	28.7	.6
Food service and lodging managers	657	746	89	13.6	.6
Electricians	545	633	88	16.2	.6
Teacher aides and educational assistants	479	566	88	18.3	.6
Blue-collar worker supervisors	1,470	1,555	85	5.8	.5
Receptionists and information clerks	458	542	83	18.2	.5
Mechanical engineers	237	317	81	34.0	.5

Table 4. Fastest growing occupations, 1984–95

[Numbers in thousands]

Occupation	Employment		Change in employment 1984–95		Percent of total job growth 1984–95
	1984	1995	Number	Percent	
Paralegal personnel	53	104	51	97.5	.3
Computer programmers	341	586	245	71.7	1.5
Computer systems analysts, electronic data processing (EDP)	308	520	212	68.7	1.3
Medical assistants	128	207	79	62.0	.5
Data processing equipment repairers	50	78	28	56.2	.2
Electrical and electronics engineers	390	597	206	52.8	1.3
Electrical and electronics technicians and technologists	404	607	202	50.7	1.3
Computer operators, except peripheral equipment	241	353	111	46.1	.7
Peripheral EDP equipment operators	70	102	32	45.0	.2
Travel agents	72	103	32	43.9	.2
Physical therapists	58	83	25	42.2	.2
Physician assistants	25	35	10	40.3	.1
Securities and financial services salesworkers	81	113	32	39.1	.2
Mechanical engineering technicians and technologists	55	75	20	36.6	.1
Lawyers	490	665	174	35.5	1.1
Correction officers and jailers	130	175	45	34.9	.3
Accountants and auditors	882	1,189	307	34.8	1.9
Mechanical engineers	237	317	81	34.0	.5
Registered nurses	1,377	1,829	452	32.8	2.8
Employment interviewers, private or public employment service	72	95	23	31.7	.1

and technological improvements. These two industries combined are projected to lose about 350,000 jobs by 1995. Other declining occupations are in railroad transportation, agriculture, and private households, industries which are expected to continue their long-run declines. Occupations that are expected to be affected adversely by technological changes are stenographers, industrial truck and tractor operators, telephone station installers and repairers, and statistical clerks.

Jobs clusters

Computer occupations. The applications for computers have expanded dramatically over the last two decades, and it appears that they will continue to do so through the mid-1990's. Workers engaged in developing computer-based systems and in operating these systems are projected to increase substantially by 1995. The number of computer systems analysts is projected to grow 69 percent from 1984 to 1995, adding more than 212,000 jobs. This occupation will benefit from the rise in new computer applications. Computer programmers are expected to increase 72 percent by 1995, or by 245,000 jobs over this period. The mounting number of new computer applications and the need to modify existing systems should bring about rapid employment growth for computer programmers, despite the increasing efficiency of programming methods.

Computer operators should continue their healthy employment growth, increasing 46 percent or by 111,000 jobs between 1984 and 1995. This increase is expected to occur as more small and medium size firms introduce more comprehensive computer systems.

The number of data processing equipment repairers is projected to increase about 56 percent, adding 28,000 jobs by 1995. Many of these workers will be needed to service the more mechanical computer-related equipment, such as disk and tape drives and printers, in addition to computers. Com-

puters have become increasingly modular in construction, leading to greater ease of repair, but the number of computers is expected to increase rapidly enough to require the services of numerous data processing equipment repairers.

Data entry keyers are the only computer-related occupation not expected to grow rapidly. The technology for data entry is changing so fast that fewer keypunch operators are needed. These workers are being replaced by terminal operators, many of whom do this work only incidentally to their main functions, for example, airline ticket agents, cashiers, and so forth. Optical character recognition equipment and direct sensing equipment are other ways of inputting data without using data entry keyers.

Scientific and technical occupations. High technology industry growth and the increasing use of high technology products in the economy as a whole will lead to the increasing employment of scientific and technical personnel. Engineers are projected to increase 36 percent during the 1984–95 period, adding 480,000 jobs. Much of this sharp rise will be found among electrical and electronic engineers (up 206,000) engaged in developing computers, communications equipment, and defense-related electronic equipment. Mechanical engineers and civil engineers are two other numerically important engineering specialties which are expected to grow rapidly. Mechanical engineers, with projected growth of 81,000 jobs from 1984 to 1995, will be needed to keep product design and production methods up-to-date as a part of industry's desire to remain competitive. Civil engineers, up 46,000 jobs, will be needed for additional heavy construction.

