

New all-employee hours and earnings from the CES survey

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The Current Employment Statistics (CES) Survey, also known as the establishment survey, has long been regarded as a primary source of average hourly earnings and hours paid for private-sector workers in the United States. The Bureau of Labor Statistics (BLS) first produced estimates of hours and earnings for production workers in 1909. The early data focused on earnings in manufacturing industries, but hours and employment data also were produced.

By 1947, industry coverage for hours and earnings was expanded to include all goods-producing industries; however, it remained impossible to compute estimates for the entire private nonagricultural economy. In 1964, collection was expanded to include hours and earnings data for nonsupervisory workers in private service-providing industries; then, in 1967, BLS began publishing hours and earnings data for all nonagricultural industries in the private sector. While the scope of the data on production and nonsupervisory employees has grown to cover more industries, the data still represent only about 80 percent of workers in the private sector. (See table 1.)

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The BLS has now expanded payroll and hours measures derived from the Current Employment Statistics survey to cover all employees of private nonfarm establishments for the Nation, each State, and more than 400 metropolitan areas. National estimates of hours and earnings for all employees were first published as experimental series in March 2007, and these series became official CES estimates with the release of the *Employment Situation* on February 5, 2010.

In this report, the scope and methods of CES hours and earnings for all employees are compared and contrasted with those for production and nonsupervisory employees. Also addressed is the development of the series, along with some of the issues that arose during the implementation process. Finally, the report analyzes

and compares hours and earnings for all employees with hours and earnings data for production and nonsupervisory employees.

Expanding coverage to all employees

Hours and earnings data have been developed to provide more information on the pay and hours of all employees. The new data series cover all paid, private-sector employees (including production employees), thereby broadening coverage beyond that of the existing production–nonsupervisory employee concept.

Respondents report total hours for which all employees received pay for the pay period that includes the 12th of the month. Total hours include regular work time, overtime, standby or reporting time, and hours not

Table 1. Production and nonsupervisory employees as a share of all employees, 2009 annual averages, employment levels in thousands

Industry	All employees	Production and nonsupervisory employees	
		Level	Percent
Total private	108,371	89,271	82.4
Production employees			
Goods-producing	18,620	13,447	72.2
Mining and logging	700	514	73.4
Construction	6,037	4,583	75.9
Manufacturing	11,883	8,350	70.3
Durable goods	7,309	5,008	68.5
Nondurable goods	4,574	3,341	73.0
Nonsupervisory employees			
Private service-providing	89,751	75,823	84.5
Trade, transportation, and utilities	24,949	21,149	84.8
Wholesale trade	5,625	4,536	80.6
Retail trade	14,528	12,475	85.9
Transportation and warehousing	4,235	3,687	87.0
Utilities	561	451	80.3
Information	2,807	2,243	79.9
Financial activities	7,758	5,999	77.3
Professional and business services	16,580	13,525	81.6
Education and health services	19,191	16,839	87.7
Leisure and hospitality	13,102	11,583	88.4
Other services	5,364	4,486	83.6

worked, but for which employees received pay, such as holiday, vacation, or sick pay. Manufacturing firms also report total overtime hours for employees who receive overtime premiums for hours beyond their regular hours. Overtime hours are a subset of total hours.

Total gross pay earned during the entire pay period (before deductions) is also reported. Payrolls include regular wages and salaries, paid leave, incentive pay, bonuses paid each pay period, and severance paid over multiple pay periods. Commissions also are reported if they are paid at least monthly. Irregular and lump-sum payments are excluded.¹

Hours and payroll are defined the same for both production employees and all employees. Estimates are also made using the same formulas. The first monthly estimates begin with sample averages—average weekly hours per employee and average hourly earnings of all employees. Subsequent monthly estimates are calculated using the difference-link and taper formula.² The only difference in the data collected and the estimates produced from that data is who gets counted.

Prior to the release of the new data series, BLS published hours and earnings for production and nonsupervisory employees (production employees), who represent about 80 percent of all employees in the private sector. The definition for these employees differs across industries—production employees in goods-producing industries and nonsupervisory workers in private service-providing industries. By definition, establishments in one industry may exclude certain types of production employees in their hours and earnings data, while establishments in another industry may include data for the same types of workers. For example, administrative clerks may work in a factory office or in a bank. Hours and earnings are excluded from the

manufacturer's payroll data for clerical employees, but the bank includes hours and earnings for them.

