

Appendix A. Measuring Employment, Hours, and Earnings in States and Areas

The Current Employment Statistics (CES) survey is an integrated Federal-State undertaking designed to produce estimates of nonfarm employment, hours, and earnings at the national, State, and area levels. It is conducted jointly by State employment security agencies and the Bureau of Labor Statistics in the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. Estimates are prepared and published monthly for each State and for major areas.

COLLECTION

Federal-State cooperation

Under cooperative arrangements between State agencies and BLS, the respondent fills out only one reporting form, which is used for national, State, and area estimates. This procedure eliminates duplicate reporting on the part of respondents and, together with the use of similar estimating techniques at the national and State levels, promotes geographic comparability of estimates.

State agencies mail the forms to the establishments and examine the returns for consistency, accuracy, and completeness. After the States use the information to prepare State and area series, the source materials are sent to BLS (Washington Office) for use in developing estimates at the national level.

Shuttle schedules

Form BLS 790—Report on Employment, Payroll, and Hours—is used to collect the data. The schedule is returned to the respondents each month by the State agency so that the next month's data can be entered in the space allotted for that month. This "shuttle" procedure promotes comparability and accuracy of reporting, since the respondents can see the figures they have reported for previous months.

Form BLS 790 provides for entry of data on the number of full- and

part-time workers on the payrolls of nonagricultural establishments and, for most industries, payroll and hours of production and related workers, construction workers, or nonsupervisory workers for the pay period which includes the 12th day of the month.

CONCEPTS

Industrial classification

Establishments are classified into industries on the basis of their principal product or activity, in accordance with the *Standard Industrial Classification Manual, 1972*. Since January 1980, the classification is determined from information on annual sales volume collected each year on a supplement to the quarterly unemployment insurance tax reports filed by employers. If an establishment makes more than one product or engages in more than one activity, the entire employment of the establishment is included under the industry of the principal product or activity.

Industry employment

Employment data, except for the Department of Defense, refer to persons on establishment payrolls who received pay for any part of the pay period which includes the 12th day of the month. For civilian employees of the Department of Defense, the figures represent the number of persons who occupied positions on the last day of the calendar month. Intermittent workers are counted if they performed any services during the month.

The data exclude proprietors, the self-employed, unpaid volunteers or family workers, and domestic workers. Salaried officers of corporations are included. Government employment covers only civilian employees; Federal military personnel are excluded from the estimates.

Persons on an establishment payroll who are on paid sick leave (when pay is received directly from the firm), on paid holiday or paid vacation, or who

work during any part of the pay period even though they are unemployed or on strike during the rest of the period are counted as employed. Not counted as employed are persons who are laid off, on leave without pay, on strike for the entire period, or who are hired but do not report to work during the period.

Industry hours and earnings

Hours and earnings data are derived from reports of payrolls and hours for production and related workers in mining and manufacturing, construction workers in construction, and nonsupervisory employees in all other private nonagricultural industries. When the reported pay period exceeds 1 week, the payroll and hours figures are reduced to a weekly basis. The above items are further defined as follows:

Production and related workers include working supervisors and all nonsupervisory workers (including group leaders and trainees) engaged in fabricating, processing, assembling, inspecting, receiving, storage, handling, packing, warehousing, shipping, maintenance, repair, janitorial and guard services, product development, auxiliary production for a plant's own use (e.g., power plant), and recordkeeping and other services closely associated with the above production operations.

Construction workers include the following employees in the construction division: Working supervisors, qualified craft workers, mechanics, apprentices, laborers, etc., whether working at the site of construction or in shops or yards, at jobs (such as precutting and preassembling) ordinarily performed by members of the construction trades.

Nonsupervisory employees include employees (not above the working supervisory level) such as office clerical workers, repairers, salespersons, operators, drivers, physicians, lawyers, accountants, nurses, social workers, research aides, teachers, drafters, photographers, beauticians, musicians, restaurant workers, custodial workers, attendants, line installers, laborers, janitors, guards, and other employees whose services are closely associated with those of the employees listed.