Engineering and scientific technicians and technologists are projected to grow 28 percent between 1984 and 1995, adding 371,000 jobs. These occupations follow the employment trends of their related scientific and engineering occupations. Drafters are expected to be a major exception

among the technician occupations. They are expected to increase more slowly than the average for total employment, owing to the introduction of computer-aided design (CAD) equipment, which has increased the efficiency of drafting operations, and is expected to continue. The expanding need for drafting work and the ability of management to improve the quality of work by using CAD, however, will prevent a decline in drafters, despite the greater efficiency of the new equipment.

Biological scientists are projected to increase about average between 1984 and 1995, as they continue to develop drugs, food products, and chemicals. The number of chemists is projected to rise 10 percent, or slower than average, reflecting the relatively mature industries in which they are concentrated. Mathematical scientists should have faster than average growth, mainly as a result of increased statistical work and mathematical modeling.

Health-related occupations. Occupations in the health care field, including medical professionals, technicians, and service workers, are projected to increase by 26 percent and add 1.4 million jobs by 1995. This faster than average rate of growth, however, will not be uniform across industries and occupations related to the delivery of health care. The hospital industry, in particular, is undergoing major changes in the services it provides and in the occupational skill mix needed to provide them. Hospital employment soared over the 1973–84 period, but slower than average growth is

projected for the 1984–95 period. Despite the deceleration in hospital employment, faster than average growth is projected for nursing homes, doctors' offices, and outpatient care facilities.

Cost-containment pressures, technological advances that allow sophisticated care to be provided on an outpatient basis, and consumer demand for community-based and home health care will have an adverse impact on some occupations and a favorable impact on others. Surgical technicians are projected to grow as fast as the average employment growth for all occupations and medical and clinical laboratory technologists are projected to grow more slowly than average. The number of physicians' assistants, however, is expected to grow much faster than the economy's projected average growth as hospitals and health maintenance organizations employ more of them to help contain costs. Additional opportunities for physicians' assistants are also expected in large multi-specialty offices of physicians. The number of medical records technologists and technicians is also expected to grow much faster than average, owing to the great importance of the medical records department to hospitals in monitoring and reducing costs. Medical assistants are also projected to grow much faster than average. Contributing to future job growth is the projected increase in the number of physicians in practice and the extremely rapid growth in outpatient care facilities, such as urgent care centers and "surgicenters."

Most other health occupations are expected to experience faster or higher than average growth. Registered nurses are expected to remain the largest specialty with 1.8 million workers in 1995—an increase of 33 percent over 1984, creating 452,000 jobs. Most of the job growth for registered nurses is expected to occur in hospitals, despite the relatively slow rate of growth for this industry within the health services sector. Their importance in hospitals will increase as they take over some of the functions performed by other health personnel. The next largest group, nursing aides, orderlies, and attendants, is projected to increase by 29 percent and 348,000 new jobs, followed by licensed practical nurses—up 18 percent and 106,000 new jobs. The dominant factor contributing to job growth for both nurses aides and licensed practical nurses is the aging of the population. Care of the aged, however, is expected to continue to shift away from hospitals to nursing homes and home health care. By 1995, nursing homes (with a projected rate of growth of 44 percent) should move ahead of hospitals as the primary employer of both nurses aides and licensed practical nurses.

Physicians and surgeons are another large occupational group that is projected to increase faster than average—up 23 percent. Other smaller health occupations that are projected to grow rapidly include physical therapists, occupational therapists, dental hygienists, dental assistants, and dietitians.

