

Revisions in State Establishment-based Employment Estimates Effective January 2017

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Introduction

With the release of the payroll employment estimates for January 2017, nonfarm payroll employment, hours, and earnings data for states and areas were revised to reflect the incorporation of the 2016 benchmarks and the recalculation of seasonal adjustment factors for payroll employment estimates. The revisions affect all not seasonally adjusted data from April 2015 to December 2016, all seasonally adjusted data from January 2012 to December 2016,¹ and select series subject to historical revisions before April 2015. This article provides background information on benchmarking methods, business birth/death modeling, seasonal adjustment of employment data, and details of the effects of the 2016 benchmark revisions on state and area payroll employment estimates.

Summary of benchmark revisions

The average absolute percentage revision across all states for total nonfarm payroll employment is 0.4 percent for March 2016. This compares to the average of 0.5 percent for the same measure during the five prior benchmark

¹ Further information regarding the difference in historical reconstruction between not seasonally adjusted data and seasonally adjusted data is available in the seasonal adjustment section of this article and at <https://www.bls.gov/sae/790over.htm>.

years of 2011 to 2015. For March 2016, the range of the percentage revision for total nonfarm payroll employment across all states is from -1.6 to 0.9 percent.

Benchmark methods

The Current Employment Statistics (CES) program, also known as the payroll survey, is a federal and state cooperative program that provides, on a timely basis, estimates of payroll employment, hours, and earnings for states and areas by sampling the population of employers. Each month the CES program surveys about 147,000 businesses and government agencies, representing approximately 634,000 individual worksites, in order to provide detailed industry level data on employment and the hours and earnings of employees on nonfarm payrolls for all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and over 450 metropolitan areas and divisions.²

As with data from other sample surveys, CES payroll employment estimates are subject to both sampling and nonsampling error. Sampling error is an unavoidable byproduct of forming an inference about a population based on a sample. The larger the sample is, relative to the population, the smaller the sampling error. The sample-to-population ratio varies across states and industries. Nonsampling error, by contrast, generally refers to errors in reporting and processing.³

In order to control for both sampling and nonsampling error, CES payroll employment estimates are benchmarked annually to employment counts from a census of the employer population. These counts are derived primarily from employment data provided in unemployment insurance (UI) tax reports that nearly all employers are required to file with state workforce agencies. The UI tax reports are collected, reviewed, and edited as part of the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program.⁴ As part of the benchmark process for benchmark year 2016, census-derived employment counts replace CES payroll employment estimates for all 50 states and the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and about 450 metropolitan areas and divisions for the period from April 2015 to September 2016.

UI tax reports are not collected on a timely enough basis to allow for replacement of CES payroll estimates for the fourth quarter, October 2016 to December 2016. For this period, estimates based on existing sample information are revised using the new September 2016 series level derived from census employment counts and incorporate updated business birth/death factors.⁵

Changes to CES published series

Unified structure

To create a more unified structure of industries below the super sector level for each state, 16 subsector series will no longer be published. This will improve consistency across geographic areas and should better facilitate comparisons.

For more detailed information, see [Appendix Table B](#). Unified series structure detail.

² Further information on the sample size for each state is available at <https://www.bls.gov/sae/sample.htm>.

³ Further information on the reliability of CES estimates is contained in the Technical Note of the latest Regional and State Employment and Unemployment news release and is available at <https://www.bls.gov/sae/news.htm>.

⁴ Further information on the BLS Quarterly Census of Employment and Wages program is available at <https://www.bls.gov/cew/>.

⁵ Further information on the monthly estimation methods of the CES program can be found in Chapter 2 of the *BLS Handbook of Methods* and is available at <https://www.bls.gov/opub/hom/pdf/homch2.pdf>.

Generalized variance functions

With the release of the 2016 benchmark, CES State and Area will begin publishing improved sample variance estimates through the use of Generalized Variance Functions (GVFs). In comparison with the previously used Repeatedly Grouped Balanced Half Samples (RGBHS) method,⁶ GVFs are regression models that relate variances to other characteristics, such as industry, resulting in different models for each super sector. Research determined that GVF models provide better coverage than the RGBHS method and create more stable variances.⁷

MSA updates

With the 2016 benchmark, CES updated its list of covered areas to include the Enid, OK MSA (FIPS 21420). This was formerly a micropolitan statistical area that now meets the Office of Management and Budget (OMB) delineations to qualify as a metropolitan statistical area (MSA).⁸ In addition to the all employee series, CES plans to publish all employee hours and earnings data for Enid, OK with a series start date of January 2011. Lastly, Macon, GA (FIPS 31420) will now be Macon-Bibb County, GA (FIPS 31420). This change is a title change only; the composition of the area did not change.

