Employment outlook, 2002–12

Employment projections to 2012: concepts and context

BLS projections are carried out against a background of explicit assumptions and model-based findings that connect the past to the future; the projections form the basis for providing information on entering the job market, changing careers, and choosing appropriate educational and training paths to job success

Michael W. Horrigan

This issue of the *Monthly Labor Review* presents the BLS employment outlook for the period from 2002 to 2012. The 2012 projections continue a longstanding tradition of BLS examinations of future job prospects dating back more than 50 years. First begun to assist returning World War II veterans back into the world of work, the BLS projections program has grown steadily from a project that reported simple descriptive material about available occupations to an undertaking encompassing a model-based approach that develops projections of the macroeconomy, the labor force, industry employment and output, and occupational employment growth.

The BLS projections are based on a long-term view of the U.S. economy that assumes a long-run full-employment economy in which labor markets clear. As a result, BLS projections address the question, "How would employment in industries and occupations grow if the economy were to operate at its full potential a decade from now?" In the article "The U.S. economy to 2012: signs of growth," which focuses on projected trends in the macroeconomy, Betty W. Su reports the results of a macroeconomic model according to which the overall U.S. economy is expected to grow from $9.4 trillion in 2002 to $12.6 trillion in 2012 (measured in chain-weighted 1996 dollars). This increase represents a growth rate of 3.0 percent per year in the real gross domestic product (GDP) of the economy. On the basis of the results from the macroeconomic model, the unemployment rate in 2012 is projected to be 5.2 percent and the annual rate of growth of productivity is expected to be 2.1 percent. Given these broad indicators of economic growth, the model used to describe macroeconomic activity provides detailed projections of four categories of expenditures: personal consumption, investment, government, and foreign trade. These projections are necessary as input to the industry projections that, in turn, form the basis of the occupational projections.

Another major factor to consider in projecting the path of the U.S. economy is the available labor supply over the next decade. In the article "Labor force projections to 2012: the graying of the U.S. workforce," Mitra Toossi uses Census Bureau population projections based on the 2000 census, along with historical trends in labor participation rates, to project labor force levels and participation rates for 136 age, sex, and race or ethnicity groups over the 2002–12 period. Overall, the Bureau of Labor Statistics expects the labor force to grow from 144.9 million in 2002 to 162.3 million in 2012, an annual growth rate of approximately 1.1 percent.

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The third major area of analysis translates the growth in the macroeconomy into the levels of final market output of each industry and the levels of intermediate inputs that are purchased by each industry to produce that output. In the article "Industry output and employment projections to 2012," Jay M. Berman reports that the flow of goods and services purchased in the production process or delivered to the market as final products will reach a total of $23.2 trillion in chain-weighted 1996 dollars) in 2012. The number of jobs needed to support this level of economic activity is expected to grow from 144.0 million to 165.3 million. The 2002–12 projections present detailed industry flows of inputs and outputs, using the 2002 North American Industrial Classification System (NAICS). This is the first set of BLS employment projections developed from the NAICS; past projections utilized the 1987 Standard Industrial Classification System (SIC). The *2004–2005 BLS Career Guide to Industries*, a companion publication to the BLS projections, offers a detailed description of NAICS-based industries and the impact the changeover will have on industry and occupational employment over the 2002–12 period.

On the basis of the description of industry production and total employment needs reported in the three articles, data from the Occupational Employment Survey (OES) are used to project the occupational staffing patterns needed in each industry. The OES gives detailed occupational employment information on each of the NAICS-based industries. These data are coupled with expert assessment of likely trends to produce employment projections for 725 detailed occupations. In the article "Occupational employment projections to 2012," Dan Hecker reports the results of the BLS analysis of the projected trends in the occupational employment that produces the goods and services of the U.S. economy. The occupational information provided in this article includes estimates of self-employment that are based on data from the Current Population Survey (CPS). Total employment is projected to increase by 14.8 percent, reflecting a net employment growth of 21.3 million jobs over the 2002–12 period. The number of job openings due to both net employment growth and net replacement needs is projected to be 56.3 million.[1] Self-employment is projected to decline 2.3 percent, from 11.5 million to 11.2 million. A separate companion publication, the *2004–2005 BLS Occupational Outlook Handbook*, gives a detailed description of more than 300 occupations; the book is widely used by students and jobseekers to obtain career advice.

Together, the four articles presented in this issue of the *Review* offer a wealth of detail on projected trends in the macroeconomy, the labor force, industry output and employment, and occupational employment growth. The purpose of this overview is to present some of the most significant findings that emerge from the articles and to provide an overall context from which to view them. Accordingly, the sections that follow examine the potential impact of baby-boomer retirements, occupational labor shortages, immigration, and high-paying, fast-growing occupations on the economy over the 2002–12 period.

Any attempt to project the direction and path of the U.S. economy and, in particular, long- run occupational employment needs, is subject to a great deal of uncertainty. The BLS approach is to state the underlying assumptions clearly and present the model-based findings about the long-run position of the economy in as transparent and objective a manner as possible. The Bureau has an ongoing tradition of evaluating its estimates against the actual state of the economy in the end year of the projections. Waiting 10 years to judge the accuracy of the projections, however, belies the more pressing need to assess the reasonableness of the BLS description of the likely secular long-run trends in the economy and their implications for occupational employment trends. The next section examines this subject.

A comparison of macroeconomic trends

One standard for assessing the reasonableness of the BLS description of the long-run position of the U.S. economy is to compare how the description of the next 10 years stands with respect to the past behavior of the economy on the basis of a broad set of macroeconomic indicators. Toward that end, the following tabulation, based on data from the Bureau of Economic Analysis, compares peak quarters, about 10 years apart, of U.S. business cycles in the post-World War II era (the last period listed, 2000–12, based on annual data, represents a comparison between the last full year of the 1991–2001 expansion with the ending year of the BLS projections—which, as noted earlier, represents a level of economic activity associated with the economy operating at its full potential):

Years spanned	*Annual average growth rate of real GDP (percent)*
1960, quarter II, to 1969, quarter IV	4.4
1969, quarter IV, to 1980, quarter I	3.3
1980, quarter I, to 1990, quarter III	2.9
1990, quarter III, to 2001, quarter I	3.1
2000 through 2012	2.7

The expansion of the U.S. economy has slowed considerably since the 1960s, from an annual rate of 4.4 percent between 1960 and 1969 to around 3 percent per year since 1980. Based on the BLS projection of GDP for 2012, the projected growth rate of 2.7 percent over the 2000–12 period is in line with the rate exhibited during the last two decades. (This growth rate, which covers the 2000–12 period, including the 2001 recession, is slightly lower than the 3.0-percent growth rate posted over the 2002–12 projection period; the box on the next page compares the 2000–10 and 2002–12 BLS projections.)

Comparing the 2000-10 and 2002–12 projections

Since the publication of the Bureau's most recent set of projections, covering the 2000–10 period, the U.S. economy entered a recession in March 2001 and has been in recovery since December of the same year. One of the hallmark features of the recovery period from December 2001 to August 2003 was the continued net employment losses after the official end of the recession. The term *job-loss recovery* has been used to describe that aspect of the economy whereby significant output gains and strong labor productivity occurred together with continued contraction in employment. The juxtaposition of the BLS long-run projections, which assume an economy operating at capacity, with this most recent experience in job losses is striking—enough to ask, "To what extent are the current projections influenced by the events of the last recession and the current recovery?"

While the model presented in the text projects a secular trend instead of pinpointing cyclical downturns or upturns, the trend is certainly affected to a degree by the current position of the economy. The long-run-growth trajectory of an economy that is in its ninth year of recovery or expansion, as the 2000–10 projections assume, may certainly look different from the long-run-growth trajectory associated with an economy in its first year of recovery, as the 2002–12 projections presuppose. But *how much* different? The growth rate projected for GDP for the 2000–10 period was 3.4 percent per year, compared with the 3.0 percent projected for the 2002–12 period. The model presented in the text implies a 5.2-percent long-run unemployment rate in the current projections, higher than the 4.0 percent postulated in the previous set of projections. Labor productivity is also somewhat lower, at 2.1 percent for the 2002–12 projections, compared with the 2.4-percent annual growth rate assumed in the 2000–10 projections. Although a more detailed comparison will reveal other differences, in general, the long-run growth trajectory in the current set of projections is not quite as strong as in the previous set, reflecting, to a certain extent, the impact of the last recession.

Productivity trends since 1995. One of the most fascinating and significant features of the current U.S. economy is the strength of both labor and multifactor productivity since 1995. Chart 1 shows the annual rate of growth of labor productivity between selected peak quarters of the U.S. economy. Included for comparison are the periods from 1990, quarter III, to 1995, quarter I, and from 1995, quarter I, to 2001, quarter I, the latter period being one of exceptional strength in productivity that has continued to this day. Between quarter III of 1990 and quarter I of 1995, labor productivity grew at an annual average rate of 1.5 percent, compared with an annual average growth rate of 2.3 percent between quarter I of 1995 and quarter I of 2001. Over the 2002–12 period, the Bureau projects an annual average growth rate of output per hour of 2.1 percent, just slightly lower than the rate of the 1995–2001 period.

Perhaps even more telling was the strength of labor productivity during the most recent recession. Chart 2 shows the annual average rate of labor productivity during each of the recessions since 1960. The strength of productivity that began in 1995 continued unabated during the most recent recession, setting the stage for continued strong growth in productivity over the 2002–12 period.

Industry trends

Output and employment by industry. Trends in overall labor productivity, while important, still tell only one part of the story. How these trends are reflected in the growth in output by industry and, in particular, between goods-producing and service-providing industries, affords an important insight into the sources of overall employment growth in the BLS projections. Table 1 compares goods-producing and service-providing sectors for the year 2002, based on the proportions of total output and total employment accounted for by each sector.

The measure of output reported in the table is nominal gross duplicated output, which includes output produced for intermediate sale to other firms and final output delivered to markets.[2] Nominal gross duplicated output has the closest connection to the amount of labor that industries will need to hire to achieve production goals, whether such output is for intermediate sale to another firm or for sale as a final market good.