Education-related occupations. Occupations in education,

Table 5. Fastest declining occupations, 1984–95

[Numbers in thousands]

Occupation	Employment		Percent decline in employment
	1984	1995	
Stenographers	239	143	−40.3
Shoe sewing machine operators and tenders	33	22	−31.5
Railroad brake, signal, and switch operators	48	35	−26.4
Rail car repairers	27	21	−22.3
Furnace, kiln, or kettle operators and tenders	63	50	−20.9
Shoe and leather workers and repairers, precision	43	35	−18.6
Private household workers	993	811	−18.3
Station installers and repairers, telephone	111	92	−17.4
Sewing machine operators, garment	676	563	−16.7
Textile machine operators, tenders, setters, and set-up operators, winding	279	235	−15.7
Machinery maintenance mechanics, textile machines	26	22	−14.8
Statistical clerks	93	81	−12.7
Industrial truck and tractor operators	389	342	−11.9
Central office operators	77	68	−11.5
Farm workers	1,079	958	−11.2
College and university faculty	731	654	−10.6
Farm and home management advisers	27	24	−9.6
Extruding and drawing machine setters and set-up operators, metal and plastic	28	25	−9.1
Pressing machine operators and tenders, textile, garment and related	116	106	−8.8
Postal service clerks	317	290	−8.5

as a group, are projected to grow about as fast as average. However, different rates of change are expected for the various specialties owing to changing demographics of the school-age population and other factors determining the rates of growth or decline of employment at the elementary, secondary, and post-secondary levels.

Kindergarten and elementary schoolteachers are projected to increase 20 percent and add 281,000 new jobs. School enrollments at the elementary level are expected to become a larger proportion of total enrollments and teacher-pupil ratios are also expected to increase. Favorable employment opportunities are expected for teacher aides and educational assistants—up 18 percent and about 88,000 new jobs.

Secondary schoolteachers are projected to grow more slowly than average (5 percent), adding 48,000 jobs. While secondary school enrollments are expected to become a smaller proportion of total school enrollments, the effect of this relative decline will be moderated somewhat by an increase in teacher-pupil ratios.

College and university faculty are projected to decline from 731,000 in 1984 to 654,000 in 1995, a loss of 77,000 jobs to the profession. The primary reason for this drop is the expected decline in college enrollments through 1995.

The number of vocational education and training teachers and instructors is expected to have an average rate of increase. The number of 18- to 24-year-olds, who are the primary consumers of vocational education, will decline through 1995. However, this decline is expected to be partially offset by an increase in the number of adults who may need retraining because of technological displacement.

Preschool teachers also grew rapidly in the past and are now projected to increase only as fast as average in the future. The rate of increase in the population under 5 years of age and in the labor force participation rate of women are both expected to slow down through 1995.

The numbers of professional librarians, library technicians, and library assistants are all expected to grow more slowly than average because of the slow enrollment growth in schools, where most library occupations are found, and the continued trend to automate the circulation, cataloging, and acquisition departments of most libraries.

Office clerical workers.   This group experienced a rapid growth in the 1960's and average growth in the 1970's but is projected to grow more slowly than average between 1984 and 1995. In addition to the direct impact that computerized office equipment will have on the clerical work force, the rate of employment growth of these workers is expected to be further slowed as more and more professionals and managers use desktop personal computers and executive workstations to do some of the work previously delegated to support staff.

In spite of the slowing employment growth, it is important to remember that office clerical workers are projected to add almost 2 million jobs and remain the largest major occu-

pational group in 1995 with 20.5 million workers. The number of new jobs created is large, even with slow growth, because of the relatively large employment base in 1984. Significant numbers of new jobs in the future are expected to be added in several clerical fields, including secretaries (268,000 jobs); general office clerks (231,000 jobs); bookkeeping, accounting, and auditing clerks (118,000 jobs); and receptionists and information clerks (83,000 jobs).

Other occupations are expected to be more severely affected by office automation and other types of technological changes that will result in little or no job growth for some and declining employment for others. Typists, for example, will continue to be affected by developments in word processing and are expected to have little change in employment from 1984 to 1995. Low growth rates are also expected for file clerks; reservation and transportation ticket agents; traffic, shipping, and receiving clerks; and production, planning, and expediting clerks. Several occupations are expected to decline in employment between 1984 and 1995, including stenographers (down 40 percent), statistical clerks (down 13 percent), and payroll and timekeeping clerks (down 5 percent).