Since production employees are defined differently depending on industry, it is not possible to derive an accurate "supervisory" hourly pay rate or average hours for all private-sector industries combined or for any goods-producing industry. One could calculate average weekly hours and earnings for all employees excluding production employees (production employees in goods-producing industries and nonsupervisory employees in private service-providing industries) by subtracting aggregate hours of production employees from aggregate hours for all employees and then dividing the difference by nonproduction employees. Average hourly earnings could be approximated in a similar manner by dividing the adjusted aggregate payroll by aggregate hours of nonproduction employees.

Data collection and cleanup

BLS started collecting pay and hours data for all employees in September 2005. Sample quality during the first several months of collection was rather poor, with low response rates compounded by large numbers of reporting errors among the participating sample. Significant efforts were made to educate respondents on the new data items and the importance of reporting each month. In addition, a comprehensive review of survey responses resulted in the development of screening tests to detect outliers. Based on improved reporting and response rates, experimental estimates for the United States were first produced for March 2006. Response rates for all employee pay and hours have improved and now surpass those for production employees by about 7 percentage points, as the following tabulation shows:

Collection rates for hours and earnings by employment type, 2009

<i>Employment type</i>	<i>Percent of reports with all employees reported</i>
All employees	43.6
Production and nonsupervisory employees	36.5

Seasonal adjustment

Many CES data users analyze seasonally adjusted over-the-month changes as a primary means of measuring overall national economic trends. Thus, accurate seasonal adjustment is an important component in the usefulness of these monthly data. The CES program employs concurrent seasonal adjustment methodology to seasonally adjust the National estimates of employment, hours, and earnings. New seasonal factors are calculated each month and use all relevant data up to and including the current month.

The CES program uses X-12 ARIMA software developed by the U.S. Census Bureau to seasonally adjust the monthly estimates.³ X-12 ARIMA requires at least 3 years of data to perform seasonal adjustment. While it is technically possible to seasonally adjust the new hours and earnings data series with minimal history, satisfaction of the minimum series length requirement is not a sufficient condition to ensure a quality seasonal adjustment. At least 5 years of data are required to adjust for variation due to calendar effects.

The CES program's current implementation of seasonal adjustment controls for several calendar effects. Inconsistencies in the seasonally adjusted series occur as a result of variations of either 4 or 5 weeks between reference periods in any given pair of months. The number of working days in a pay period may distort CES

hours and earnings, especially when the industry is dominated by semi-monthly (10 or 11 days) and monthly (20–21 or 22–23 days) pay periods. Floating holidays, such as Easter and Labor Day, can also cause significant variation associated with the relative timing of the survey reference period and the holiday.

An alternative approach has been implemented to address the calendar effects until 5 years of history are available. The existing method for production employees' hours and earnings relies on a dummy-variable approach that implicitly treats each month; the alternate technique treats only the months for which calendar effects impact the data. Affected months are manually treated as outliers when defining parameters for X-12 ARIMA. This treatment dampens the calendar effects, but spikes from the 10/11 day effect are still present in the adjusted series. Furthermore, the series average for seasonally adjusted data is not preserved relative to the unadjusted average, because the adjustment is applied outside of X-12 ARIMA. A second step is required to preserve the average.

A correction factor forces the average of each series adjusted for calendar effects to the average of the corresponding unadjusted series. The factor is defined as follows:

$$\text{Correction Factor} = \frac{\sum_{t=1}^n X_t}{\sum_{t=1}^n \hat{X}_t}$$

X_t = Unadjusted value of series at month t

\hat{X}_t = Adjusted, calendar-effect-treated value of series at month t

The factor is applied multiplicatively to all observations in the seasonally adjusted series. Testing has shown that this method effectively reconciles level shifts introduced by the modified calen-

dar effects treatment procedure, thereby maintaining consistency between unadjusted and seasonally-adjusted levels of the series.⁴

Average weekly hours

Production and nonsupervisory employees represent approximately 80 percent of all employees; thus their respective hours and earnings reflect similar trends over time. Average weekly hours for all employees and for production and nonsupervisory employees (production employees) reached high points in 2007 and started to trend down in 2008. The workweek for all employees is, on average, 0.8 hour higher than average hours for production employees. (See table 2.)