As the table indicates, the goods-producing sector's share of gross duplicated output is substantially higher than its share of total nonfarm wage and salary employment, especially for manufacturing industries. In contrast, the service-providing sector's share of gross duplicated output, 67.1 percent, is smaller than its 82.0-percent share of employment. Two notable exceptions are the information and financial activities sectors, which both account for a larger share of output than employment.[3]

Given these differences between goods-producing and service-providing industries, it is not surprising that the

Chart 1. **Annual rate of growth of output per hour, nonfarm business, selected peak-to-peak and other comparisons**

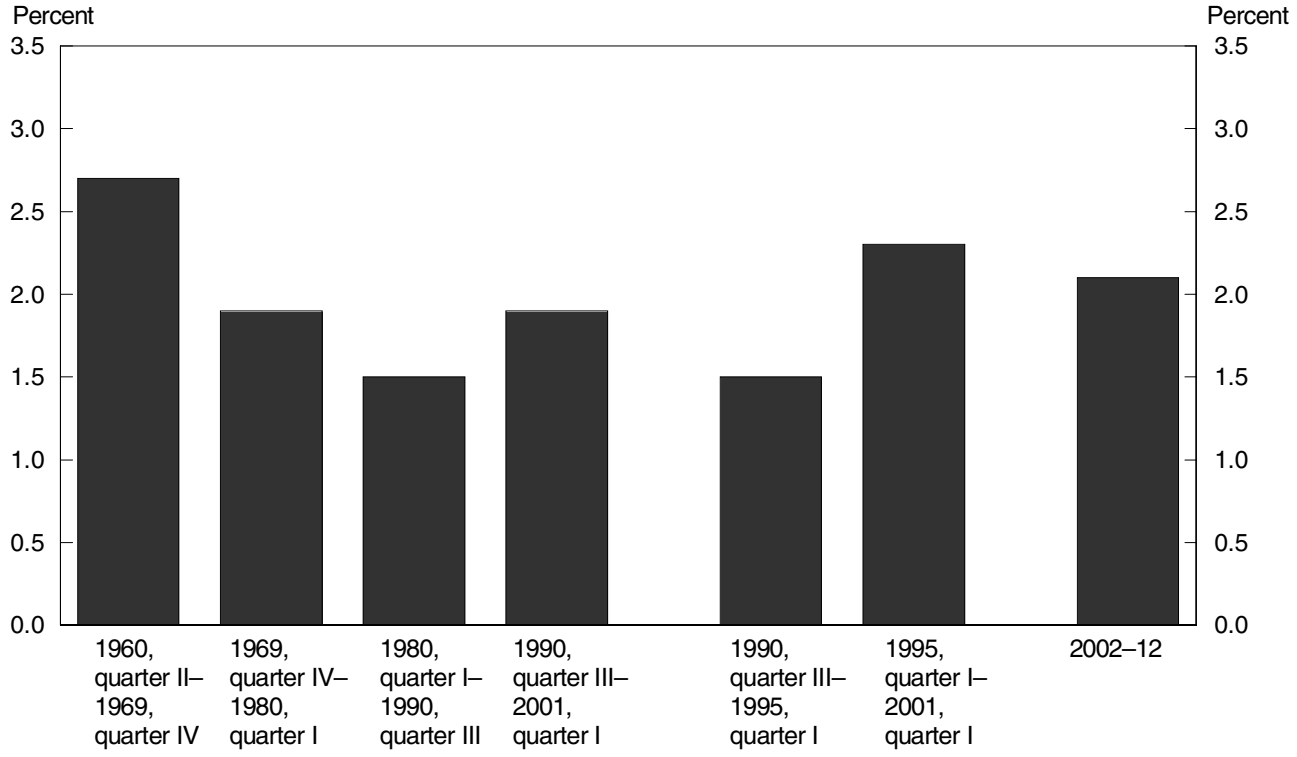
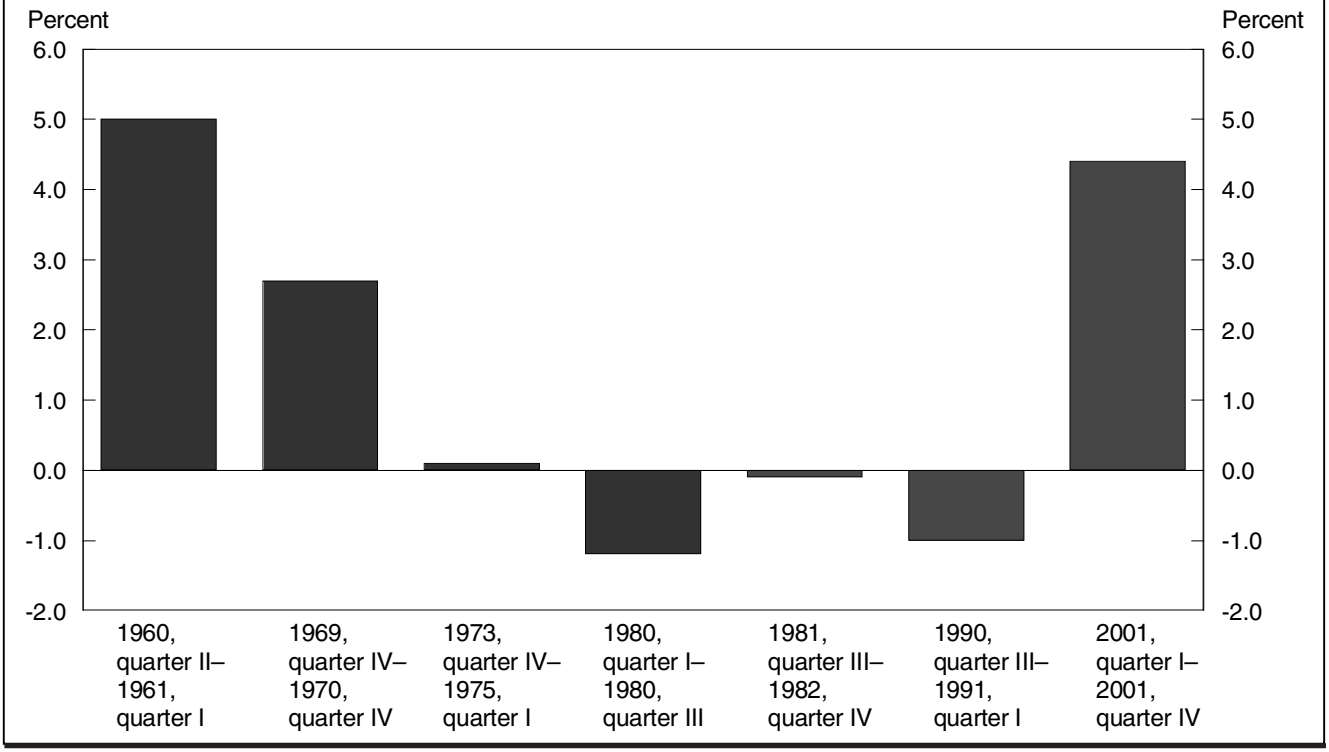


Chart 2. **Annual rate of growth of output per hour, nonfarm business, selected peak-to-trough comparisons**



Bureau projects that net change in nonfarm wage and salary employment over the 2002–12 period will be largely in the service-providing industries: 20.8 million (96.3 percent) out of a projected net employment gain of 21.6 million. Nor should it be surprising that goods-producing industries account for 22.8 percent of the projected increase in output, measured on a nominal gross duplicated basis, and only 3.7 percent of the net employment change over the same period. (See table 2.)

Do these figures mean that there will be very few job opportunities in goods-producing industries? Not at all. The reason is that the BLS projections are based on net employment change and do not reflect the underlying dynamic flows of hirings and separations that occur within industries. How much turnover is there by industry? The Bureau now calculates job turnover statistics by industry in its new Job Opening and Labor Turnover Survey (JOLTS). Table 3 shows the breakdown of turnover by major NAICS industry group in September 2003, the latest month for which data were available at the time this article was written. In the private sector, 4.2 million individuals were hired during September 2003, representing 3.8 percent of private nonfarm payroll employment that month. Also, 4 million workers were separated from their jobs during September, accounting for 3.7 percent of employment. An examination of the industries listed in table 3 shows how dynamic U.S. labor markets are across industries.

Another measure of the dynamic nature of labor markets is the number of job openings that are created to replace workers who leave occupations. Hecker lists the number of job openings for each detailed occupation over the 2002–12 period, a figure that represents the hiring required both to meet net employment growth and to replace workers who leave each occupation.[4] As noted previously, the Bureau projects an overall level of job openings of 56.3 million jobs over the period, representing a net employment growth of 21.3 million and an additional 35 million job openings due to replacement needs.

While a principal and highly popular use of BLS projections is to offer guidance on which occupations are projected to grow the fastest or add the most jobs, the projected trends are closely tied to the underlying changes in industry output and employment levels. An industry that is projected to have a significant increase in the level or the rate of growth of its output can have a significant impact on the types of occupations that will be in demand over the next decade. One reason for this relationship has to do with the concentrations of particular occupations in specific industries. For example, 49 percent of registered nurses work in hospitals, and another 17 percent work in offices of physicians and in ambulatory health-care centers, including home health-care centers. The projected increases of 27 percent and 57 percent in the real output of hospitals and ambulatory health-care services, respectively, translates into 71 percent of the nearly 623,000 total projected increase in the employment of registered nurses.

Another important influence of industries on the occupational staffing mix results from changes in the technology of production—which can have significant impacts on the types of

Table 1. Output[1] and nonfarm wage and salary employment by major industry division, 2002[2]

Industry	Levels		Shares	
	Output	Employment (thousands)	Output	Employment
Total	$18,409.6	131,063	100.0	100.0
Goods producing, excluding agriculture	4,904.5	22,550	26.6	17.2
Mining	158.8	512	.9	.4
Construction	865.5	6,732	4.7	5.1
Manufacturing	3,880.3	15,307	21.1	11.7
Service providing	12,352.2	108,513	67.1	82.8
Utilities	302.4	600	1.6	.5
Wholesale trade	951.0	5,641	5.2	4.3
Retail trade	1,064.9	15,047	5.8	11.5
Transportation and warehousing	685.4	4,205	3.7	3.2
Information	965.3	3,420	5.2	2.6
Financial activities	2,497.9	7,843	13.6	6.0
Professional and business services	2,089.2	16,010	11.3	12.2
Education and health services	1,289.7	16,184	7.0	12.3
Leisure and hospitality	687.9	11,969	3.7	9.1
Other services	444.1	6,105	2.4	4.7
Federal Government	376.4	2,767	2.0	2.1
State and local government	998.0	18,722	5.4	14.3

[1] Gross duplicated output, measured in nominal dollars.
[2] Industry output levels do not add to totals, due to the exclusion of agriculture, forestry, fishing, and hunting industries, as well as special industries and a residual category.