Non-AE data suppression

BLS identified errors in metropolitan area and division hours and earnings series, and the data were suppressed on December 16, 2016. The processing error affected close to 1,000 series across approximately 350 metropolitan areas and divisions from October 2012 to December 2016. No statewide employment, hours, or earnings data were affected. More details on the suppressions can be found at: <https://www.bls.gov/sae/saesup2016.htm>.⁹

Industry reconstructions

HMO Reconstructions

During the 2016 benchmark of national CES data, BLS discovered a change to NAICS codes for reports in health care services affecting two industries. This change was determined to be noneconomic and affected the entire series going back to 1990. Reconstructions have been made at the national level, as well as the state and area level.

Several establishments originally coded in CES industry 65-621111 (offices of physicians, except mental health) should have been coded in CES industry 65-621491 (HMO medical centers). In California, employment from all establishments that changed from NAICS 621111 to NAICS 621491 was calculated for December 2015 and that amount was removed from series containing NAICS 621111 to NAICS 621491 back to January 1990 at the statewide level and some metropolitan statistical areas (MSAs): Los Angeles-Long Beach-Glendale, Riverside-San Bernardino-Ontario, and San Jose-Sunnyvale-Santa Clara. For Riverside-San Bernardino-Ontario MSA, the reconstruction was a wedge rather than a level shift due to the historical low level of employment and increasing trend of its series 65-621100.

Oregon state and local government reconstructions

Public universities were reclassified from state to local ownership in 2014 and 2015. The shift occurred with some institutions in July 2014 with the remainder in July 2015. This ownership change is considered economic in nature so large level shifts are evident in the state and local government (90-920000, 90-930000) and state and local government education employment series (90-921611, 90-931611) at these points. Both reported UI employment and noncovered employment values switched ownership for the affected universities at the July

⁶ Further information on variance and standard errors for CES State and Area estimates can be found at <https://www.bls.gov/sae/790stderr.htm>.

⁷ Research on the use of GVFs for the CES program can be found at <https://www.bls.gov/ore/pdf/st020170.pdf>.

⁸ MSA delineations may be found at <https://www.bls.gov/sae/saemsa.htm>.

⁹ A full summary of all corrections and suppressions for CES State and Area employment, hours, and earnings data is available at https://www.bls.gov/bls/errata/sae_errata.htm.

2014 and 2015 dates, respectively. In some metropolitan statistical areas employment in the state government education series (90-921611) dropped to zero after the ownership change, while in other areas there were unaffected education units that kept the series employment positive. Series 90-920000 and 90-930000 will continue to be published seasonally adjusted, though there may be shifting seasonal patterns.

Business birth/death modeling

Sample-based estimates are adjusted each month by a statistical model designed to reduce a primary source of nonsampling error: the inability of the sample to capture employment growth generated by new business formations on a timely basis. There is an unavoidable lag between an establishment opening for business and its appearance in the sample frame making it available for sampling. Because new firm births generate a portion of employment growth each month, nonsampling methods must be used to estimate this growth.

Earlier research indicated that, while both the business birth and death portions of total employment are generally significant, the net contribution is relatively small and stable. To account for this net birth/death portion of total employment, BLS uses an estimation procedure with two components. The first component excludes employment losses due to business deaths from sample-based estimation in order to offset the missing employment gains from business births. This is incorporated into the sample-based estimate procedure by simply not reflecting sample units going out of business, but rather imputing to them the same employment trend as the other continuing firms in the sample. This step accounts for most of the birth and death changes to employment.¹⁰

The second component is an autoregressive integrated moving average (ARIMA) time series model designed to estimate the residual birth/death change to employment not accounted for by the imputation. To develop the history for modeling, the same handling of business deaths as described for the CES monthly estimation is applied to the population data. Establishments that go out of business have employment imputed for them based on the rate of change of the continuing units. The employment associated with continuing units and the employment imputed from deaths are aggregated and compared to actual population levels. The differences between the two series reflect the actual residual of births and deaths over the past five years. The historical residuals are converted to month-to-month differences and used as input series to the modeling process. Models for the residual series are then fit and forecasted using X-13 ARIMA-SEATS software.¹¹ The residuals exhibit a seasonal pattern and may be negative for some months. This process is performed at the national level and for each individual state. Finally, differences between forecasts of the nationwide birth/death factors and the sum of the states' birth/death factors are reconciled through a ratio-adjustment procedure, and the factors are used in monthly estimation of payroll employment in 2017. The updated birth/death factors are also used as inputs to produce the revised estimates of payroll employment for October 2016 to December 2016.