Although the workweek of all employees is higher than produc-

tion and nonsupervisory employees for all private industries combined, this is not the case across industries. Hours for all employees are higher than those for production employees in most service-providing industries, while the workweek for production employees is higher than that for all employees in each major goods-producing industry. (See charts 1 and 2.)

In 2009, mining and logging had the longest average workweek for both all employees (42.1 hours) and for production employees (43.3 hours). Average weekly hours of production employees exceeded those for all employees by 1.2 hours in both mining and logging and utilities, which has the second longest workweek.

Leisure and hospitality had the shortest average weekly hours for all employees and for production employees in 2009. Hours for all employees ex-

Table 2. Average weekly hours, 2009 annual averages

Industry	All employees	Production and nonsupervisory employees	Difference
Average weekly hours			
Total private.....	33.9	33.1	0.8
Goods-producing.....	38.5	39.2	-.7
Mining and logging.....	42.1	43.3	-1.2
Construction.....	37.2	37.6	-.4
Manufacturing.....	39.0	39.8	-.8
Durable goods.....	39.1	39.9	-.8
Nondurable goods.....	38.8	39.8	-1.0
Private service-providing.....	32.9	32.1	.8
Trade, transportation, and utilities.....	34.1	32.9	1.2
Wholesale trade.....	37.9	37.6	.3
Retail trade.....	31.3	29.9	1.4
Transportation and warehousing.....	38.1	36.0	2.1
Utilities.....	40.9	42.1	-1.2
Information.....	36.5	36.6	-.1
Financial activities.....	36.6	36.1	.5
Professional and business services.....	35.0	34.7	.3
Education and health services.....	33.0	32.3	.7
Leisure and hospitality.....	25.6	24.8	.8
Other services.....	31.6	30.5	1.1
Average overtime hours			
Manufacturing.....	2.3	2.9	-.6
Durable goods.....	2.1	2.7	-.6
Nondurable goods.....	2.6	3.2	-.6

Chart 1. Average weekly hours of all employees and production and nonsupervisory employees in the goods-producing industry, March 2006–February 2010, seasonally adjusted