Table 2. Output[1] and nonfarm wage and salary employment by major industry division, 2002 and 2012[2]

Industry	2002 Levels		2012 Levels		Share of change between 2002 and 2012	
	Output	Employment (thousands)	Output	Employment (thousands)	Output	Employment
Total	$18,409.6	131,063	$31,599.4	152,690	100.0	100.0
Goods producing, excluding agriculture	4,904.5	22,550	7,917.6	23,346	22.8	3.7
Mining	158.8	512	208.0	451	.4	–.3
Construction	865.5	6,732	1,204.9	7,745	2.6	4.7
Manufacturing	3,880.3	15,307	6,504.7	15,149	19.9	–.7
Service providing	12,352.2	108,513	22,360.8	129,344	75.9	96.3
Utilities	302.4	600	460.0	565	1.2	–.2
Wholesale trade	951.0	5,641	1,898.2	6,279	7.2	3.0
Retail trade	1,064.9	15,047	1,993.9	17,129	7.0	9.6
Transportation and warehousing	685.4	4,205	1,183.3	5,120	3.8	4.2
Information	965.3	3,420	1,981.0	4,052	7.7	2.9
Financial activities	2,497.9	7,843	4,315.4	8,806	13.8	4.5
Professional and business services	2,034.6	16,010	4,136.8	20,876	15.3	22.5
Education and health services	1,289.7	16,184	2,455.0	21,329	8.8	23.8
Leisure and hospitality	687.9	11,969	1,160.8	14,104	3.6	9.9
Other services	444.1	6,105	739.7	7,065	2.2	4.4
Federal Government	376.4	2,767	542.9	2,779	1.3	.1
State and local government	998.0	18,722	1,493.7	21,240	3.8	11.6

[1] Gross duplicated output, measured in nominal dollars.
[2] Industry output levels do not add to totals, due to the exclusion of agriculture, forestry, fishing, and hunting industries, as well as special industries and a residual category.

workers employed as new production technologies are adopted. In 1983, for example, the production of computer and office equipment required the services of nearly 100,000 precision production, craft, and repair workers and 7,000 computer engineers, scientists, and systems analysts. By 1998, as innovations in the production of computer and office equipment were introduced into this industry, the number of production workers had dropped to 68,000, and employment in computer-related occupations had grown to more than 51,000.

A number of other factors related to industry output and employment can have an important influence on the occupational staffing patterns observed in the U.S. economy: the discovery of new technologies and their integration into the production process; the influence of global competition; the different emphases placed by industries on research and development, marketing, and output customization; and the outsourcing of functions to firms in other domestic industries or abroad, among others.

Fast employment growth, high output growth

With the aforementioned multiple factors affecting industry output, are there ways of summarizing the likely impact of industry trends on occupational employment? One approach is to group industries on the basis of selected characteristics and examine the employment growth (or decline) that is projected for those industries over the next decade. Berman lists (1) the industries that are projected to have the fastest-growing and most rapidly decining employment growth,[5] (2) the industries with the fastest-growing and most rapidly decining output growth,[6] (3) the industries with the largest employment growth and declines,[7] and (4) the industries with the largest output growth and declines.[8] Another grouping that provides insight into employment and occupational staffing patterns is the set of industries that are projected to post relatively high rates of growth in *both* output and employment. Table 4 lists industries that are projected to have employment increases greater than 14.8 percent (the overall increase in employment projected for the 2002–12 period). The industries are listed in descending order of their projected output growth over the 2002–12 period.

The first row of the table shows that the Internet services, data processing, and other information services industry is projected to have the highest annual rate of change of real output over the projection period: 10.3 percent per year. This industry is expected to add 244,000 jobs, an increase of 46.2 percent, over the period. Twenty-one industries are projected to have real output growth rates that equal or exceed the overall annual average of 4.0 percent. The last two columns indicate that these industries together accounted for 14 percent of nonfarm wage and salary employment in 2002 and are projected to account for 32 percent of overall net employment growth over the projection period.

If the list of industries with fast employment growth is extended to include those with average annual output growth of 3 percent or more per year, 35 industries qualify. These industries

account for 24 percent of nonfarm wage and salary employment in 2002 and 48 percent of their net employment growth over the 2002–12 period. Note that not all 35 industries are in the service-providing sector of the economy. Although goods-producing industries generally have greater output than employment gains, the list of 35 industries includes metalworking machinery manufacturing industries; forging and stamping industries; plastics product manufacturing industries; and architectural and structural metals manufacturing industries.

The 50 industries with average annual output growth of 2 percent or more per year and employment growth exceeding 14.8 percent account for 65 percent of nonfarm wage and salary growth over the projection period. Further, a total of 84 percent of employment growth is accounted for by all of the industries with projected net employment growth exceeding the overall average of 14.8 percent. This total of 58 industries accounted for 55 percent of employment in 2002, and each has a projected annual average growth rate of real output of at least 1 percent between 2002 and 2012.

Trends in labor supply

One of the most significant influences on both labor force growth and labor force participation rates in the last 50 years has been the aging of the baby-boom cohort. Indeed, one of the recurring themes that run through the four articles in this issue of the *Review* is the influence of the baby-boom generation on everything from consumer expenditures to housing, medical care, and retirement, to name just a few factors.

The baby boomers were born between 1946 and 1964, were aged 38 through 56 in 2002, and will be aged 48 through 66 in 2012. In table 5, boldface is used to denote when the baby boomers reached (or will reach) various age groups between 1950 and 2010. One way to see the impact of this cohort is to compare the size of an age group before the arrival of the baby boomers with its size once the baby boomers have reached the indicated ages. For example, in 1970, the baby boomers were aged 6 to 24 years, and in that year, there were 48 million individuals aged 25 to 44. Twenty years later, with the baby boomers aged 26 to 44, the number of individuals in the 25–44 age group stood at 80.8 million, an increase of 68.3 percent.

Perhaps the aspect of the baby boomers that is generating the most interest at present is their potential impact on the remaining size of the labor supply as the boomers enter older age groups and begin to retire. According to Census Bureau population projections given in the table, by 2010, when baby boomers will be 46 to 64 years, the number of 55- to 64-year-olds will grow by more than 11 million compared with the number in 2000, an increase of 46 percent.

Table 3. Annual average hiring rates and levels, and separations rates and levels, by industry, September 2003

Industry	Hiring rate	Hiring level (thousands)	Separation rate	Separation level (thousands)
Total	3.5	4,575	3.3	4,320
Total private	3.8	4,177	3.7	4,002
Natural resources and mining	2.4	14	3.2	18
Construction	5.7	403	6.3	446
Manufacturing	2.4	353	2.3	342
Durable goods	2.4	218	2.2	200
Nondurable goods	2.4	136	2.5	142
Trade, transportation, and utilities	4.0	1,012	3.4	860
Wholesale trade	3.0	164	2.6	145
Retail trade	4.6	680	4.1	605
Transportation, warehousing, and utilities	3.5	168	2.3	109
Information	1.9	61	2.0	66
Financial activities	2.4	194	2.5	197
Finance and insurance	2.1	122	1.9	113
Real estate and rental and leasing	3.5	73	4.0	83
Professional and business services	3.9	627	3.4	551
Education and health services	3.6	591	2.7	437
Educational services	4.6	122	1.9	49
Health care and social assistance	3.4	469	2.8	387
Leisure and hospitality	5.9	725	7.2	888
Arts, entertainment, and recreation	4.6	84	11.6	211
Accommodation and food services	6.1	641	6.5	677
Other services	3.7	197	3.8	199
Government	1.9	399	1.5	318
Federal	1.4	38	1.4	38
State and local	2.0	361	1.5	280

SOURCE: Job Openings and Labor Turnover Survey, Bureau of Labor Statistics.

One question that naturally arises is whether the baby boomers have had a discernible impact on labor force participation rates. That is to say, as the baby boomers have aged, have their labor force participation rates differed significantly from the cohorts that came before them or the cohorts that followed them? Table 6 provides the answer. For men, the dominant feature is the declining participation rates among those aged 55 and older since 1950, a group that does not yet include the baby boomers. From an examination of the younger age groups listed in the table, it does not appear that the labor force participation rates of baby boomers differed significantly from those of similarly aged cohorts that came before or after.

The table also shows the remarkable rise in the labor force participation rates for women since 1950, especially among the prime working-age groups from 25 to 54 years. In each case, the rising trend predates the arrival of female baby boomers. Although these women certainly contributed to the trend, the data do not support the idea that the rising labor force participation rates of women since 1950 were the result of the entry of the baby-boomer cohorts.

In Toossi's article on labor force projections, changes in the labor force levels of various age groups are decomposed into changes in the size of the population and changes in the labor force participation rates of each age group. Consistent with the findings just given, Toossi finds that changes in labor force levels of each age group are largely the result of changes in the size of the population in various age groups, rather than changes in their underlying labor force participation rates.

Labor shortages

There is a growing interest in the potential impact of the upcoming retirement of baby boomers—specifically, the prospect of a general shortage of workers and its effects on specific occupational labor markets. Table 7 gives the actual and expected sizes of the labor force by age group between 1950 and 2050, by decade, based on previously published research by Toossi.[9] The arrival on the economic scene and the subsequent aging of the baby boomers has had a significant impact on labor force growth rates. Between 1950 and 2000, the civilian labor force grew by 79 million, from 62.2 million to 140.9 million, an increase of 1.6 percent per year. The Bureau projects that, between 2000 and 2010, labor force growth will slow to 1.1 percent per year, and after the retirement of the baby boomers, between 2010 and 2020, labor force growth will slow to 0.4 percent per year. Overall, the civilian labor force is expected to grow by 51 million between 2000 and 2050, a slowdown to a 0.6-percent increase per year.

Will these increases in the size of the labor force be too small to meet the needs of the U.S. economy? Will there be a general shortage of workers, so that many of the jobs needed to produce the level of output demanded by the economy (and by U.S. trading partners in the form of exports) will go unfilled? To what extent do the projections account for this possibility? Consider the latter question first. The BLS projections, as mentioned earlier, assume a labor market that clears. The Bureau does not base its estimates of changes in total, industry, or occupational employment on labor markets that have either a shortage or a surplus of workers. Despite this assumption, numerous analyses have been produced by researchers in past years using BLS employment projections as a basis for measuring what is believed to be evidence of a future shortage of workers in the U.S. economy.

One of the most common ways in which BLS numbers are used to project a "coming shortage" is by asserting that the difference between the projected labor force level and the projected employment count represents a shortage of workers. For example, the Bureau projects a labor force of 162.3 million individuals in 2012. At the same time, the Bureau expects that the 2012 economy will require that 165.3 million jobs be filled. Does this difference imply a shortage of 3.0 million workers come 2012? Absolutely not—but if not, then what accounts for the difference? First, BLS projections of occupational employment are based on the number of jobs that the economy is expected to require. However, because individuals can and do hold more than one job, the count of workers will most certainly be less than the number of jobs. Second, and more technically, the data the Bureau uses for projecting industry employment are based on the Current Employment Statistics survey, which counts payroll jobs at establishments. The data the Bureau uses to project labor force levels, by contrast, are based on the CPS, a household survey yielding estimates of the number of individuals in the labor force. Besides multiple jobholding, then, there are statistical differences between these two series that contribute to the difference between the job count and the count of individual employees in BLS projections.