Seasonal adjustment

CES State and Area payroll employment data are seasonally adjusted by a two-step process.¹² BLS uses the X-13 ARIMA-SEATS program to remove the seasonal component of month-to-month employment changes. This process uses the seasonal trends found in census-derived employment counts to adjust historical benchmark employment data while also incorporating sample-based seasonal trends to adjust sample-based employment estimates. These two series are independently adjusted then spliced together at the benchmark month (in this case

¹⁰ Technical information on the estimation methods used to account for employment in business births and deaths is available at <https://www.bls.gov/web/empsit/cesbd.htm>.

¹¹ Further information on the X-13 ARIMA-SEATS is available on the US Census Bureau website at <https://www.census.gov/srd/www/x13as/>.

¹² Research from the Dallas Federal Reserve has shown that CES benchmarked population data exhibits a seasonal pattern different from the sample-based estimates. Please see Berger, Franklin D. and Keith R. Phillips (1994) "Solving the Mystery of the Disappearing January Blip in State Employment Data," Federal Reserve Bank of Dallas, Economic Review, April, 53-62, available at <http://www.dallasfed.org/assets/documents/research/er/1994/er9402d.pdf>.

September 2016).¹³ By accounting for the differing seasonal patterns found in historical benchmark employment data and the sample-based employment estimates, this technique yields improved seasonally adjusted series with respect to analysis of month-to-month employment change.¹⁴ Seasonally adjusted employment data for the most recent 13 months are published regularly in table D-1.¹⁵

The aggregation method of seasonally adjusted data is based upon the availability of underlying industry data. For all 50 states, the District of Columbia, and Puerto Rico, the following series are sums of underlying industry data: total private, goods-producing, service-providing, and private service-providing. The same method is applied for the Virgin Islands with the exception of goods-producing, which is independently seasonally adjusted because of data limitations. For all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands, data for manufacturing, trade, transportation, and utilities, financial activities, education and health services, leisure and hospitality, and government are aggregates wherever exhaustive industry components are available; otherwise these industries' employment data are directly seasonally adjusted. In a very limited number of cases, the not seasonally adjusted data for mining, construction, manufacturing, trade, transportation, and utilities, financial activities, education and health services, leisure and hospitality, and government do not exhibit enough seasonality to be adjusted; in those cases the not seasonally adjusted data are used to sum to higher level industries. The seasonally adjusted total nonfarm data for all metropolitan statistical areas (MSAs) and metropolitan divisions are not an aggregation but are derived directly by applying the seasonal adjustment procedure to the not seasonally adjusted total nonfarm level.¹⁶

Variable survey intervals

BLS utilizes special model adjustments to control for survey interval variations, sometimes referred to as the 4 vs. 5 week effect, for all nonfarm seasonally adjusted series. Although the CES survey is referenced to a consistent concept, the pay period including the 12th day of each month, inconsistencies arise because there are sometimes 4 and sometimes 5 weeks between the weeks including the 12th day in a given pair of months. In highly seasonal industries, these variations can be an important determinant of the magnitude of seasonal hires or layoffs that have occurred at the time the survey is taken.¹⁷

Area updates

With the 2014 benchmark, CES updated its area definitions to reflect new area delineations announced by the Office of Management and Budget (OMB) based on the application of new data standards from the 2010 Census.¹⁸ For new areas resulting from the BLS update in the 2014 benchmark to official 2010 area delineations, only two years of published sample data are available as inputs to the two-step seasonal adjustment process. Therefore, BLS will not be publishing any seasonally adjusted data for these areas for at least one more year.¹⁹

For redelineated areas, BLS conducted research to test for breaks in the seasonality of new series. The goal was to balance the statistical integrity of what is published with the overall demand for seasonally adjusted data. BLS determined in 2015, through a number of statistical tests for series breaks, that most areas that had an absolute compositional change equal to or more than 4 percent would be more certain of having a break in the seasonality of the sample-based series, and therefore not be eligible for seasonal adjustment. Further research was conducted in 2016 after additional sample data were available and it was determined that a cut-off of 4 percent was too conservative. Therefore, 55 areas that did not meet these requirements in 2015 or 2016 are now eligible for publication in 2017, while 5 areas will continue to not be published on a seasonally adjusted basis for 2017 until more sample-based data become available (see Appendix tables A1 and A2).