Technological changes in specific industries are also expected to adversely affect certain occupations. The implementation of electronic switching in the telephone industry, for example, is projected to cause the number of central office operators to decline by 11 percent. Also, the rapid spread of automated teller machines and the increased use of electronic funds transfer in banking is expected to cause tellers to increase more slowly than average, in contrast to the rapid growth that has occurred for many years. United States Postal Service clerks are projected to decline by 9 percent owing to the further application of technologies that reduce labor requirements in this occupation, including computer forwarding, optical character recognition, sorting devices, and electronic weighing of mail. Many of these same technological advances will curtail the need for mail clerks (except mailing machine operators and postal service), but rapid growth of private express mail companies is expected to moderate some of the impact and result in little change in employment for the occupation.

Some clerical occupations are projected to increase significantly, despite technological changes because they are concentrated in industries that are expected to increase in employment. Among these occupations are switchboard operators, adjustment clerks, bill and account collectors, insurance adjusters and investigators, court clerks, and credit checkers.

Service occupations, except private household workers.   A continued trend toward eating outside the home is foreseen, but within the eating and drinking industry, a slowing in the growth of employment in fast-food establishments and an increase in restaurants is expected. A rapid projected rate of growth for the industry overall will result in a faster than

average increase for food and beverage service occupations with 1.5 million jobs added by 1995. Among the occupations in this group projected to add large numbers of new jobs are waiters and waitresses (424,000); food preparation workers, except fast-food (219,000); and restaurant cooks (138,000). Because of their large employment size, food preparation and service workers in fast food restaurants are projected to add 215,000 jobs, despite only average growth.

The number of janitors and cleaners is projected to show average growth, 15 percent, but because of the size of the occupation this will result in 443,000 new jobs. In most industries, however, janitors and cleaners will decline as a proportion of employment, as contractors will increasingly provide these services. An exception is the services to buildings industry, in which the large concentration of these employees is expected to grow very rapidly.

The numbers of police and detectives and of workers in firefighting occupations are both projected to increase as fast as the average, adding 66,000 and 48,000 new jobs. Guards are expected to increase at a faster than average rate, adding almost 188,000 new jobs. As with janitors and cleaners, their services are increasingly being purchased by contracting out.

About 295,000 new jobs are expected to be added by personal service workers. Several of the detailed occupations are projected to grow faster than average, including flight attendants, cosmetologists and related workers, social welfare service aides, and amusement and recreation attendants.

Construction trades. The construction trades are expected to experience a moderate employment growth of 12 percent between 1984 and 1995. However, even this moderate growth should generate 396,000 additional jobs because of the large employment in this group of occupations.

Carpenters, the largest of the construction trades, are projected to grow about as fast as average and add about 100,000 jobs between 1984 and 1995. Electricians, another large construction trade, should have more significant employment growth between 1984 and 1995, with a growth rate of 16 percent and 88,000 additional jobs. The employment of electricians is split about evenly between those working in the construction industry and those doing maintenance work throughout the rest of the economy.

Mechanics and repairers. Mechanics, installers, and repairers are projected to increase 15 percent, adding 647,000 new jobs by 1995. Many of these occupations are employed in manufacturing which tends to slow their growth, but they are also found outside manufacturing, sharing the more rapid expansion of those industries. Wherever mechanics, installers, and repairers are employed, they have increased employment to some extent because of the growing use of capital equipment which requires maintenance and repair.

Automotive and motorcycle mechanics are projected to

add 185,000 jobs. Bus and truck mechanics and diesel engine specialists should add another 48,000 jobs. Automotive body and related repairers should gain 32,000 jobs by 1995. Thus, motor vehicles are expected to be responsible for about two-fifths of the total growth of the mechanics and repairs occupational group.

Other occupations in this group also contribute significantly to its employment growth. General utility maintenance repairers are projected to add 137,000 jobs. Heating, air conditioning, and refrigeration mechanics and installers are expected to add 29,000 new jobs.

Production occupations. Employment growth of production occupations is closely tied to the growth of manufacturing employment. Within the production worker cluster, the occupational group of helpers, laborers, and material movers (hand) should increase more slowly than average because of the growing use of automation in manufacturing. Blue-collar worker supervisors are projected to increase more slowly than average but add 85,000 additional jobs because of the large size of the occupation. Other occupations within the production worker cluster are also affected by changing practices within the manufacturing industries.