Essentially, the BLS projections are based on an examination of the labor required to produce projected levels of output by industry. How industries manage their human resource requirements is influenced by a great many factors: the available labor supply (including immigration), the skill levels of prospective jobseekers, the use of technology in the production process, the required capital-labor ratio consistent with the technology used for production, how work is organized, the use of employees from the personnel supply services industry, the hiring of self-employed contractors, the use of flextime and flexiplace, the use of overtime or mandatory shift coverage, and the hiring of offshore labor in foreign countries, among others. Although the projections do not attempt to explicitly model these various possible management options that firms may exercise, a perspective on their potential importance is certainly necessary to consider in building any set of projections and, in particular, detailed descriptions of the outlook for occupations. The next two subsections examine two areas of growing interest in assessing the reaction of firms to the available qualified labor

Table 4. Industries with relatively fast employment growth,[1] ranked by projected annual growth rate of output, 2002–12

Industry	Growth rate of output per year, 2002–12	Employment, 2002 (thousands)	Employment, 2012 (thousands)	Change in employment		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
				Number (thousands)	Percent		
Internet services, data processing, and other information services	10.3	529	773	244	46.2	0.4	1.1
Computer systems design and related services	9.0	1,163	1,798	635	54.6	1.3	4.1
Software publishers	8.4	256	430	174	67.9	1.5	4.9
Motion picture and sound recording Industries	6.7	387	503	116	30.0	1.8	5.4
Scientific research and development and other professional, scientific, and technical services	5.5	1,026	1,241	215	21.0	2.6	6.4
Other general purpose machinery manufacturing	5.2	288	339	51	17.7	2.8	6.6
Advertising and related services	5.2	442	525	84	18.9	3.1	7.0
Employment services	5.1	3,249	5,012	1,764	54.3	5.6	15.2
Metalworking machinery manufacturing	4.9	217	251	34	15.5	5.8	15.3
Religious, grantmaking and giving services, and social advocacy organizations	4.9	1,944	2,372	428	22.0	7.2	17.3
Ambulatory health care services except offices of health practitioners	4.6	1,444	2,113	670	46.4	8.4	20.4
Forging and stamping	4.5	114	132	18	16.2	8.4	20.5
Amusement, gambling, and recreation industries	4.2	1,308	1,717	410	31.3	9.4	22.4
Office administrative and facilities support services	4.2	390	508	117	30.1	9.7	22.9
Securities, commodity contracts, and other financial investments and related activities	4.2	801	925	124	15.5	10.3	23.5
Individual, family, community, and vocational rehabilitation services	4.1	1,269	1,867	597	47.1	11.3	26.3
Commercial and industrial equipment (except automotive and electronic) repair and maintenance	4.1	156	185	29	18.7	11.4	26.4
Traveler accommodation	4.1	1,726	2,019	293	17.0	12.7	27.8
Management, scientific, and technical consulting services	4.1	732	1,137	406	55.4	13.3	29.6
Plastics product manufacturing	4.1	668	797	128	19.2	13.8	30.2
Child day care services	4.0	734	1,050	316	43.1	14.4	31.7
Commercial and industrial machinery and equipment rental and leasing	3.9	102	143	41	39.7	14.5	31.9
Architectural and structural metals manufacturing	3.9	400	478	77	19.3	14.8	32.2
Truck transportation and couriers and messengers	3.8	1,897	2,404	507	26.7	16.2	34.6
Business support and investigation and security services and support services, n.e.c.[2]	3.7	1,772	2,261	489	27.6	17.6	36.8
Specialized design services	3.6	123	161	38	30.8	17.7	37.0
Offices of health practitioners	3.5	3,190	4,419	1,229	38.5	20.1	42.7
Pharmaceutical and medicine manufacturing	3.5	293	361	68	23.2	20.3	43.0
Other wood product manufacturing	3.4	320	386	67	20.9	20.6	43.3
Community care facilities for the elderly and residential care facilities, n.e.c.[2]	3.4	695	1,078	382	55.0	21.1	45.1
Other personal services	3.3	219	270	51	23.2	21.3	45.3
Nondepository credit intermediation and related support activities, funds, trust, and lessors of nonfinancial intangibles	3.2	1,058	1,253	196	18.5	22.1	46.2
RV parks, recreational camps, and rooming and boarding houses	3.2	53	62	8	15.5	22.1	46.3
Services to buildings and dwellings	3.1	1,597	1,980	383	24.0	23.3	48.0
Waste management and remediation services	3.0	317	404	87	27.5	23.6	48.4
Automotive repair and maintenance	2.9	897	1,046	149	16.7	24.2	49.1
Museums, historical sites, and similar institutions	2.7	113	136	24	21.2	24.3	49.2
Consumer goods rental and general rental centers	2.7	353	484	131	37.2	24.6	49.8
Water, sewage, and other systems	2.7	49	71	23	46.4	24.6	49.9

Table 4. Continued—Industries with relatively fast employment growth,[1] ranked by projected annual growth rate of output, 2002–12

Industry	Growth rate of output per year, 2002–12	Employment, 2002 (thousands)	Employment, 2012 (thousands)	Change in employment		Cumulative percentage of total 2002 employment	Cumulative percentage of total pr ojected employment change, 2002–12
				Number (thousands)	Percent		
Veneer, plywood, and engineered wood product manufacturing	2.6	116	138	21	18.4	24.7	50.0
Scenic and sightseeing transportation and support activities for transportation	2.6	553	652	100	18.0	25.1	50.5
Personal care services	2.6	523	667	144	27.6	25.5	51.2
Cement and concrete product manufacturing	2.5	230	278	48	20.9	25.7	51.4
Hospitals	2.4	4,153	4,785	632	15.2	28.9	54.3
Food services and drinking places	2.4	8,412	9,749	1,337	15.9	35.3	60.5
Nursing care and residential mental health facilities	2.4	2,048	2,607	559	27.3	36.9	63.1
Performing arts companies, promoters, agents, managers, and independent artists	2.3	240	277	37	15.5	37.1	63.3
State and local electric utilities	2.2	93	108	14	15.2	37.1	63.3
Accounting, tax preparation, bookkeeping, and payroll services	2.1	867	1,082	215	24.8	37.8	64.3
Animal slaughtering and processing	2.0	520	601	80	15.4	38.2	64.7
Cable and other subscription programming and program distribution	1.9	221	300	79	35.7	38.4	65.0
Spectator sports	1.9	118	144	26	22.3	38.4	65.2
Educational services	1.8	2,651	3,410	759	28.6	40.5	68.7
Construction	1.7	6,732	7,745	1,014	15.1	45.6	73.4
State and local government education	1.5	9,876	11,606	1,730	17.5	53.1	81.4
Civic, social, business, and similar organizations	1.5	917	1,088	172	18.7	53.8	82.2
Legal services	1.3	1,112	1,330	218	19.6	54.7	83.2
Transit and ground passenger transportation	1.2	372	488	116	31.3	55.0	83.7

[1] Fast employment growth is defined as a projected percentage in employment greater than 14.8 percent, the overall average for the 2002–12 projection period.
[2] n.e.c. = not elsewhere classified.

supply: immigration and the outsourcing of the production of goods and services to establishments based in foreign countries.

The potential role of immigration in increasing the available supply of labor. Rising trends in immigration levels to the United States, especially over the last decade, are one source of labor for occupations in which it may be increasingly difficult to find qualified workers. The following tabulation shows the levels and rates of immigration to the Nation, by decade, since 1901, as compiled by the U.S. Census Bureau:

Period	*Number of immigrants entering United States*	*Rate per thousand U.S. population*
1901–10	8,795,000	10.4
1911–20	5,736,000	5.7
1921–30	4,107,000	3.5
1931–40	528,000	.4
1941–50	1,035,000	.7
1951–60	2,515,000	1.5
1961–70	3,322,000	1.7
1971–80	4,493,000	2.1
1981–90	7,338,000	3.1
1991–98	7,605,000	3.6

The population projections from the Census Bureau that are used as the basis for BLS labor force projections include an estimate of the level of legal immigration to the United States over the next decade. In its most recent population projections, the Census Bureau estimates annual immigration levels of 1.1 million from 2000 to 2005, a decline to 900,000 per year from 2006 to 2010, and an increase to 1.3 million annually from 2011 to 2012.

Much uncertainty accompanies any discussion of the role of immigration in addressing pressures on labor markets to find qualified workers. Changes in immigration policy, the occupational and educational profiles of new immigrants, and the regional impacts of where immigrants choose to live are but a few of the somewhat speculative areas that make assessing this potential problematic. To the extent that past serves as prologue, however, the preceding tabulation does suggest that there will be substantial levels of immigration into the United States over the next decade.

What kinds of occupations do recent immigrants enter? Using data from the CPS for the period 2000–02, table 8 lists occupational employment distributions for immigrant groups based on the number of years since their immigration into the Nation, compared

Table 5. Ages of baby boomers and the populations of various age groups in the United States, 1950–2010

Year	Ages of baby boomers	Age group								
		0–14	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and older
1950	0–4	**40,482,524**	22,098,426	23,759,267	21,450,359	17,342,653	13,294,595	8,414,885	3,277,751	576,901
1960	0–14	**55,786,173**	24,020,004	22,818,310	24,081,352	20,485,439	15,572,317	10,996,842	4,633,486	929,252
1970	6–24	**57,900,052**	**35,441,369**	24,907,429	23,087,805	23,219,957	18,589,812	12,435,456	6,119,145	1,501,901
1980	16–34	51,290,339	**42,486,828**	**37,081,839**	25,634,710	22,799,787	21,702,875	15,580,605	7,728,755	2,240,067
1990	26–44	53,567,871	36,774,327	**43,175,932**	**37,578,903**	25,223,086	21,147,923	18,106,558	10,055,108	2,240,067
2000	36–54	60,253,375	39,183,891	39,891,724	**45,148,527**	**37,677,952**	24,274,684	18,390,986	12,361,180	4,239,587
2010	46–64	59,444,392	42,818,900	38,851,057	39,442,358	**44,160,748**	**35,429,393**	21,154,241	12,775,045	5,785,840

NOTE: Boldface denotes when the baby boomers reached or will reach the indicated age group. SOURCE: U.S. Census Bureau.

with the distribution for all U.S. employees. Individuals who have immigrated within the last 5 years have a greater likelihood than the overall population of U.S. workers of being in food preparation and serving related occupations, production occupations, and construction trades. They also have a greater likelihood of being in computer and mathematical occupations. As the number of years since immigration increases, the occupational distribution of immigrants begins to broadly resemble the overall occupational distribution, although immigrants still have a greater likelihood of being in production and food-related occupations, compared with all U.S. employees.