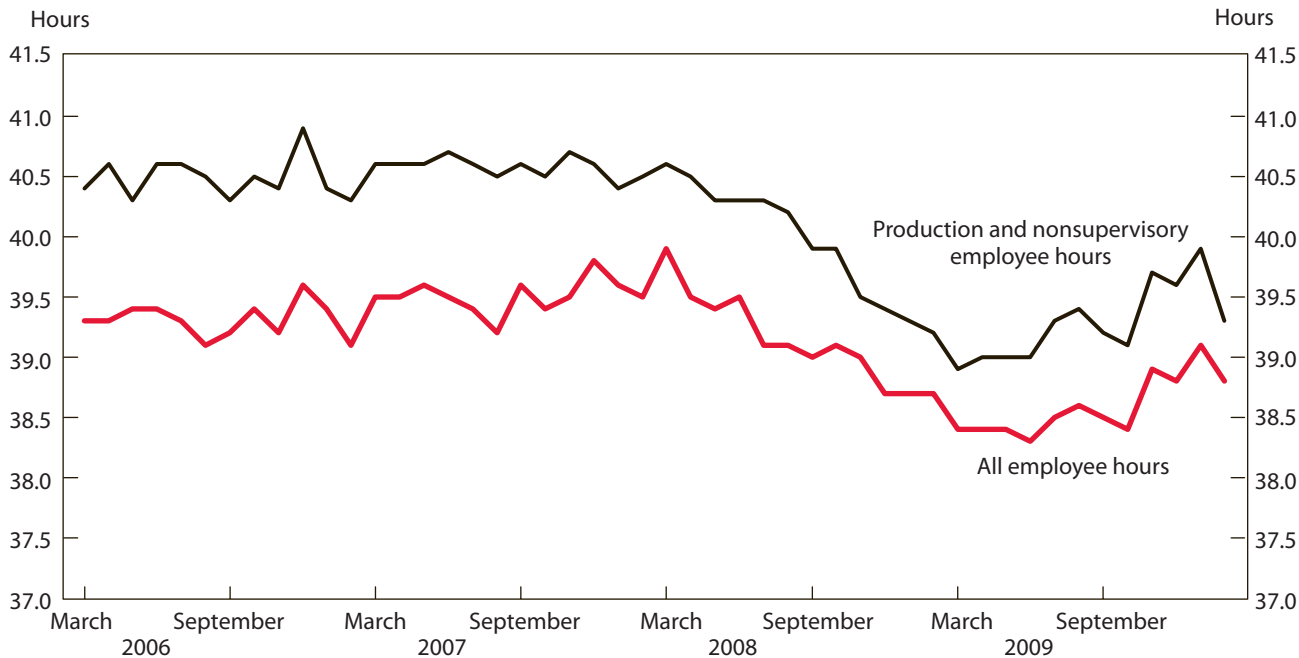
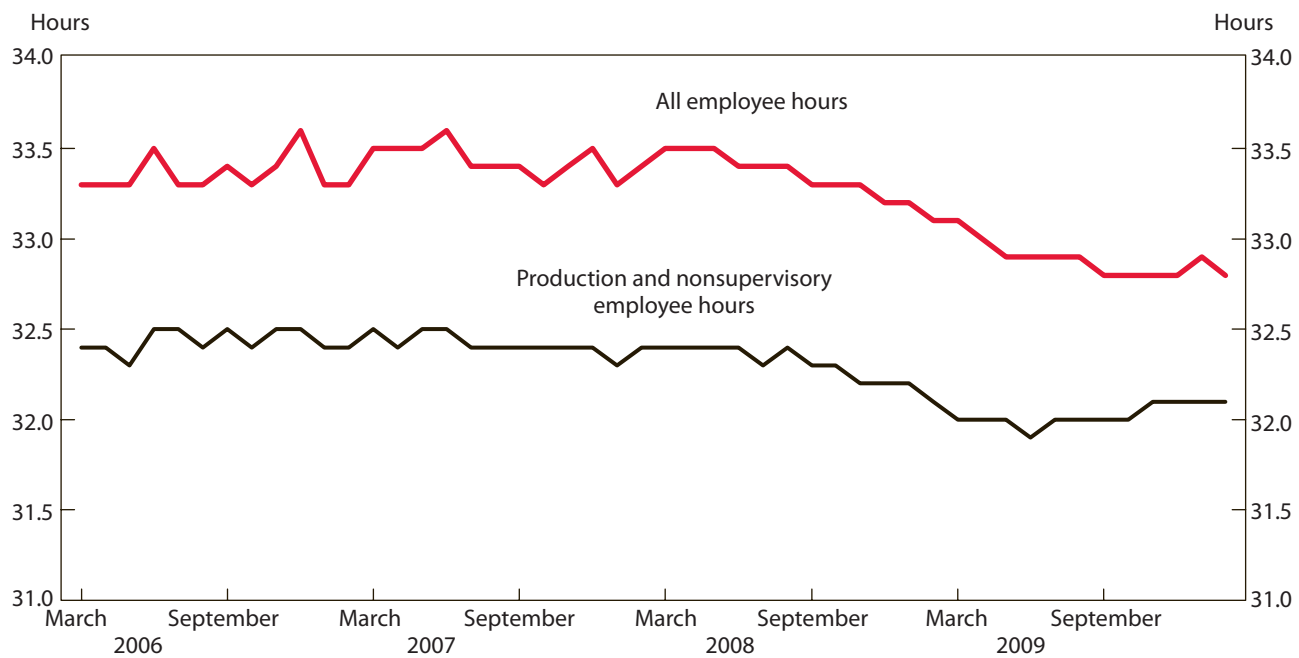


Chart 2. Average weekly hours of all employees and production and nonsupervisory employees in the private service-providing industry, March 2006–February 2010, seasonally adjusted



ceeded those for production employees by 0.8 hour. Transportation and warehousing had the largest positive difference in the workweeks between all employees and production employees, 1.4 hours. The percentage of employees who usually work part time in each industry helps explain the differences in average weekly hours between industries. According to 2009 data from the Current Population Survey, for example, only 3.2 percent of mining employees usually worked part time, while 40.4 percent of leisure and hospitality employees usually worked part time.⁵

Average hourly earnings

Average hourly earnings for all employees were 19.3 percent higher than earnings for production and nonsupervisory employees in 2009. (See table 3.) Given the overlap in employment, both earnings series also show similar trends. (See chart 3.) Since March 2006, the first month of the all employee earnings series, hourly earnings have grown by 11.9 percent, compared with 14.4

percent for hourly earnings of production employees.