¹³ The two-step seasonal adjustment process is explained in detail by Scott, Stuart; Stamas, George; Sullivan, Thomas; and Paul Chester (1994), "Seasonal Adjustment of Hybrid Economic Time Series," *Proceedings of the Section on Survey Research Methods*, American Statistical Association, available at <https://www.bls.gov/osmr/abstract/st/st940350.htm>.

¹⁴ A list of all seasonally adjusted employment series is available at <https://www.bls.gov/sae/saeseries.htm>.

¹⁵ Table D-1 can be viewed at <https://www.bls.gov/sae/tables.htm>.

¹⁶ A list of BLS MSAs is available at <https://download.bls.gov/pub/time.series/sm/sm.area>.

¹⁷ For more information on the presence and treatment of calendar effects in CES data, see <https://www.bls.gov/ore/pdf/st960190.pdf>.

¹⁸ For a summary of changes to statistical areas made with the 2014 benchmark, see www.bls.gov/sae/benchmark2015.pdf.

¹⁹ The X-13 ARIMA-SEATS software used by BLS requires a minimum of 3 years of data to process a time series. A list of new areas added in the 2014 benchmark is available in table A3 of the Appendix.

Benchmark revisions

Revisions by industry

The magnitude of benchmark revisions is commonly gauged by the percentage difference between the sample-based estimates of payroll employment and the revised benchmark payroll employment levels for March of the benchmark year, presently March 2016. As noted earlier, the average absolute percentage revision across all states for total nonfarm payroll employment is 0.4 percent for March 2016. This compares to the average of 0.5 percent for the same measure during the five prior benchmark years of 2011 to 2015. For March 2016, the range of the percentage revision for total nonfarm payroll employment across all states is from -1.6 to 0.9 percent. (See table 1a.)

For December 2016, the average absolute percentage revision for state total nonfarm payroll employment is 0.5 percent. This compares to the average of 0.7 percent for the same measure during the five prior benchmark years of 2011 to 2015. The range of the percentage revision for state total nonfarm payroll employment is from -1.9 to 1.2 percent for December 2016. (See table 1a.)

Absolute level revisions provide further insight on the magnitude of benchmark revisions. Absolute level revisions are measured as the absolute difference between the sample-based estimates of payroll employment and the benchmark levels of payroll employment for March 2016. A relatively large benchmark revision in terms of percentage can correspond to a relatively small benchmark revision in terms of level due to the amount of employment in the industry.

Table 1a. Absolute percentage differences between state employment estimates and benchmarks by industry, March 2011–March 2016 and December 2016 (all values in percent)

Industry	Mar 2011	Mar 2012 ¹	Mar 2013 ²	Mar 2014	Mar 2015	Mar 2016	Dec 2016
Total nonfarm.....	0.5	0.7	0.4	0.5	0.4	0.4	0.5
Mining and logging.....	3.2	4.7	3.7	2.8	4.2	4.5	5.3
Construction.....	3.2	4.4	3.1	3.0	2.6	2.3	3.7
Manufacturing.....	1.4	1.5	1.4	1.2	1.3	1.3	1.5
Trade, transportation, and utilities.....	0.9	1.1	1.0	0.7	0.6	0.8	1.0
Information.....	2.4	3.2	2.2	2.0	2.6	3.0	3.7
Financial activities.....	1.9	2.2	1.6	2.0	1.9	2.3	2.4
Professional and business services.....	1.8	1.9	1.8	1.6	1.6	1.4	1.8
Education and health services.....	0.9	1.4	1.6	0.9	0.9	0.8	1.2
Leisure and hospitality.....	1.9	2.3	1.4	1.4	1.4	1.5	1.3
Other services.....	2.4	2.7	2.1	2.4	2.1	2.4	2.9
Government.....	0.7	1.0	0.7	0.9	0.7	0.5	0.8
Total nonfarm:							
Range.....	-1.8 to 1.4	-1.5 to 2.2	-0.7 to 2.9	-1.5 to 2.0	-1.8 to 1.3	-1.6 to 0.9	-1.9 to 1.2
Mean.....	0.2	0.6	0.3	0.1	(3)	-0.1	0.1
Standard deviation.....	0.6	0.7	0.6	0.6	0.5	0.6	0.7

¹ CES State and Area payroll employment estimates are typically replaced with census derived employment counts through the third quarter of the benchmark year. However, in the 2011 benchmark year, CES estimates were replaced only through the second quarter of 2011 (through June 2011). As a result, the March 2012 benchmark revisions reflect revisions to cumulatively more months of sample-based estimates than is typical, contributing to generally higher rates of revision. For more information, see <https://www.bls.gov/sae/benchmark2013.pdf>.

