# Assumptions and Methods Used in Preparing Employment Projections

Occupational statements in the *Handbook* use one of seven phrases to describe the projected change in employment between 2006 and 2016. (See page 26.) These phrases are based on numerical projections developed using the Bureau of Labor Statistics (BLS) employment projections model system. Projections of occupational employment are the sixth and final step in the system; the six steps are listed in the discussion of methods below. A discussion of projections methods also is accessible on the Internet at: **http://www.bls.gov/emp/empmth01.htm** The November 2007 *Monthly Labor Review* presents a comprehensive discussion of the 2006-16 projections of the economy, labor force, and industry and occupation employment. The winter 2007-08 *Occupational Outlook Quarterly* presents the projections in a series of charts.

The projections reflect the knowledge and judgment of staff in the BLS Office of Occupational Statistics and Employment Projections and of knowledgeable people from other BLS offices, other government agencies, colleges and universities, industries, unions, professional societies, and trade associations, who furnished data and information, prepared reports, or reviewed the projections. BLS takes full responsibility, however, for the projections.

*Assumptions.* The information in the *Handbook* is based on an economic projection, which is characterized by slower growth in labor force (0.8 percent annually from 2006 to 2016 compared with 1.2 percent annually over the past 10-year period, 1996-2006), an expected unemployment rate of 5.0 percent in 2016, a slowdown in labor productivity (2.2 percent average annual growth compared with 2.6 percent annually over the 1996-2006 period), and an increasing deficit of foreign trade. The Federal budget deficit is assumed to grow due to growth in expenditures for Federal defense and for Medicare and Social Security. Other assumptions include consumer spending on durable goods that grows faster than consumer spending on services and nondurable goods. The declining share of nondurable goods as a percent of total consumer spending is expected to continue. Within services, consumer spending on medical care is expected to drive growth. Investment spending is expected to grow 3.1 percent annually from 2006 to 2016, slower than the 4.5 percent average annual growth in the previous 10 years. This slowdown will stem largely from a decline in the annual average growth rate of spending on computers and software. Expenditures for construction of residential structures will settle down after the 2005 record high to a 1.7 percent average annual growth rate over the 2006-16 projection period. Spending on nonresidential construction will grow faster than the historical pace—1.5 percent annually over the projection period, compared with 0.3 percent annual growth between 1996 and 2006.

Although BLS considers these assumptions reasonable, the economy may follow a different course, resulting in a different pattern of occupational growth. Real growth also could be different because most occupations are sensitive to a much wider variety of factors than those considered in the various projections models. Unforeseen changes in consumer, business, or government spending patterns and in the ways in which goods and services are produced could greatly alter the growth of individual occupations.

*Methods.* This section summarizes the steps involved in BLS projections of employment by occupation. BLS uses U.S. Census Bureau projections of the population by age, gender, and race, combined with projections of labor force participation rates—the percent of the specified group of the population working or seeking work—to arrive at estimates of the civilian labor force for the projected year.

BLS projections are developed in a series of six steps, each of which is based on separate projections procedures and models and various related assumptions. These six steps, or system components, deal with:

1. Size and demographic composition of the labor force
2. Growth of the aggregate economy
3. Final demand or gross domestic product (GDP)
4. Interindustry relationships (input-output)
5. Industry output and employment
6. Occupational employment

These components provide the overall analytical framework needed to develop detailed employment projections. Each component is developed in order, with the results of each used as input for successive components and with some results feeding back into earlier steps. Each step is repeated a number of times to ensure internal consistency as assumptions and results are reviewed and revised.

The projections of the labor force and assumptions about other demographic variables, fiscal and monetary policies, foreign economic activity, and energy prices and availability form the input to the macroeconomic model. This model projects GDP (sales to all final consuming sectors in the economy) and the distribution of GDP by its major demand components (consumer expenditures, investment, government consumption and gross investments, and exports and imports). Estimating the intermediate flows of goods and services—for example, the steel incorporated into automobiles—is the next step in the projections process. The resulting estimates of demand for goods and services are used to project industry output of final products as well as total output by industry.

Industry output of goods and services is then converted to industry employment. Studies of trends in productivity and technology are used to estimate future output per worker hour, and regression analysis is used to estimate worker hours. These estimates, along with output projections, are used to develop the final industry employment projections.

An industry-occupation matrix, also known as the national employment matrix, is used to project employment for wage

and salary workers. The matrix shows occupational staffing patterns—each occupation as a percent of employment in every industry. The matrix covering the 2006-16 period includes 311 detailed industries and 754 detailed occupations. Data for current staffing patterns in the matrix come from the BLS Occupational Employment Statistics (OES) surveys, which collect data from employers on a 3-year cycle.

The occupational staffing patterns for each industry were projected based on anticipated changes in the ways in which goods and services are produced, and were then applied to projected industry employment. The resulting employment was summed across industries to derive total wage and salary employment by occupation. Using this method, rapid employment growth is projected for health care workers, while employment of footwear manufacturing workers is expected to decline, reflecting the projected changes in the health care and footwear manufacturing industries, respectively.

Employment in an occupation also may grow or decline as a result of many other factors. For example, relatively fast growth is expected among computer support specialists as organiza-

tions continue to adopt increasingly sophisticated technology. On the other hand, automation, the expanding use of computers, and developments in computer software will result in declining employment among procurement clerks, order clerks, and word processors and typists. The projected-year matrix incorporates these expected changes.

Data on self-employed workers in each occupation come from the Current Population Survey (CPS). Numbers of self-employed workers were projected separately.

***Replacement needs.*** In most occupations, replacement needs provide more job openings than growth. 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 stop working temporarily, perhaps to return to school or care for a family; other workers—retirees for example—leave the labor force permanently. A discussion of replacements and the methods used to prepare estimates is presented in *Occupational Projections and Training Data, 2008-09 Edition*, BLS Bulletin 2702.