The potential role of hiring offshore employees.[10] One of the areas of increasing interest in U.S. labor markets is the use of offshore employees as part of the production process for U.S. firms. Outsourcing work to foreign countries—that is, purchasing services formerly produced in the United States from establishments in other countries—has been widely cited in recent months as having a growing impact on U.S. employment. The exact magnitude of outsourcing is not known, owing to the lack of specific, systematic data on the use of foreign employment to produce outsourced goods and services. Outsourcing is a trend that has been going on for quite some time. The current interest in it appears to reflect a transition from the importation of goods to the

Table 6. Ages of baby boomers and labor force participation rates of various age groups in the United States, 1950–2000

Year	Ages of baby boomers	Age group					
		16–24	25–34	35–44	45–54	55–64	65 and older
Total							
1950	0–4	0.60	0.64	0.68	0.66	0.57	0.27
1960	0–14	.56	.65	.69	.72	.61	.21
1970	6–24	**.60**	.70	.73	.74	.62	.17
1980	16–34	**.68**	**.80**	.80	.75	.56	.13
1990	36–44	.67	**.84**	**.85**	.81	.56	.12
2000	36–54	.66	.85	**.85**	**.83**	.59	.13
Men							
1950	0–4	.77	.96	.98	.96	.87	.46
1960	0–14	.72	.98	.98	.96	.87	.33
1970	6–24	**.69**	.96	.97	.94	.83	.27
1980	16–34	**.74**	**.95**	.96	.91	.72	.19
1990	36–44	.72	**.94**	**.94**	.91	.68	.16
2000	36–54	.69	.93	**.93**	**.89**	.67	.18
Women							
1950	0–4	.44	.34	.39	.38	.27	.10
1960	0–14	.43	.36	.43	.50	.37	.11
1970	6–24	**.51**	.45	.51	.54	.43	.10
1980	16–34	**.62**	**.66**	.66	.60	.41	.08
1990	36–44	.63	**.73**	**.76**	.71	.45	.09
2000	36–54	.63	.76	**.77**	**.77**	.52	.09

NOTE: Boldface denotes when the baby boomers reached or will reach the indicated age group.

Table 7. Actual and projected civilian labor force levels and growth rates per year, 1950–2050

Year	Level	Change	
		Number	Annual growth rate
Actual			
1950	62,208	…	...
1960	69,628	7,420	1.1
1970	82,771	13,143	1.7
1980	106,940	24,169	2.6
1990	125,840	18,900	1.6
2000	140,863	15,023	1.1
Projected			
2010	157,721	16,858	1.1
2020	164,681	6,960	.4
2030	170,090	5,409	.3
2040	180,517	10,427	.6
2050	191,825	11,308	.6
Summary			
1950	62,208	…	...
2000	140,863	78,655	1.6
2050	191,825	50,962	.6

direct purchase of foreign-produced services, a phenomenon that has expanded with the development of the Internet and its dissolution of temporal and spatial barriers to the free flow of services.

What is the potential impact of this transition? Domestic industries have already outsourced such functions as accounting, marketing, and advertising to other domestic industries that both specialize in these services and produce them more cheaply. With outsourcing, a purchase of a service from another industry replaces all the material and labor inputs that the purchasing industry previously used internally in order to create that service. The total output of the industry now buying the service from an outside source is somewhat lower, reflecting the inherent cost-efficiency of the industry producing the service. Some of the purchasing industry's employment is shifted to the producing industry, while some is freed up for other jobs in the economy. The productivity of the remaining employees in the purchasing industry now appears to be somewhat higher. If the outsourcing is provided by a foreign establishment, the output of the purchasing industry is again little affected. The jobs outsourced, however, are no longer counted in U.S. employment totals, and because imports are removed in total from the GDP accounts, GDP is lower.

Foreign outsourcing influences the projections through its impact on the industry distribution of GDP. As industries import more foreign services, the trend toward higher importation will be reflected in the relative declines in the output and employment of the affected industries over time. Because the Bureau bases its industry employment projections largely on trend analyses of detailed establishment-based time series, the effects of the recent past have been implicitly addressed to the extent that the data used have already begun to reflect the situation. More explicitly, expert review of the model-based projections by BLS occupational employment analysts brings to bear subjective, but current, knowledge of industry employment practices. Studies of past outsourcing trends and careful detailing of expectations for continued outsourcing in the future will ensure that foreign outsourcing is carefully accounted for in future projections prepared by the Bureau.

Labor shortages by occupation. The fact that BLS projections are based on the assumption of a labor market in balance does not mean that employers will not experience significant difficulties in finding and hiring workers in labor markets for individual occupations. One bellwether indicator of the relative difficulties that arise in hiring sufficient supplies of workers in any occupation is whether any trends show a consistent pattern of rising wages and rising employment, suggesting that the demand for workers in the occupation in question is increasing faster than the supply. Such a situation may represent a shortage, which is theoretically consistent with the persistent existence of vacancies despite rising wage offers to fill the vacant jobs.[11] Alternatively, the situation may be consistent simply with a market that is maintaining equilibrium by paying higher wages. In either case, depending on the degree of mismatch between demand and supply, especially by geographic area, there may be significant difficulties in finding workers in particular occupations.

Consider, for example, the employment and wage trends for registered nurses, an occupation often cited as having a shortage of workers. Between 1994 and 2000, a period of significant economic expansion, the net employment of usual full-time registered nurses increased by 8.9 percent, and their real wages declined by 0.2 percent, compared with an increase in real weekly wages of 6.3 percent for U.S. workers as a whole. In contrast, since 2000, despite the recession, there has been strong growth in both employment (12.5 percent) and real wages (5.9 percent) of registered nurses, suggestive of increased recent difficulties in finding adequate supplies of workers in that occupational group.

What other evidence can be gathered to develop a profile of how relatively easy or difficult it has been in recent years to find and hire registered nurses or, for that matter, workers in any other occupation—and how might that evidence be used to track similar difficulties in the future? One potentially important indicator is to calculate the percentage of an occupation that is in the 55-years-and-older age range—and, therefore, is theoretically ready to retire over the next decade. On the basis of 2002 annual averages, 13.4 percent of registered nurses in this country are aged 55 and older. The national average across all occupations is 13.9 percent.

Table 9 shows the occupations that have at least 20 percent of their employees aged 55 and older and that are projected to have net employment increases larger than the overall national average of 14.8 percent. For these occupations, the table suggests that hiring, if only for replacement purposes, is going to be fairly brisk—and the need to expand total employment levels will only serve to accentuate the hiring challenge.

Table 8. Percentage distribution of occupations by immigration status, 2000–02

Occupation	All employees	Did not immigrate	Immigrated 1–5 years ago	Immigrated 5–10 years ago	Immigrated more than 10 years ago
Architectural and engineering occupations	2.1	2.1	2.2	2.0	2.5
Arts, design, entertainment, sports, and media occupations	2.0	2.0	1.6	1.4	1.6
Business and financial occupations	3.9	4.1	1.7	2.2	3.3
Community and social service occupations	1.5	1.6	.5	.7	1.0
Computer and mathematical occupations	2.4	2.2	5.4	3.6	2.6
Construction trades	5.6	5.2	10.7	9.0	6.3
Education, training, and library occupations	5.4	5.8	3.2	2.8	3.5
Extraction workers	.1	.1	.0	.1	.0
Farming, fishing, and forestry occupations	.8	.6	3.1	2.1	1.8
Food preparation and serving related occupations	8.6	7.5	20.4	17.4	12.4
Healthcare practicitioners and technical occupations	4.5	4.5	2.3	3.8	4.8
Healthcare support occupations	1.9	1.8	1.6	2.5	2.2
Installation, maintenance, and repair workers	3.5	3.5	2.2	2.8	3.2
Legal occupations	1.1	1.2	.3	.3	.7
Life, physical, and social science occupations	.9	.9	1.5	1.3	.9
Management occupations	10.6	11.2	4.7	4.9	8.6
Office and administrative support occupations	14.7	15.5	7.1	8.6	11.3
Personal care and service occupations	3.1	3.1	2.9	3.8	3.6
Production occupations	7.8	7.0	12.9	13.4	11.8
Protective service occupations	1.9	2.1	.8	.9	1.2
Sales and related occupations	11.6	11.9	7.7	9.3	10.3
Transportation and material moving occupations	6.2	6.1	7.2	7.3	6.4

SOURCE: Current Population Survey.

Are there other pieces of evidence? The general problem with addressing the question whether the U.S. labor market will have a shortage of workers in specific occupations over the next 10 years is the difficulty of projecting, for each detailed occupation, the dynamic labor market responses to shortage conditions. Employers adapt to difficult hiring markets in a variety of ways: modifying the duties of a job, changing the capital-labor ratio, imposing mandatory shift coverage, and hiring contract employees, immigrants, or offshore labor in foreign countries, among other approaches. Perhaps the best that can be done is to examine as many of these indicators as possible and develop a profile of how the labor market is responding to the changes in each occupation's relative demand for, and supply of, workers.

High-paying, fast-growing occupations

While it is certainly a challenge to project future labor market shortages, another question of abiding interest is what guidance the BLS projections provide with regard to what many refer to as "hot jobs" in the U.S. economy? In his article on occupational employment, Hecker discusses the *fastest-growing* and *largest-growing* occupations.[12] Table 10 on pages 17–21 of the current article lists occupations that are expected to grow faster than the overall average and that are known to be relatively high paying in the current economy. Table 10 also shows both the cumulative percentage of 2002 employment and the cumulative percentage of projected employment growth between 2002 and 2012 that is accounted for by these fast-growing, high-paying occupations. The table uses the 2002 Occupational Employment Survey to identify "high-paying" occupations, defining them as any occupation whose mean annual earnings are in the top half of the overall distribution of earnings. Concomitantly, "fast-growing" occupations are defined as occupations that are projected to grow faster than 14.8 percent (again, the national average for all occupations).

A number of interesting aspects of the occupations listed in table 10 readily present themselves. For one, the list is not the exclusive domain of the fast-growing health- or computer-related occupations—although there are obviously a great many such occupations on the list. For example, a number of management-, education-, sales-, art-, architecture-, design-, and accounting-related occupations are listed. Nor does the list exclude occupations in which a significant percentage of employees are not college graduates. For example, electricians; plumbers, pipefitters, and steamfitters; structural iron and steel workers; reinforcing iron and rebar workers; tapers; tile and marble setters; sheet metal workers; and heating, air-conditioning, and refrigerator mechanics and installers appear on the list. Overall, the occupations listed in the table accounted for 31.2 percent of employment in 2002 and are projected to account for 51 percent of the expected net gain in employment over the 2002–12 period.

The impact of education and training. As the discussion of table 10 indicated, there are a number of relatively high-paying, high-growth occupations in which the most significant source of education or training usually is not associated with the job-

holder's having obtained a 4-year college degree. An upcoming BLS publication lists, for each occupation, the most significant source of education and training generally required by employers.[13] The same publication also gives the percentages of employees in each occupation that have a high-school degree or less, some college, or a college degree or higher. These descriptions are intended to provide general guidance, and, as a reading of the more detailed descriptions of occupations in the BLS *2004–2005 Occupational Outlook Handbook* indicates, there is often a variety of educational or training pathways that enable a worker to become skilled in an occupation.