Payroll covers the payroll for full- and part-time production, construction, or nonsupervisory workers who received pay for any part of the pay period which includes the 12th day of the month. The payroll is reported before deductions of any kind, e.g., for old-age and unemployment insurance, group insurance, withholding tax, bonds, or union dues; also included is pay for overtime, holidays, vacation, and sick leave paid directly by the firm. Bonuses (unless earned and paid regularly each pay period), other pay not earned in the pay period reported (e.g., retroactive pay), tips and the value of free

rent, fuel, meals, or other payment in kind are excluded. Moreover, "fringe benefits" (such as health and other types of insurance, contributions to retirement plans, etc., paid by the employers) are also excluded.

Hours cover hours paid for during the pay period which includes the 12th day of the month, for production, construction, or nonsupervisory workers. Hours include hours paid for holidays and vacations, and for sick leave when pay is received directly from the firm.

Average weekly hours relate to the average hours for which pay was received and are different from standard or scheduled hours. Such factors as absenteeism, labor turnover, part-time work, and stoppages cause average weekly hours to be lower than scheduled hours of work for an establishment. Group averages further reflect changes in the workweek of component industries.

Average hourly earnings are on a "gross" basis. They reflect not only changes in basic hourly and incentive wage rates but also such variable factors as premium pay for overtime and late-shift work and changes in the output of workers paid on an incentive plan. They also reflect shifts in the number of employees between relatively high-paid and low-paid work and changes in workers' earnings in individual establishments. Averages for groups and divisions further reflect changes in average hourly earnings for individual industries.

Averages of hourly earnings differ from wage rates. Earnings are the actual return to the worker for a stated period of time; rates are the amounts stipulated for a given unit of work or time. The earnings series do not measure the level of total labor costs on the part of the employer since the following are excluded: Irregular bonuses, retroactive items, payments of various welfare benefits, payroll taxes paid by employers, and earnings for those employees not covered under the production worker, construction worker, or nonsupervisory employee definitions.

Average weekly earnings are derived by multiplying average weekly hours by average hourly earnings. Therefore, weekly earnings are affected not only by changes in average hourly earnings but also by changes in the length of the workweek. In addition, monthly variations in such factors as the proportion of part-time workers, stoppages for varying reasons, labor turnover during the survey period, and absenteeism for which employees are not paid may cause the average workweek to fluctuate.

Long-term trends of average weekly earnings can be affected by structural changes in the makeup of the work force. For example, persistent long-term increases in the proportion of part-time workers in retail trade and many of the service industries have reduced average workweeks in these industries and have affected the average weekly earnings series.

ESTIMATING METHODS

Employment

The principal features of the procedures used to estimate employment for the industry statistics are (1) the use of the "link relative" technique, which is a form of ratio estimation, and (2) periodic adjustment of estimated employment levels to new benchmarks. Further details are provided in the *BLS Handbook of Methods*, Bulletin 2285 (1988), chapter 2.

The "link relative" technique

From a sample of establishments which reported for both the previous and current months, the ratio of current-month employment to that of the previous month is computed. The estimates of employment (all employees, including both production and nonproduction workers) for the current month are obtained by multiplying the estimates for the previous month by these "link relatives."

At the aggregate industry level, i.e., divisions and groups, employment is the sum of the employment estimates for component industries. Annual average employment is the sum of the monthly estimates divided by 12.

Benchmark adjustment

Each year, employment estimates are compared with benchmarks (comprehensive counts of employment) for the various nonagricultural industries, and appropriate adjustments are made. The estimates in this bulletin are projected from March 1987 benchmarks, except as noted.

The primary source of benchmark information is the employment data, by industry, compiled quarterly by State agencies from reports of establishments covered under State unemployment insurance laws. These reports cover about 98 percent of employees on nonagricultural payrolls in the United States. Benchmark data for the residual are obtained from the records of the Social Security Administration, the Interstate Commerce Commission, and a number of other agencies in private industry or government.