² The CES estimates in this column were subject to large revisions and historical reconstructions due to substantial reclassifications by the QCEW program in the financial activities and education and health services sectors. For more information, see https://www.bls.gov/news.release/archives/cewqtr_09262013.htm.

(3) Less than +/- 0.05 percent.

The following example demonstrates the necessity of considering both percentage revision and level revision when evaluating the magnitude of a benchmark revision in an industry. The average absolute percentage benchmark revisions across all states for information and for professional and business services are 3.7 and 1.8 percent, respectively, for December 2016. However, for December 2016, the absolute level revision across all states for the information industry is 1,700, while the absolute level revision across all states for the professional and business services industry is 5,900. (See table 1b.) Relying on a single measure to characterize the magnitude of benchmark revisions in an industry can potentially lead to an incomplete interpretation.

Table 1b. Absolute level differences between state employment estimates and benchmarks by industry, March 2011–March 2016 and December 2016 (all values payroll employment)

Industry	Mar 2011	Mar 2012 ¹	Mar 2013 ²	Mar 2014	Mar 2015	Mar 2016	Dec 2016
Total nonfarm.....	10,200	14,800	16,900	11,500	9,200	7,700	9,400
Mining and logging.....	500	600	600	400	800	500	800
Construction.....	3,300	4,200	2,700	2,800	2,500	2,700	3,800
Manufacturing.....	2,100	2,200	1,500	1,700	2,200	2,200	2,400
Trade, transportation, and utilities.....	2,800	3,900	3,900	2,600	2,700	3,300	3,400
Information.....	1,300	1,500	800	900	1,100	1,400	1,700
Financial activities.....	2,600	2,500	2,000	2,100	1,900	2,300	2,600
Professional and business services.....	4,700	5,500	4,100	3,900	5,100	4,400	5,900
Education and health services.....	3,000	4,600	12,000	3,400	3,700	3,000	4,600
Leisure and hospitality.....	3,100	5,200	2,900	3,500	2,600	2,900	2,900
Other services.....	1,900	2,300	2,000	2,000	1,800	1,800	2,200
Government.....	3,700	4,100	2,500	3,900	2,600	2,300	2,900
Total nonfarm:							
Range.....	-15,300 to 57,500	-28,900 to 59,400	-13,700 to 428,200	-40,800 to 103,800	-103,600 to 21,200	-26,500 to 40,400	-14,500 to 44,400
Mean.....	6,100	13,100	13,800	5,500	-2,400	200	4,200
Standard deviation.....	15,300	16,200	60,800	20,200	17,400	11,600	11,700

¹ CES State and Area payroll employment estimates are typically replaced with census derived employment counts through the third quarter of the benchmark year. However, in the 2011 benchmark year, CES estimates were replaced only through the second quarter of 2011 (through June 2011). As a result, the March 2012 benchmark revisions reflect revisions to cumulatively more months of sample-based estimates than is typical, contributing to generally higher rates of revision. For more information, see <https://www.bls.gov/sae/benchmark2013.pdf>.

² The CES estimates in this column were subject to large revisions and historical reconstructions due to substantial reclassifications by the QCEW program in the financial activities and education and health services sectors. For more information, see https://www.bls.gov/news.release/archives/cewqtr_09262013.htm.

Revisions by state

For March 2016, 22 states and the District of Columbia revised nonfarm payroll employment upward, while 28 states revised payroll employment downward. (See table 2 or map 1.)

For December 2016, 30 states and the District of Columbia revised nonfarm payroll employment upward, while 20 states revised payroll employment downward. (See table 2 or map 2.) The distribution of percent revisions for March 2016 and December 2016 can be found below. (See Exhibit 1.)