Of the major industry sectors, utilities had the highest average hourly earnings levels for all employees, as well as for production and nonsupervisory employees, in 2009. Leisure and hospitality had the lowest hourly earnings, followed by retail trade. The largest spread between average hourly earnings for all employees and those for production and nonsupervisory employees occurred in financial activities. Hourly earnings for all employees in that industry were 27.1 percent higher than those for nonsupervisory employees; the difference (\$5.65) was also the largest in absolute terms. Transportation and warehousing had the smallest gap, with earnings for all employees just 8.9 percent (or \$1.67) higher than production employees.

Whether an industry is goods-producing or service-providing does not necessarily determine if it has above- or below-average hourly earnings. For example, mining and logging had the

fourth-highest earnings in 2009, while nondurable goods manufacturing had the fifth-lowest earnings. Similarly, information had the second-highest earnings, while leisure and hospitality had the lowest overall.

Derivative series

BLS derives several series from hours and earnings series. (See table 4.) Average weekly earnings are simply the product of average weekly hours and average hourly earnings. In 2009, weekly earnings for all employees were 22.0 percent greater than weekly earnings for production and nonsupervisory employees. Real hourly and weekly earnings for all employees are derived by deflating regular earnings by the consumer price index for all urban consumers (CPI-U), base year 1982–84. The deflator for earnings of all employees differs from the deflator for production employees, which uses the consumer price index for urban wage earners and clerical workers (CPI-W), base year 1982–84.

Because they cover all employees in private nonfarm businesses, the new hours and earnings data provide improved input for other major economic indicators, such as labor productivity and personal income. Aggregate weekly hours, the product of employment and average weekly hours, are used for calculating estimates of industrial production and output per hour.⁶ BLS indexes aggregate weekly hours to 2007 annual averages of aggregate hours. Aggregate weekly payrolls, the product of aggregate weekly hours and average hourly earnings, are inputs into estimates of personal income for the National Income and Product Accounts.⁷ BLS also indexes aggregate weekly payrolls to 2007 annual aver-

Table 3. Average hourly earnings, 2009 annual averages

Industry	All employees	Production and nonsupervisory employees	Percent difference
Total Private.....	\$22.21	\$18.62	19.3
Goods-producing.....	23.77	19.90	19.4
Mining and logging.....	27.30	23.29	17.2
Construction.....	24.84	22.67	9.6
Manufacturing.....	23.03	18.23	26.3
Durable goods.....	24.51	19.35	26.7
Nondurable goods.....	20.64	16.56	24.6
Private service-providing.....	21.83	18.35	19.0
Trade, transportation, and utilities..	19.34	16.50	17.2
Wholesale trade.....	25.42	20.85	21.9
Retail trade.....	15.40	13.02	18.3
Transportation and warehousing..	20.47	18.80	8.9
Utilities.....	32.95	29.56	11.5
Information.....	29.38	25.45	15.4
Financial activities.....	26.48	20.83	27.1
Professional and business services..	27.02	22.35	20.9
Education and health services.....	22.41	19.49	15.0
Leisure and hospitality.....	12.96	11.11	16.7
Other services.....	19.52	16.59	17.7

Chart 3. Average hourly earnings of all employees and production and nonsupervisory employees in the total private industry, March 2006–February 2010, seasonally adjusted