The estimates for the benchmark month are compared with the new benchmark levels, industry by industry. If revisions are necessary, the monthly series of employment estimates between benchmarks are adjusted to new levels, and the new benchmark for each industry is then carried forward progressively to the current month on the basis of trends shown in the sample. Under this procedure, the benchmark is used to establish the level of employment while the sample is used

to measure the month-to-month changes in the level.

Data for the periods subsequent to the last benchmark are subject to revision.

Hours and earnings

These estimates are based on the same sample used for the employment estimates. The average weekly hours and average hourly and weekly earnings series apply only to production, construction, or nonsupervisory workers as distinguished from all employees.

For individual industries, monthly estimates of weekly hours are obtained by dividing aggregate (total) hours by the number of production workers (or construction, or nonsupervisory workers). Average hourly earnings are computed by dividing aggregate payrolls by aggregate hours. Industry group and division averages are obtained by weighting the averages for individual industries by production worker employment (in the case of average weekly hours) or production worker hour aggregates (in the case of average hourly earnings) in the particular groups or divisions.

To obtain annual averages of average weekly hours, the 12-month total of aggregate hours (average weekly hours multiplied by production worker employment) is divided by the 12-month total of employment. The 12-month total of aggregate payrolls (weekly earnings multiplied by employment weights or hourly earnings multiplied by aggregate hours for 12 months) is divided by the 12-month total of aggregate hours to yield average hourly earnings.

Average weekly earnings, except for industries where hours data are not collected, are the product of average weekly hours and average hourly earnings.

THE SAMPLE

Design

The sampling plan used in the survey is an optimum allocation design known as "sampling proportionate to average size of establishment." Under this design, large establishments fall into the sample with certainty. However, the proportion of total employment covered varies considerably from industry to industry. For example, sample coverage is high (51 percent on the average) in manufacturing industries in which a large proportion of total employment is concentrated in relatively few establishments. On the other hand, coverage is much lower in wholesale trade (16 percent) and in retail trade (20 percent), which contain many small establishments. The large sample in manufacturing is desirable because manufacturing industries have a greater tendency to

lead cyclical patterns in the economy than do nonmanufacturing industries.

Reliability of the employment estimates

The estimates derived from the employment and payroll survey may differ from the figures that would have been obtained if it were possible to take a complete census using the same schedules and procedures. However, the relatively large size of the samples maintained by the State agencies and the annual adjustment of employment estimates to more recent benchmark levels assure a very high degree of accuracy. One measure of the reliability of an estimate projected from a benchmark is the absolute amount by which it differs from the new benchmark at the next adjustment period. BLS uses this criterion rather than the standard error of the estimates. The distribution of States by industry and percentage differences between benchmarks and estimates in March 1987 is shown in table A-1. A distribution of areas is provided in table A-2.

Differences between the benchmarks and the estimates result not only from sampling and response errors but also from changes in the industrial classification of individual establishments (resulting from changes in their product or service), which are not reflected in the estimate levels until the data are adjusted to new benchmarks. At the more detailed industry levels, particularly within manufacturing, changes in classification are often the major cause of differences. Another cause of differences, generally minor, between the estimates and the benchmarks is improvement in the quality of the benchmark data.

Table A-1. Distribution of States by industry and percentage differences between benchmarks and estimates, March 1987

| Industry | Percentage differences— | | | | | | |
|---|-------------------------|---------|---------|---------|---------|---------|--------------|
| | Less than 0.5 | 0.5-0.9 | 1.0-1.9 | 2.0-2.9 | 3.0-3.9 | 4.0-4.9 | 5.0 and over |
| Total | 22 | 14 | 11 | 4 | 1 | 0 | 1 |
| Mining | 9 | 1 | 7 | 4 | 3 | 6 | 21 |
| Construction | 3 | 3 | 3 | 6 | 11 | 6 | 21 |
| Manufacturing | 13 | 15 | 14 | 5 | 3 | 0 | 3 |
| Transportation and public utilities | 4 | 15 | 13 | 7 | 8 | 1 | 5 |
| Wholesale and retail trade | 14 | 8 | 18 | 7 | 1 | 3 | 2 |
| Finance, insurance, and real estate | 7 | 13 | 15 | 5 | 4 | 4 | 5 |
| Services | 9 | 16 | 17 | 7 | 2 | 0 | 2 |
| Government | 19 | 17 | 14 | 2 | 1 | 0 | 0 |