In the last two decades, several important trends in educational attainment have arisen that can have a significant impact on occupational career choices. One of these trends is that, since the late 1970s, average premiums paid by the labor markets to those with higher levels of education have increased. Certainly, there are a number of important factors besides earnings that help to determine the career choices made by individuals. However, it is the growing distance, on average, between those with more education, compared with those with less, that speaks to a general preference on the part of employers to hire those with skills associated with higher levels of education. As shown in table 11, in 2000, on average, full-time wage and salary workers with a bachelor's degree or higher had earnings that were nearly twice those of high school graduates. This finding holds for both men and women.

Between 1994 and 2000, the supply of male college graduates increased by more than 20 percent and their real earnings rose by nearly 5 percent. (See table 11.) This willingness of the market to absorb and reward such a substantial increase in the labor

Text continues on p. 22.

Table 9. Percentage of employees and projected net employment change in selected occupations, by age group[1]

Occupation	Percent distribution of employees by age group			Employment (thousands)		Change		Total job openings due to growth and net replacement (thousands)
	16–24	25–54	55 and older	2002	2012	Number	Percent	
All occupations	14.7	71.4	13.9	144,015	165,319	21,305	14.8	56,305
Bus drivers	9.8	45.4	44.8	654	781	106	16.2	249
Ushers, lobby attendants, and ticket takers	7.5	60.1	32.4	105	121	16	15.5	76
Loan counselors and officers	4.8	62.8	32.3	255	302	48	18.7	89
Sales representatives, services, all other	4.7	64.0	31.2	577	717	140	24.3	250
Social workers	3.5	66.4	30.1	477	604	127	26.7	209
Environmental scientists and geoscientists	4.1	67.8	28.1	101	121	20	20.1	38
Network systems and data communications analysts	8.0	64.7	27.3	186	292	106	57.0	128
Aircraft pilots and flight engineers	2.5	70.8	26.7	100	118	18	17.8	45
Transportation, storage, and distribution managers	5.5	68.0	26.5	111	133	22	19.7	44
Clergy	11.2	62.5	26.3	400	463	62	15.5	144
Television, video, and motion picture camera operators and editors	.3	74.3	25.4	48	56	9	18.7	19
Market and survey researchers	8.4	66.2	25.4	155	193	38	24.7	78
Ambulance drivers and attendants, except emergency medical technicians	5.8	68.9	25.3	17	22	5	26.7	6
Sales engineers	11.7	63.4	24.9	82	98	16	19.9	41
Chief executives	.6	74.9	24.4	553	645	93	16.7	197
Special education teachers	5.4	70.9	23.7	433	563	130	30.0	233
Chiropractors	2.7	73.8	23.4	49	60	11	23.3	21
Human resources, training, and labor relations specialists	3.7	73.3	23.0	474	606	131	27.7	204
Transit and railroad police	18.0	59.6	22.4	6	7	1	15.9	2
Public relations specialists	5.5	72.8	21.7	158	210	52	32.9	75
Motor vehicle operators, all other	7.9	71.0	21.1	111	139	28	25.2	44
Personal and home care aides	34.8	44.1	21.0	608	854	246	40.5	343
Public relations managers	2.8	76.2	21.0	69	85	16	23.4	28
Food preparation and serving related workers, all other	13.3	66.2	20.5	117	134	18	15.2	54
Human resources assistants, except payroll and timekeeping	9.9	69.8	20.3	174	207	33	19.3	71

Table 10. Occupations that were relatively high paying in 2002 and are projected to grow faster than average over the 2002–12 projection period[1]

Industry	Annual average earnings[2]	Employment		Change		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
		2002	2012	Number	Percent		
Physicians and surgeons	$151,153	583,014	696,530	113,516	19.5	0.4	0.5
Chief executives	134,960	552,761	645,341	92,579	16.7	.8	1.0
Airline pilots, copilots, and flight engineers	122,230	79,158	93,830	14,672	18.5	.8	1.0
Podiatrists	107,430	13,263	15,257	1,994	15.0	.9	1.0
Lawyers	105,890	695,248	813,119	117,872	17.0	1.3	1.6
Optometrists	95,440	32,051	37,529	5,478	17.1	1.4	1.6
Athletes and sports competitors	92,540	15,116	18,017	2,901	19.2	1.4	1.6
Computer and information systems managers	90,440	284,415	387,023	102,608	36.1	1.6	2.1
Marketing managers	87,170	202,628	245,880	43,252	21.3	1.7	2.3
All other health diagnosing and treating practitioners	86,280	107,336	133,630	26,293	24.5	1.8	2.4
Sales managers	86,110	343,046	447,607	104,562	30.5	2.0	2.9
General and operations managers	83,590	2,048,913	2,424,916	376,003	18.4	3.4	4.7
Chiropractors	83,440	48,936	60,332	11,396	23.3	3.5	4.8
Financial managers	83,080	599,055	708,511	109,456	18.3	3.9	5.3
Actuaries	80,780	15,310	17,587	2,277	14.9	3.9	5.3
Computer and information scientists, research	80,510	23,244	30,205	6,961	29.9	3.9	5.3
Personal financial advisors	78,460	126,208	169,856	43,648	34.6	4.0	5.5
Computer software engineers, systems software	75,840	281,103	408,906	127,803	45.5	4.2	6.1
Pharmacists	75,140	230,200	299,387	69,187	30.1	4.4	6.4
Education administrators, elementary and secondary school	74,050	216,713	261,540	44,826	20.7	4.5	6.7
Computer software engineers, applications	73,800	394,076	573,437	179,361	45.5	4.8	7.5
Veterinarians	73,720	57,537	71,984	14,447	25.1	4.8	7.6
Education administrators, postsecondary	71,630	125,037	157,390	32,353	25.9	4.9	7.7
Human resources managers	70,960	202,245	241,568	39,323	19.4	5.1	7.9
Management analysts	70,160	577,421	753,116	175,695	30.4	5.5	8.7
Public relations managers	69,870	69,185	85,408	16,223	23.4	5.5	8.8
Industrial-organizational psychologists	69,670	1,865	2,164	299	16.0	5.5	8.8
Medical and health services managers	69,370	243,574	314,910	71,336	29.3	5.7	9.1
Advertising and promotions managers	69,200	85,245	106,536	21,291	25.0	5.7	9.2
Sales engineers	69,200	81,682	97,938	16,256	19.9	5.8	9.3
Agents and business managers of artists, performers, and athletes	68,970	15,171	19,392	4,221	27.8	5.8	9.3
Financial analysts	67,180	172,122	204,266	32,144	18.7	5.9	9.5
Medical scientists, except epidemiologists	66,200	57,807	73,364	15,557	26.9	6.0	9.6
Biochemists and biophysicists	65,620	16,733	20,560	3,827	22.9	6.0	9.6
Transportation, storage, and distribution managers	65,070	110,929	132,810	21,880	19.7	6.0	9.7
Computer systems analysts	64,890	468,345	652,691	184,346	39.4	6.4	10.5
Biomedical engineers	64,420	7,597	9,583	1,986	26.1	6.4	10.6
Physician assistants	63,490	63,033	93,827	30,794	48.9	6.4	10.7
Sales representatives, wholesale and manufacturing, technical and scientific products	63,460	398,259	475,252	76,993	19.3	6.7	11.1
Environmental engineers	63,440	47,114	65,129	18,016	38.2	6.7	11.1
Architects, except landscape and naval	62,530	113,243	132,782	19,538	17.3	6.8	11.2
First-line supervisors/managers of police and detectives	61,650	113,828	131,191	17,363	15.3	6.9	11.3
Producers and directors	61,500	76,125	90,019	13,894	18.3	6.9	11.4
Network systems and data communications analysts	61,390	185,971	292,044	106,073	57.0	7.1	11.9
Atmospheric and space scientists	61,000	7,700	8,944	1,244	16.2	7.1	11.9
Market research analysts	60,260	134,474	165,927	31,453	23.4	7.2	12.0
Physical therapists	60,180	136,854	185,185	48,331	35.3	7.3	12.3
Radiation therapists	60,110	13,505	17,774	4,269	31.6	7.3	12.3
Administrative services managers	59,350	320,509	383,973	63,464	19.8	7.5	12.6
Database administrators	59,080	109,954	158,567	48,613	44.2	7.6	12.8
Hydrologists	58,820	7,957	9,628	1,671	21.0	7.6	12.8
Epidemiologists	58,190	3,936	5,215	1,279	32.5	7.6	12.8
Commercial pilots	58,000	21,073	24,218	3,145	14.9	7.6	12.8
All other computer specialists	57,960	191,639	261,647	70,009	36.5	7.7	13.2
Dental hygienists	57,790	147,961	211,701	63,740	43.1	7.8	13.5

Table 10. Continued—Occupations that were relatively high paying in 2002 and are projected to grow faster than average over the 2002–12 projection period[1]