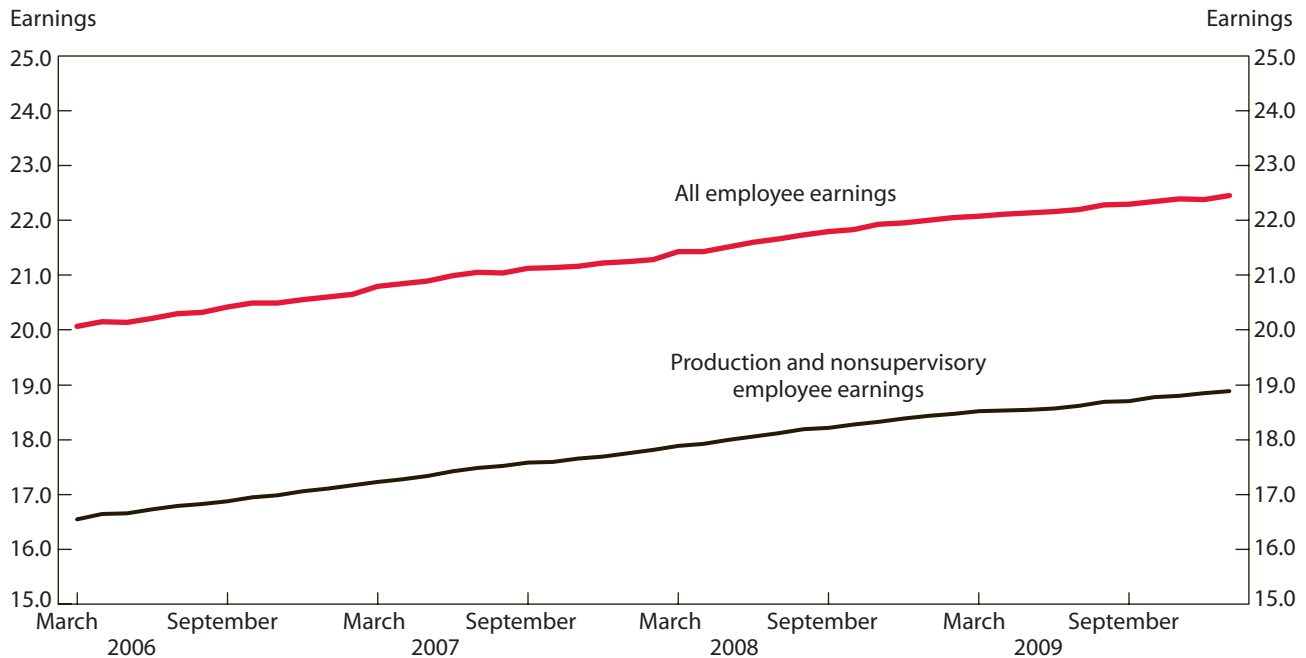


Table 4. Derivative series, 2009 annual averages

Industry	All employees	Production and nonsupervisory employees
Total private industry		
Average weekly earnings	\$753.02	\$617.11
Average hourly earnings, 1982–1984 dollars.....	\$10.59	\$8.88
Average weekly earnings, 1982–1984 dollars.....	\$359.21	\$294.38
Index of aggregate weekly hours	92.1	98.8
Index of aggregate weekly payrolls.....	97.5	123.0
Manufacturing		
Average hourly earnings, excluding overtime	\$22.37	\$17.58

ages. The aggregate hours and earnings for all employees are not strictly comparable to those for production and nonsupervisory employees, since the indexes for production employees are indexed to 2002 annual averages.

Average hourly earnings excluding overtime are produced for all

employees in manufacturing only. These are the only industries surveyed that report overtime. BLS assumes that overtime hours are paid at time and one half per hour; this assumption is the same as earnings measures for production employees in manufacturing. □

Notes

¹ For more details on data collected from respondents, see the definitions on CES collection forms, on the Internet at www.bls.gov/ces/idcfcesforms.htm (visited March 5, 2010).

² The difference link is represented by the change in sampled average weekly hours (or average hourly earnings) with the prior month subtracted from the current month. The taper is a weighted average of the prior month's estimated average weekly hours (or average hourly earnings) and the prior month's sample average of the same data type. The current month's estimate is the sum of the difference link and the taper. For more information, see Chapter 2 in the *BLS Handbook of Methods*, on the Internet at www.bls.gov/opub/hom/homch2_a.htm (visited March 30, 2010).

³ The X-12 ARIMA software is available on the U.S. Census Bureau Web site on the Internet at www.census.gov/srd/www/x12a/ (visited March 5, 2010).

⁴ For more information on seasonally adjusting CES data, see "Adjusting for Calendar Related Fluctuations in Average Weekly Hours and Average Hourly Earnings Series" and "Seasonal Adjustment in the Current Employment Statistics Program" on the Internet at www.bls.gov/ces/cesseasadj.htm (visited March 5, 2010).

Program Report

⁵ The Current Population Survey (CPS), also known as the household survey, produces employment estimates by full- and part-time status. These data can be accessed on the

Internet at www.bls.gov/cps/lfcharacteristics.htm#fullpart (visited March 5, 2010).

⁶ Industrial production is estimated by the Federal Reserve Board, while labor productivity

is produced by BLS.

⁷ The Bureau of Economic Analysis produces data for the National Income and Product Accounts.