Precision production jobs overall are projected to increase by 10 percent, with about 287,000 new jobs. Precision inspectors, testers, and graders should increase rapidly, up almost 49,000 jobs, as more emphasis is placed on quality control of high technology products. Sheet metal workers should gain almost 33,000 jobs. Machinists are being affected by the introduction of numerically controlled machine tools which require less specialized set-up procedures and therefore, their numbers are expected to grow more slowly than average.

Machine setters, set-up operators, and tenders are projected to increase by only 4 percent because of increasing automation in most manufacturing industries. However, this slow growth should still yield 196,000 more jobs on account of the large size of this group of occupations. The number of plastic molding machine operators and tenders would, under the assumptions used by BLS in developing these projections, grow faster than average between 1984 and 1995. This growth results from the increasing substitution of plastics for other materials in manufactured goods. Many of the textile and garment occupations in this group should decline mainly as employment in the apparel and textile industries decline as a result of increasing foreign competition.

The handworking occupations, including assemblers and fabricators, are projected to grow more slowly than average. Precision assemblers, however, should increase as fast as average, adding 66,000 jobs in the high technology industries, such as electronics, aircraft, and machine tools.

Transportation and material moving occupations. Employment in this group of occupations generally follows overall economic activity, increasing when total employ-

ment is increasing and declining in recessions. After peaking in 1979, employment for this group declined during the recessions of 1980 and 1982. With recovery in 1984, employment rose again and is now projected to increase about as fast as total employment, adding 528,000 jobs by 1995.

The largest detailed occupation in the group is truck drivers, with employment projected to increase from 2.5 million in 1984 to 2.9 million in 1995. No significant technological developments are anticipated that would adversely affect their employment. Average growth is also expected for both the drivers of school buses and local and intercity buses. The fastest growing occupation in this group is aircraft pilots and flight engineers (23 percent), whose employment is expected to be favorably influenced by the faster than average growth projected for the air transportation industry.

Some transportation and material moving occupations will be adversely affected by declining industry employment and others by technological change. The rapid decline in employment projected for the railroad industry (from 369,000 to 272,000) will cause railroad transportation workers to decline. The shift to self-service gasoline stations will continue to have an impact on the employment of service station attendants, with little change in employment projected over the 1984–95 period. Industrial truck and tractor operators are projected to lose 46,000 jobs owing to technological innovations. New industrial trucks that are linked to the dispatcher by computer will make their operators more productive and the growth of automated warehouses will eliminate the need for many of these workers.

Low and high alternative projections

Total employment in the moderate-trend projections varies by only about 4 percent from both the low and high alternatives. The distribution of employment by broad occupational group varies little among the alternatives (table 6) because of offsetting changes within the major occupational groups. In looking at specific occupations, however, significant differences may exist between the moderate and either the low and high alternatives (table 2). The differences

Table 6. Percent distribution of total employment by major occupation group, 1984 and projected 1995 alternativves

Occupation	1984	1995		
		Low	Moderate	High
Total employment	100.0	100.0	100.0	100.0
Executive administrativve, and managerial workers	10.6	11.2	11.2	11.2
Professional workers	12.0	12.8	12.7	12.6
Technical and related support	3.0	3.4	3.4	3.4
Salesworkers	10.5	10.8	10.9	11.0
Administrative support workers, including clerical	17.5	16.7	16.7	16.7
Private household workers	.9	.7	.7	.7
Service workers, except private household workers	14.6	15.4	15.4	15.4
Precision production, craft, and repair workers	11.4	11.1	11.1	11.1
Operators, fabricators, and laborers	16.2	15.1	15.2	15.2
Farming, forestry, and fishing workers	3.3	2.8	2.8	2.8

in occupational employment from one scenario to another are caused only by differences in projected industry employment levels because the same set of occupational staffing patterns were used for all three scenarios. The following identifies the top 10 occupations with the greatest numerical differences between the alternative (high or low) projected employment and the moderate-trend employment:

Occupation	Employment difference
Salespersons, retail	159,000
Janitors and cleaners	150,000
Truckdrivers	143,000
Secretaries	137,000
Cashiers	126,000
General office clerks	118,000
Bookkeeping, accounting, and auditing clerks	101,000
Waiters and waitresses	96,000
Registered nurses	76,000
Blue-collar worker supervisors	74,000

Data uses and limitations

The current and projected occupational employment data presented in this article were developed at a detailed industry level as part of a national industry-occupation employment matrix. Data on specific occupations from the matrix along with other information on training requirements, nature of work, working conditions, and earnings will be used in the 1986–87 edition of the *Occupational Outlook Handbook* which will be issued in the spring of 1986. In addition to being used in the development of career guidance information, national occupational employment data and projections are used at all levels of government, and by others, to formulate education plans, including vocational education and training requirements.