Industry	Annual average earnings[2]	Employment		Change		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
		2002	2012	Number	Percent		
Network and computer systems administrators	$57,620	251,375	345,273	93,899	37.4	8.0	13.9
First-line supervisors/managers of fire fighting and prevention workers	56,750	62,602	74,299	11,698	18.7	8.0	14.0
Clinical, counseling, and school psychologists	56,540	137,248	170,782	33,534	24.4	8.1	14.1
Microbiologists	55,700	16,454	19,737	3,283	20.0	8.2	14.1
All other life scientists	55,270	25,965	30,710	4,745	18.3	8.2	14.2
Postsecondary teachers	54,960	1,581,247	2,183,986	602,739	38.1	9.3	17.0
All other business operations specialists	54,340	1,055,663	1,346,043	290,380	27.5	10.0	18.3
Geographers	54,290	817	977	160	19.5	10.0	18.3
Elevator installers and repairers	53,540	21,012	24,603	3,591	17.1	10.0	18.4
Orthotists and prosthetists	53,410	4,631	5,505	874	18.9	10.0	18.4
Technical writers	53,310	49,584	63,030	13,446	27.1	10.1	18.4
Accountants and auditors	53,230	1,055,217	1,260,676	205,459	19.5	10.8	19.4
Occupational therapists	53,040	81,624	110,366	28,742	35.2	10.8	19.5
Detectives and criminal investigators	52,960	93,667	114,674	21,006	22.4	10.9	19.6
Nuclear medicine technologists	52,260	17,142	21,193	4,051	23.6	10.9	19.6
Loan officers	52,160	223,469	265,540	42,071	18.8	11.1	19.8
Landscape architects	52,050	23,135	28,270	5,136	22.2	11.1	19.9
Audiologists	51,840	10,929	14,098	3,170	29.0	11.1	19.9
All other financial specialists	51,550	161,978	190,476	28,498	17.6	11.2	20.0
Speech-language pathologists	51,490	94,319	119,964	25,645	27.2	11.3	20.1
Cost estimators	51,310	188,044	223,007	34,963	18.6	11.4	20.3
Sales representatives, wholesale and manufacturing, except technical and scientific products	51,130	1,458,800	1,738,145	279,345	19.1	12.4	21.6
Environmental scientists and specialists, including health	50,970	65,069	80,476	15,407	23.7	12.5	21.7
Multi-media artists and animators	50,860	74,826	86,648	11,821	15.8	12.5	21.7
Flight attendants	50,460	104,008	120,596	16,588	15.9	12.6	21.8
Writers and authors	50,300	138,980	161,316	22,336	16.1	12.7	21.9
First-line supervisors/managers of mechanics, installers, and repairers	50,030	443,985	512,275	68,290	15.4	13.0	22.2
Registered nurses	49,840	2,284,459	2,907,614	623,156	27.3	14.6	25.2
Diagnostic medical sonographers	49,710	36,508	45,281	8,774	24.0	14.6	25.2
Credit analysts	49,530	65,934	78,282	12,349	18.7	14.7	25.3
Instructional coordinators	49,510	98,454	123,472	25,018	25.4	14.7	25.4
Musicians and singers	48,240	161,154	188,649	27,495	17.1	14.8	25.5
Compensation, benefits, and job analysis specialists	47,920	90,669	116,074	25,405	28.0	14.9	25.6
Emergency management specialists	47,320	10,948	14,040	3,092	28.2	14.9	25.6
First-line supervisors/managers of correctional officers	47,000	33,417	39,754	6,336	19.0	14.9	25.7
Social and community service managers	46,900	128,769	164,424	35,654	27.7	15.0	25.8
Public relations specialists	46,590	158,079	210,133	52,054	32.9	15.1	26.1
Educational, vocational, and school counselors	46,160	228,159	262,295	34,136	15.0	15.3	26.2
Appraisers and assessors of real estate	46,120	88,245	103,796	15,551	17.6	15.3	26.3
Employment, recruitment, and placement specialists	46,050	174,819	222,547	47,728	27.3	15.5	26.5
Secondary school teachers, except special and vocational education	46,010	987,503	1,167,231	179,728	18.2	16.2	27.4
Training and development specialists	46,000	208,952	267,248	58,296	27.9	16.3	27.7
Special education teachers	45,776	432,925	562,698	129,772	30.0	16.6	28.3
Sound engineering technicians	45,750	12,830	16,097	3,266	25.5	16.6	28.3
Transit and railroad police	45,750	6,153	7,132	980	15.9	16.6	28.3
Cartographers and photogrammetrists	45,180	8,554	9,846	1,292	15.1	16.6	28.3
Film and video editors	44,540	19,390	24,507	5,117	26.4	16.6	28.3
Elementary school teachers, except special education	44,080	1,467,155	1,690,357	223,203	15.2	17.7	29.4
Electricians	43,910	659,441	813,908	154,467	23.4	18.1	30.1
Interior designers	43,770	60,050	73,073	13,023	21.7	18.2	30.2
Fine artists, including painters, sculptors, and illustrators	43,750	23,192	27,028	3,836	16.5	18.2	30.2

Table 10. Continued—Occupations that were relatively high paying in 2002 and are projected to grow faster than average over the 2002–12 projection period[1]

Industry	Annual average earnings[2]	Employment		Change		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
		2002	2012	Number	Percent		
Medical and clinical laboratory technologists	$43,670	149,952	178,879	28,926	19.3	18.3	30.3
Police and sheriff's patrol officers	43,390	618,786	771,581	152,795	24.7	18.7	31.0
Forensic science technicians	43,280	8,390	9,977	1,587	18.9	18.7	31.0
All other media and communication workers	43,120	57,717	67,621	9,903	17.2	18.7	31.1
Actors	42,820	63,033	74,202	11,168	17.7	18.8	31.1
Plumbers, pipefitters, and steamfitters	42,630	492,126	584,068	91,942	18.7	19.1	31.6
Structural iron and steel workers	42,360	78,060	90,443	12,383	15.9	19.2	31.6
All other sales and related workers	42,350	576,778	717,076	140,298	24.3	19.6	32.3
Computer support specialists	42,320	506,877	660,309	153,432	30.3	19.9	33.0
Kindergarten teachers, except special education	42,040	168,461	214,322	45,861	27.2	20.1	33.2
Dietitians and nutritionists	41,920	48,871	57,550	8,679	17.8	20.1	33.3
Adult literacy, remedial education, and GED teachers and instructors	41,470	80,076	96,375	16,299	20.4	20.1	33.3
Graphic designers	41,380	211,871	258,250	46,379	21.9	20.3	33.6
Aircraft cargo handling supervisors	41,220	8,916	10,306	1,390	15.6	20.3	33.6
Meeting and convention planners	41,020	36,867	44,713	7,846	21.3	20.3	33.6
Airfield operations specialists	40,850	6,081	7,127	1,046	17.2	20.3	33.6
Respiratory therapists	40,700	85,770	115,599	29,829	34.8	20.4	33.7
Reinforcing iron and rebar workers	40,640	28,670	33,445	4,775	16.7	20.4	33.8
Paralegals and legal assistants	40,590	199,626	256,907	57,281	28.7	20.5	34.0
Tapers	40,550	40,763	49,245	8,482	20.8	20.6	34.1
All other entertainers and performers, sports and related workers	40,380	56,054	65,220	9,166	16.4	20.6	34.1
Gaming supervisors	40,180	38,962	45,066	6,103	15.7	20.6	34.1
Radiologic technologists and technicians	40,150	174,112	214,071	39,958	22.9	20.8	34.3
Archivists, curators, and museum technicians	39,750	22,258	26,040	3,782	17.0	20.8	34.3
Telecommunications line installers and repairers	39,560	167,389	198,845	31,456	18.8	20.9	34.5
All other media and communication equipment workers	39,530	24,342	29,243	4,900	20.1	20.9	34.5
Environmental engineering technicians	39,380	19,085	24,496	5,411	28.4	20.9	34.5
Education administrators, preschool and child care center/program	39,190	57,991	76,544	18,553	32.0	21.0	34.6
Health educators	39,190	44,536	54,279	9,743	21.9	21.0	34.7
Medical and public health social workers	38,920	107,194	137,903	30,709	28.6	21.1	34.8
Marriage and family therapists	38,370	23,495	28,761	5,266	22.4	21.1	34.8
First-line supervisors/managers of protective service workers, except police, fire, and corrections	38,060	56,314	69,754	13,440	23.9	21.1	34.9
Tile and marble setters	37,740	33,171	41,960	8,790	26.5	21.1	34.9
Cardiovascular technologists and technicians	37,680	43,390	57,943	14,554	33.5	21.2	35.0
Sheet metal workers	37,620	205,016	245,604	40,588	19.8	21.3	35.2
All other vehicle and mobile equipment mechanics, installers, and repairers	37,580	35,818	41,327	5,509	15.4	21.3	35.2
Fire fighters	37,530	281,948	340,402	58,454	20.7	21.5	35.5
Environmental science and protection technicians, including health	37,370	27,591	37,738	10,147	36.8	21.6	35.6
Set and exhibit designers	37,250	12,119	14,652	2,534	20.9	21.6	35.6
Occupational therapist assistants	36,950	18,484	25,725	7,241	39.2	21.6	35.6
All other electrical and electronic equipment mechanics, installers, and repairers	36,710	21,928	26,229	4,301	19.6	21.6	35.6
Legal secretaries	36,580	263,712	313,403	49,691	18.8	21.8	35.9
Audio and video equipment technicians	36,550	41,759	52,927	11,169	26.7	21.8	35.9
All other life, physical, and social science technicians	36,520	137,443	161,500	24,057	17.5	21.9	36.0
Loan counselors	36,450	31,106	36,644	5,539	17.8	21.9	36.0
Heating, air conditioning, and refrigeration mechanics and installers	36,430	248,669	327,731	79,062	31.8	22.1	36.4
Physical therapist assistants	36,360	50,188	72,580	22,392	44.6	22.1	36.5
Drywall and ceiling tile installers	36,350	135,361	164,373	29,012	21.4	22.2	36.7
First-line supervisors/managers of landscaping, lawn service, and groundskeeping workers	36,220	149,727	182,142	32,415	21.6	22.3	36.8

Table 10. Continued—Occupations that were relatively high paying in 2002 and are projected to grow faster than average over the 2002–12 projection period[1]