COMPARABILITY WITH OTHER SERIES

County Business Patterns

Data in *County Business Patterns*, published by the Bureau of the Census, differ from BLS establishment statistics in the treatment of central administrative offices and auxiliary units. Differences also may arise because of industrial classification, and reporting practices. In addition, CBP coverage is incomplete for some nonprofit activities, and interstate railroads and government are excluded.

Employment covered by State unemployment insurance programs

Most nonagricultural wage and salary workers are covered by unemployment insurance programs. However, certain employees, such as those working for interstate railroads or members of religious orders working in parochial schools and churches, are not covered. They are included, however, in BLS establishment statistics. Data for railroads are obtained from the Interstate Commerce Commission; data for parochial schools and churches are obtained from the U.S. Office of Education, the National Catholic Welfare Conference, the National Council of Churches, and surveys of churches conducted by several State agencies.

Statistics on manufacturing and business, Bureau of the Census

BLS establishment statistics on employment differ from employment counts derived by the Bureau of the Census from its censuses or sample surveys of manufacturing and business establishments. The major reasons for noncomparability are different treatment of business units considered parts of an establishment, such as central administrative offices and auxiliary units, the industrial classification of establishments, and different reporting patterns of multiunit companies. There are also differences in the scope of the industries covered, e.g., the Census of Business excludes professional services, public utilities, and financial establishments, whereas these are included in BLS statistics.

Statistics on State and local government, Bureau of the Census

BLS statistics on State and local government employment differ slightly from the employment counts of the Bureau of the Census in its censuses and annual sample surveys. BLS excludes and Census includes certain

Table A-2. Distribution of areas by industry and percentage differences between benchmarks and estimates, March 1987

| Industry | Percentage differences— | | | | | | |
|---|-------------------------|---------|---------|---------|---------|---------|--------------|
| | Less than 0.5 | 0.5-0.9 | 1.0-1.9 | 2.0-2.9 | 3.0-3.9 | 4.0-4.9 | 5.0 and over |
| Total | 76 | 76 | 89 | 35 | 7 | 5 | 6 |
| Mining | 93 | 0 | 2 | 1 | 3 | 3 | 85 |
| Construction | 26 | 6 | 21 | 20 | 26 | 19 | 0 |
| Manufacturing | 53 | 29 | 86 | 53 | 32 | 13 | 29 |
| Transportation and public utilities | 53 | 15 | 35 | 38 | 36 | 25 | 88 |
| Wholesale and retail trade | 30 | 51 | 80 | 51 | 25 | 23 | 34 |
| Finance, insurance, and real estate | 77 | 17 | 45 | 35 | 23 | 28 | 65 |
| Services | 39 | 47 | 67 | 57 | 32 | 19 | 31 |
| Government | 80 | 57 | 75 | 34 | 15 | 17 | 16 |

nominal employment (such as paid elected officials of small cities) and Federal-State cooperative extension personnel serving under a Federal

appointment. BLS classifies employees of local government libraries in "education" whereas Census includes them under "other local functions."

Federal Civilian Work Force Statistics Bulletin, Office of Personnel Management

The Office of Personnel Management (OPM), publishes this bulletin monthly using data from reports it collects. The BLS Federal employment series by State are derived from statistics based on coverage of the unemployment compensation program for Federal employees. OPM data exclude and BLS data include Defense Department workers paid from nonappropriated funds, employees of certain local agricultural committees of the Department of Agriculture, and Federal-State cooperative employees serving under a Federal appointment. OPM data include and BLS data exclude employees of Federal hospitals. The BLS count of employment (except for Defense Department units) is for the pay period including the 12th day of the month, whereas the OPM count represents the number of persons employed on the last workday of the month plus all intermittent employees during the month.