Most discussions of future job opportunities focus on the employment growth in industries and occupations. Because faster growing industries and occupations generally offer better opportunities for employment and advancement, employment growth is an important gauge of job outlook. However, it is not the only one. Another element in the employment outlook is replacement needs. Replacement openings occur as people leave occupations. Some individuals transfer to other occupations as a step up the career ladder or to change careers. Some temporarily stop working, perhaps to return to school or care for a family, and some leave the labor force permanently—retirees, for example. In many occupations, as a consequence, replacement needs are more important than openings owing to growth in an occupation.[3] Another consideration in interpreting the data on occupational demand is the availability or supply of workers trained or educated to enter an occupation. Even with rapidly expanding job openings from either growth or replacement needs, jobseekers may have a difficult time finding a job because the supply of workers is expanding at an even faster pace. □

[1] Data on occupational distribution patterns are derived from the Occupational Employment Statistics surveys for all nonagricultural industries, except private households. See *Handbook of Methods*, Bulletin 2134 (Bureau of Labor Statistics, 1982), for a description of the OES survey.

[2] Table 2 includes only detailed occupations with employment of 25,000 or more in 1984. Projections developed in greater detail with employment of 5,000 or more in 1984 will be published in the spring of 1986 in *Occupational Projections and Training Data*, 1986 edition. Current and projected occupational employment estimates are developed by the Bureau in the National Industry–Occupational Employment Matrix program. The national matrix is developed by applying data on occupational staffing patterns of industries collected in the Occupational Employment Statistics program to estimates of annual average industry employment collected in the Current Employment Statistics program. These surveys count jobs rather than people; therefore, the employment estimates contained in this report are different from those derived from a count of individuals in the Current Population Survey.

[3] A discussion of replacements, including rates for selected occupations, will appear in *Occupational Projections and Training Data* to be available in the spring of 1986.

Commissioner Neill's mediation activities

Although the President and Congress called upon [BLS Commissioner Charles P.] Neill for many tasks, mediation of labor disputes proved to be his major and most absorbing public work. As Commissioner, he helped settle some 60 railway controversies, and his involvement in railroad labor relations extended into World War I, when he served on the first Railway Board of Adjustment.

The Erdman Act of 1898 had provided for a board of mediation for railroad disputes, with the Commissioner of Labor as a member, but the act's procedures had been asked for only once during [Commissioner Carroll D.] Wright's tenure. In December 1906, the Southern Pacific Railroad Company applied to the board when it found itself threatened by a jurisdictional dispute between two railway unions. Although one of the unions was skeptical at first about the board's role, it viewed the final result favorably, finding that "Mr. Neill applied himself with such diligence to the task of bringing about an adjustment that he was soon familiar with every detail of the controversy. He was absolutely fair to all interested." Within a month, the unions agreed to an arbitration panel. This success, coupled with the broadening scope of railroad collective bargaining agreements, spurred use of the act's machinery.

Neill noted that, in the beginning, the companies viewed him with some suspicion since they presumed him to be pro-labor because of his position. But, he said, "After the first case or two, why, they became convinced of my fair-mindedness." He further explained. "There is no occasion to charge either side, as a rule, with unfairness. . . . It is human nature to want to be fair. But it is also human nature to be self-centered. Therefore, each side has an entirely different conception of what is fair."

—JOSEPH P. GOLDBERG AND WILLIAM T. MOYE
*The First Hundred Years of the
Bureau of Labor Statistics,*
Bulletin 2235 (Bureau of Labor
Statistics, 1985).

BLS projections procedures

For several decades, the Bureau of Labor Statistics has been preparing 5 to 15 year projections of the U.S. economy. Since the early 1970's, projections have been prepared on a regular 2-year cycle. The projections cover the future size and composition of the labor force, the rate of aggregate economic growth, industrial production, and industrial and occupational employment. The data serve a number of users who need information on future changes in the U.S. economy. The information on future employment opportunities by occupation, for example, is used by counselors, educators, and others helping young persons choose a career, and by officials who plan education and training programs.