Industry	Annual average earnings[2]	Employment		Change		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
		2002	2012	Number	Percent		
Clergy	$36,080	400,485	462,599	62,114	15.5	22.6	37.1
Athletic trainers	36,070	14,283	18,548	4,265	29.9	22.6	37.1
Painters, transportation equipment	35,700	49,999	58,751	8,752	17.5	22.7	37.2
Child, family, and school social workers	35,640	274,455	338,049	63,594	23.2	22.8	37.5
Hazardous materials removal workers	35,610	37,559	53,760	16,201	43.1	22.9	37.5
All other health practitioners and technical workers	35,530	189,504	241,031	51,528	27.2	23.0	37.8
Audio-visual collections specialists	35,370	9,771	11,361	1,590	16.3	23.0	37.8
All other teachers, primary, secondary, and adult	35,210	679,385	908,116	228,731	33.7	23.5	38.9
Respiratory therapy technicians	34,930	26,421	35,469	9,048	34.2	23.5	38.9
Carpet installers	34,920	82,218	96,013	13,795	16.8	23.6	39.0
Interpreters and translators	34,900	24,111	29,427	5,317	22.1	23.6	39.0
Mental health and substance abuse social workers	34,860	94,946	127,709	32,763	34.5	23.6	39.1
Computer, automated teller, and office machine repairers	34,810	156,286	179,815	23,529	15.1	23.7	39.3
Glaziers	34,660	48,519	56,859	8,340	17.2	23.8	39.3
Correctional officers and jailers	34,650	427,147	530,522	103,375	24.2	24.1	39.8
Biological technicians	34,630	47,903	57,181	9,279	19.4	24.1	39.8
Water and liquid waste treatment plant and system operators	34,620	99,300	115,180	15,881	16.0	24.2	39.9
Security and fire alarm systems installers	34,390	46,303	60,277	13,974	30.2	24.2	40.0
Truck drivers, heavy and tractor-trailer	34,350	1,767,093	2,103,667	336,574	19.0	25.4	41.5
Private detectives and investigators	34,250	48,009	60,160	12,151	25.3	25.5	41.6
Coaches and scouts	34,170	129,715	153,492	23,777	18.3	25.6	41.7
Cement masons and concrete finishers	33,800	181,692	229,047	47,355	26.1	25.7	41.9
Choreographers	33,790	17,313	20,057	2,744	15.8	25.7	41.9
Desktop publishers	33,730	34,994	45,211	10,217	29.2	25.7	42.0
Massage therapists	33,720	92,086	116,998	24,912	27.1	25.8	42.1
All other counselors, social, and religious workers	33,710	247,823	317,863	70,040	28.3	26.0	42.4
Cargo and freight agents	33,350	59,128	68,286	9,157	15.5	26.0	42.5
Roofers	33,020	166,235	197,094	30,859	18.6	26.1	42.6
Self-enrichment education teachers	32,910	200,365	280,783	80,418	40.1	26.3	43.0
Mental health counselors	32,800	84,816	107,419	22,604	26.7	26.3	43.1
Lay-out workers, metal and plastic	32,600	12,802	14,793	1,991	15.5	26.3	43.1
Insulation workers	32,500	53,466	61,938	8,472	15.8	26.4	43.2
All other library, museum, training, and other education workers	32,490	92,674	115,506	22,832	24.6	26.4	43.3
Directors, religious activities and education	32,330	105,311	130,657	25,346	24.1	26.5	43.4
Licensed practical and licensed vocational nurses	32,300	701,879	843,658	141,779	20.2	27.0	44.1
Makeup artists, theatrical and performance	32,120	1,627	1,923	296	18.2	27.0	44.1
Mechanical door repairers	32,080	10,766	13,117	2,351	21.8	27.0	44.1
Chefs and head cooks	32,000	131,857	152,753	20,896	15.8	27.1	44.2
Surgical technologists	31,960	72,248	92,423	20,175	27.9	27.1	44.3
Substance abuse and behavioral disorder counselors	31,860	67,148	82,760	15,612	23.3	27.2	44.3
Surveying and mapping technicians	31,760	60,139	74,059	13,920	23.1	27.2	44.4
Tax preparers	31,630	79,498	97,924	18,426	23.2	27.3	44.5
Human resources assistants, except payroll and timekeeping	31,530	173,844	207,311	33,467	19.3	27.4	44.6
All other related transportation workers	31,360	40,478	46,609	6,132	15.1	27.4	44.7
Medical appliance technicians	31,340	13,806	16,031	2,225	16.1	27.4	44.7
Maintenance and repair workers, general	31,010	1,265,585	1,472,372	206,787	16.3	28.3	45.7
Terrazzo workers and finishers	30,830	6,351	7,318	967	15.2	28.3	45.7
Welders, cutters, solderers, and brazers	30,820	390,524	456,731	66,206	17.0	28.6	46.0
Bus drivers, transit and intercity	30,810	201,921	232,523	30,602	15.2	28.7	46.1
First-line supervisors/managers of housekeeping and janitorial workers	30,430	229,910	267,243	37,333	16.2	28.9	46.3
Survey researchers	30,360	20,246	27,055	6,809	33.6	28.9	46.3
Medical and clinical laboratory technicians	30,330	147,462	176,127	28,665	19.4	29.0	46.5
Motorboat mechanics	30,310	21,660	25,626	3,966	18.3	29.0	46.5
Locksmiths and safe repairers	30,250	22,929	27,748	4,819	21.0	29.0	46.5
Fitness trainers and aerobics instructors	29,910	182,720	263,947	81,227	44.5	29.2	46.9

Table 10. Continued—Occupations that were relatively high paying in 2002 and are projected to grow faster than average over the 2002–12 projection period[1]

Industry	Annual average earnings[2]	Employment		Change		Cumulative percentage of total 2002 employment	Cumulative percentage of total projected employment change, 2002–12
		2002	2012	Number	Percent		
Septic tank servicers and sewer pipe cleaners	$29,750	17,923	21,724	3,801	21.2	29.2	46.9
Segmental pavers	29,630	2,170	2,527	357	16.5	29.2	46.9
Motorcycle mechanics	28,690	15,095	17,916	2,821	18.7	29.2	46.9
Rehabilitation counselors	28,590	122,239	163,536	41,298	33.8	29.3	47.1
Recreational vehicle service technicians	28,530	12,552	15,287	2,735	21.8	29.3	47.1
Bill and account collectors	28,330	412,966	513,945	100,979	24.5	29.6	47.6
Coin, vending, and amusement machine servicers and repairers	28,250	42,729	49,212	6,483	15.2	29.6	47.6
Customer service representatives	28,240	1,894,053	2,353,786	459,732	24.3	30.9	49.8
Dental assistants	27,910	266,025	378,992	112,967	42.5	31.1	50.3
All other air transportation workers	27,910	11,725	13,999	2,274	19.4	31.1	50.3
Opticians, dispensing	27,830	63,207	74,681	11,474	18.2	31.2	50.4
Medical transcriptionists	27,730	100,830	123,637	22,807	22.6	31.2	50.5

[1] *Relatively high paying* is defined as "having average annual earnings that are in the top two quartiles of the overall distribution of earnings in the 2002 Occupational Employment Survey." *Fast growing* is defined as "having a projected employment change equal to or exceeding 14.8 percent, the overall average of the projections."

Table 11. Employment and average real weekly earnings of usual full-time wage and salary workers, by gender and level of educational attainment, 1994–2000

Population	Employment (thousands)			Real weekly earnings in 2002 CPI-U dollars			Earnings as a percentage of average high school earnings in 2000
	1994	2000	Percent change	1994	2000	Percent change	
Total	87,382	99,917	14.3	$697	$724	3.9	128.8
Less than high school	9,373	10,674	13.9	415	409	–1.4	72.8
High school	29,992	32,213	7.4	556	562	1.1	100.0
Some college, no degree	17,377	19,403	11.7	633	644	1.7	114.6
Associate's degree, educational	4,027	4,588	13.9	673	673	.0	119.8
Associate's degree, vocational	3,315	4,189	26.4	705	711	.9	126.5
Bachelor's degree	15,872	19,534	23.1	938	996	6.2	177.2
Master's degree or higher	7,427	9,315	25.4	1,270	1,273	.2	226.5
Some college	24,719	28,181	14.0	649	659	1.5	117.3
Bachelor's degree or higher	23,299	28,849	23.8	1,044	1,085	3.9	193.1
Men	49,993	56,273	12.6	787	821	4.3	128.7
Less than high school	6,325	7,010	10.8	453	452	–.2	70.8
High school	17,052	18,267	7.1	630	638	1.3	100.0
Some college, no degree	9,534	10,539	10.5	724	738	1.9	115.7
Associate's degree, educational	2,077	2,432	17.1	758	777	2.5	121.8
Associate's degree, vocational	1,675	1,971	17.7	797	833	4.5	130.6
Bachelor's degree	8,960	10,757	20.1	1,079	1,146	6.2	179.6
Master's degree or higher	4,372	5,297	21.2	1,426	1,460	2.4	228.8
Some college	13,285	14,942	12.5	739	757	2.4	118.7
Bachelor's degree or higher	13,332	16,054	20.4	1,193	1,250	4.8	195.9
Women	37,387	43,644	16.7	578	599	3.6	129.4
Less than high school	3,048	3,664	20.2	336	328	–2.4	70.8
High school	12,940	13,946	7.8	458	463	1.1	100.0
Some college, no degree	7,843	8,865	13.0	523	532	1.7	114.9
Associate's degree, educational	1,950	2,156	10.6	583	554	–5.0	119.7
Associate's degree, vocational	1,641	2,219	35.2	611	603	–1.3	130.2
Bachelor's degree	6,912	8,777	27.0	755	811	7.4	175.2
Master's degree or higher	3,055	4,018	31.5	1,047	1,026	–2.0	221.6
Some college	11,434	13,239	15.8	546	548	.4	118.4
Bachelor's degree or higher	9,966	12,795	28.4	845	879	4.0	189.8

SOURCE: Current Population Survey, quarterly sample, annual averages.

supply of men who have graduated from college is an indicator of the continued relative increase in the demand for workers with more education. Earnings of men with some college (including those with associate's degrees) increased by 2.4 percent, and the employment of the group grew by 13 percent. Real earnings of female college graduates rose by 4 percent, and their employment increased by nearly 30 percent. Women with some college saw their real earnings remain steady, while their employment increased by 16 percent.

THIS ISSUE OF THE *MONTHLY LABOR REVIEW* PRESENTS PROJECTIONS of industry and occupational employment trends. These projections form the basis for providing career advice to individuals entering the job market, changing careers, or making further educational and training choices. Although the Bureau of Labor Statistics must judge its work against an uncertain future, a hallmark of the agency's projections is that the assumptions and model-based findings on which they are grounded are made explicit. Further, while much is known in terms of trends in economic series to date, past is not always prologue, and care must always be taken whenever projections are involved. With these points in mind, the reader will be better able to appraise and utilize the carefully thought-out content of the articles presented in this issue of the *Review*. □

Notes

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

[2] In traditional national income accounting practices, nominal gross duplicated output (also called double counting) is a measure of duplicated output, by virtue of the fact that it includes intermediate inputs which are eventually part of final output. This article uses nominal, rather than real,1996 chain-weighted gross duplicated output because adding the outputs of various industries under the latter concept does not yield total output.

[3] Perhaps nowhere is the contrast more apparent than in the production of computers compared with the provision of computer services. The production of computers is a capital-intensive enterprise. Between 1992 and 2002, nonfarm wage and salary employment in the computer and peripheral equipment manufacturing industry fell by 24 percent, from 329,000 to 250,000. Over the same period, output in the industry grew from $28 billion to $263 billion (in 1996 chain-weighted dollars), an increase of more than 24.9 percent per year. In the computer systems design and related services industry, employment increased by more than 161 percent, from 445,000 to 1,163,000 over the 1992–2002 period. Output also increased over the same period, at an annual rate of 8.8 percent. The Bureau projects a similar trend in the two industries over the 2002–12 period. (See Jay M. Berman, "Industry output and employment projections to 2012," this issue, pp. 58–79, table 3.)

[4] Daniel E. Hecker, "Occupational employment projections to 2012," this issue, pp. 80–105.

[5] See Berman, "Industry output and employment projections to 2012," table 4.

[6] *Ibid.*, table 5.

[7] *Ibid.*, table 6.

[8] *Ibid.*, table 7.

[9] Mitra Toossi, "A century of change: The U.S. labor force, 1950–2050, *Monthly Labor Review*, May 2002, pp. 15–28.

[10] The material in this section was prepared both by the author and by Norman Saunders, Division of Industry Employment Projections, Office of Occupational Statistics and Employment Projections.

[11] Currently, however, there are no national surveys of occupations that provide information either on the durations of vacancies or on wage offers. The BLS Job Openings and Labor Turnover Survey estimates job openings by industry for the entire U.S. economy, and 37 States conduct job vacancy surveys that estimate job openings by occupation.

[12] Hecker, "Occupational employment projections to 2012"; see especially tables 3 and 4.

[13] *2004–2005 Occupational Projections and Training Data*, forthcoming.