Over the years, the procedures used to develop the projections have undergone many changes, as new data series were released and economic and statistical tools improved. Since the late 1970's, the BLS projection methodology has been relatively unchanged and it is that system which is described below.

The BLS projections are developed in a series of five steps each of which is based on a separate model: (1) labor force; (2) aggregate economic performance; (3) industry final demand and total industry production; (4) industry employment; and (5) occupational employment. While each of these five steps is conducted separately, the projection model used in each step depends upon inputs from the earlier step and feeds logically into the next. Although the models used to develop projections for each step in the process are complex, they provide only a framework for detailed analysis of the structure and composition of the economy in the future. As a result of detailed analyses, the models are run and rerun, assumptions are revised, and the results are reviewed until, in the judgment of the BLS staff, projections are achieved for all of the integral parts of the system which are both reasonable and internally consistent.

(1) The labor force projections, the first step in the BLS projections sequence, are determined by the future age, sex, and racial composition of the population and by trends in the labor force participation rates—the percent of a specified group in the population who will be working or seeking work. The population projections, prepared by the U.S. Bureau of the Census, are based on trends in birth rates, death rates, and net migration. With the population projections in hand, BLS analyzes and projects changes in labor force participation rates for 82 age, sex, and race groups.

The labor force participation rate projection for each group is developed by first selecting a trend rate of change based on participation rate behavior during 1962–1984 or for some subperiod which analysis indicates is more appropriate. Second, the rate is modified when the time-series projections for the specific group appears inconsistent with the results of cross-sectional and cohort analyses. This second step, in which many of the selected growth rates are averaged, ensures consistency among the various groups. Finally, the sizes of the anticipated labor force are calculated by applying the labor force participation rates to the population projections. The results are again reviewed for consistency.

(2) Aggregate economic performance—the second model in the BLS projection procedures—is developed by projecting the Gross National Product (GNP), and major categories of demand and income. Because the purpose of the BLS projections is to identify long-term trends, no attempt is made to project cyclical movements. The labor force and population projections are but two of many inputs used in the model. Alternative economic scenarios, usually three, are developed to provide controls for the various categories of demand and employment. The scenarios encompass a range of possible rates of growth. In later stages of the projection process, industry output and employment projections and occupational projections are developed that are consistent with the aggregate economic alternatives.

Wharton Econometrics developed the model used by the Bureau to project aggregate economic trends, in response to a competitive procurement process. The Wharton long-term model is a system of behavioral relationships and identities based on annual data and designed to allow an analyst to explore the determinants of medium- to long-term growth in the U.S. economy. Made up of approximately 2,400 equations, the model is driven by a set of 900 exogenous variables. Under the terms of this agreement, the Bureau uses the Wharton long-term macroeconomic model to develop the BLS projections. BLS analysts determine the assumptions and values for the exogenous variables and equation adjustments in the Wharton model.

The exogenous variables include true policy variables, such as various Federal transfer programs, the response of the monetary authority to growth in the economy, and the level of the armed forces. They also include variables for which other reliable and generally accepted projections are available, such as the population projections developed by the U.S. Bureau of the Census. Finally, the exogenous variables include those items which are too volatile or too politically determined to project. The former group includes such items as economic growth and inflation rates in the economies of the major trading partners of the United States and the long-term behavior of the U.S. dollar's exchange value. The latter group includes items such as energy prices.

It should be noted that the BLS does not rely on the Wharton model alone for projecting possible trends in the future. Rather, the model provides a framework for the preparation of a consistent set of economy-wide projections given a set of exogenous assumptions. BLS analysts then review the aggregate results for reasonableness. The review includes checks on internal consistency, evaluation of continuity with past trends, and comparisons with projections made by others. Although the review tends to focus on such items as GNP, unemployment, and productivity, the model's framework ensures that other important measures of economic performance are not overlooked.

(3) The BLS projection procedure then moves from the aggregate to the industrial level. For the industry output projections, the U.S. economy is disaggregated into 156 producing sectors that cover the U.S. industrial structure, both the public and private. The framework for this procedure is an input-output

model. The initial input-output data used by BLS are prepared by the Bureau of Economic Analysis, U.S. Department of Commerce.

The development of projections of industry output begin with the aggregate demand projections from the Wharton model. In this model, projections are made for 14 categories of consumption, 4 types of investment, 15 end-use categories of foreign trade, and 6 categories of government spending. A further disaggregation of the values from the model is then undertaken: purchases of producers' durable equipment, for example, is estimated for 107 consuming industries.

Furthermore, to develop industry output projections, provision is made to allow for shifts in the industrial makeup of a given demand category. This is accomplished by projecting "bridge tables" relating individual types of demand to producing industries. The bridge table is a percent distribution for each given demand category, such as for a consumption category or for investment, among each of the 156 industries in the BLS input-output model. In projecting changes in these bridge tables, expected changes in technology, consumer tastes or buying patterns, the industrial pattern of exports and imports, the future composition of each industry's business investment, and other structural factors are considered.

The next element in developing industry output projections is the projection of the input-output table which accounts for the changes in the input pattern or the way in which goods or services are produced by each industry. In general, two types of changes in these input patterns are made in developing a future input-output table: (a) those made to the inputs of a specific industry (as, for example, the changes in inputs in the publishing industry); and, (b) those made to the inputs of a specific commodity in all or most industries (as for increased use of business services across a wide spectrum of industries). These changes are based on studies of specific industries conducted internally or by other organizations both within and outside of government. Changing the input patterns in the future input-output table is the procedure used to accommodate the impacts of expected relative price changes, or future changes in technology. The output requirements by industry are developed by multiplying the projected input-output table, by the projected changes in the level, and in the distribution of final demand.

(4) The projected changes in industry employment are computed based on the projected changes in output and other factors. BLS uses a regression model containing an equation for each industry to estimate worker-hours as a function of (a) the industry's output, (b) aggregate capacity utilization, (c) the relative price of labor, and (d) a technology variable as approximated by the output/capital ratio. For each industry, worker-hours are converted into jobs using trends in average annual hours for that industry. In order to balance total employment from the aggregate projections with the sum of employment projections, a number of iterations of the process are necessary.

The projections of employment for the 156 producing sectors in the economic growth model are further disaggregated using

a time series regression model into 378 industries that, with few exceptions, correspond to three-digit Standard Industrial Classification codes. The 378 resulting projections are reviewed in light of a broad range of economic information. These projections are then used as inputs into the process of projecting occupational employment.

(5) The model used to develop the occupational employment projections is an industry-occupation matrix showing the distribution of employment for 378 industries and for more than 550 detailed occupations. Occupation staffing patterns for the industries are based on data collected by State Employment Security Agencies and analyzed by BLS.

Staffing patterns of industries in the base-year industry-occupation matrix are projected to the target year of the projections to account for changes expected to occur because of technological change, shifts in product mix, and other factors. The changes introduced into the input-output model for expected technological change, as an example, may also change future staffing patterns in industries using the new technology. (For example, one would expect greater employment of computer specialists as computer technology spreads across industries.) The projected industry employment data are applied to the projected industry occupational staffing patterns, yielding employment by occupation for each industry. This is aggregated across all industries to yield total occupational employment for the projected year.

Final review

An important element of the projection system is its comprehensive structure. To ensure the internal consistency of this large structure, the BLS projection procedure encompasses detailed review and analysis of the results at each stage for reasonableness and for consistency with the results from other stages of the BLS projections. For example, changes in staffing patterns in the occupational model are closely related to changes in industry productivity and technology projections are reviewed in detail by the BLS Office of Productivity and Technology. In short, the final results reflect innumerable interactions among staff members who focus on particular variables in the model. Because of this review, BLS' projection process converges to an internally consistent set of employment projections across a substantial number of industries and occupations. The continued cross-checking of the assumptions and results makes it difficult to quantify the effects of each change in each variable.

The projection process at the Bureau of Labor Statistics does not end with the development and publication of a set of projections. Once the target year is reached, BLS evaluates the average of the projections to determine what changes in assumptions or models would have made them more accurate. Knowing the sources of errors helps improve the projection process. It also highlights for users the imprecise nature of making statements about future economic, industrial activity, or employment growth.