Table 2. Percent differences between nonfarm payroll employment benchmarks and estimates by state, March 2011–March 2016 and December 2016 (all values in percent)

State	Mar 2011	Mar 2012	Mar 2013	Mar 2014	Mar 2015	Mar 2016	Dec 2016
Alabama.....	-0.1	0.6	0.4	-0.1	-0.3	0.4	0.4
Alaska.....	-0.2	0.8	0.1	-0.2	0.2	-1.1	-1.2
Arizona.....	0.6	0.3	0.3	0.1	-0.2	-0.3	0.7
Arkansas.....	-1.1	1.2	-0.5	-0.7	-0.6	(1)	0.4
California.....	(1)	0.3	2.9	0.7	-0.7	(1)	0.1
Colorado.....	0.7	0.2	0.5	0.5	0.7	-0.5	-0.5
Connecticut.....	(1)	0.6	0.2	-0.1	-1.0	-0.2	-0.3
Delaware.....	0.7	0.1	0.2	0.3	0.4	-1.1	-1.2
District of Columbia.....	1.4	-0.8	1.1	0.3	0.4	0.9	0.1
Florida.....	0.5	0.5	0.3	-0.1	-0.2	0.5	0.3
Georgia.....	1.4	0.7	(1)	0.7	-0.3	-0.6	0.1
Hawaii.....	(1)	0.5	1.0	0.6	0.7	-0.7	-0.5
Idaho.....	-0.4	0.3	0.2	2.0	-0.4	(1)	1.0
Illinois.....	(1)	0.7	0.1	0.5	0.2	0.1	0.1
Indiana.....	0.7	0.7	-0.2	-0.1	-0.1	0.6	0.5
Iowa.....	-0.2	0.8	-0.1	(1)	-0.5	-0.3	-0.7
Kansas.....	1.2	0.9	-0.2	0.5	-0.2	0.9	1.0
Kentucky.....	-0.3	-0.1	-0.3	0.3	-0.6	-0.2	0.8
Louisiana.....	0.9	-1.5	-0.1	0.5	0.3	(1)	-0.5
Maine.....	-0.4	0.3	(1)	-0.7	0.3	0.6	1.0
Maryland.....	1.1	-0.2	-0.4	-0.3	-0.2	-0.1	0.7
Massachusetts.....	0.3	1.3	1.2	0.1	0.5	0.5	(1)
Michigan.....	0.2	1.1	0.9	1.1	-0.6	-0.5	0.1
Minnesota.....	0.8	0.8	(1)	-0.6	-0.1	0.1	0.1
Mississippi.....	-0.4	1.1	-0.7	(1)	0.2	0.1	0.8
Missouri.....	-0.4	0.4	1.1	-1.5	0.4	0.7	0.7
Montana.....	-0.7	2.1	0.6	0.2	1.3	0.8	1.2
Nebraska.....	-0.6	1.5	1.3	0.7	(1)	-0.2	0.1
Nevada.....	-0.1	0.4	0.5	-0.6	0.7	0.2	1.1
New Hampshire.....	(1)	0.8	(1)	-0.3	-0.1	(1)	0.1
New Jersey.....	-0.2	0.3	-0.1	0.5	(1)	-0.2	0.5
New Mexico.....	(1)	-0.2	0.2	0.5	-0.4	0.2	0.6
New York.....	0.7	(1)	(1)	0.6	0.1	0.4	0.5
North Carolina.....	0.8	0.3	-0.3	-0.1	-0.5	0.1	0.4
North Dakota.....	0.3	2.0	-0.2	-1.4	-1.8	-1.6	-1.2
Ohio.....	-0.3	0.6	0.9	0.4	0.1	-0.2	-0.3
Oklahoma.....	(1)	1.5	0.4	-0.3	0.5	-0.5	-0.4
Oregon.....	-0.3	0.7	0.2	-0.4	(1)	0.1	-0.7
Pennsylvania.....	0.3	0.4	(1)	0.2	-0.1	-0.2	0.2
Rhode Island.....	(1)	1.7	0.4	-0.2	0.1	(1)	(1)
South Carolina.....	0.3	0.3	0.2	0.5	-0.2	-0.1	0.3
South Dakota.....	0.5	1.4	-0.1	0.8	(1)	-0.1	-0.6
Tennessee.....	0.7	0.8	-0.2	0.4	0.4	(1)	0.2
Texas.....	-0.1	0.5	(1)	0.1	0.1	0.1	(1)
Utah.....	0.2	0.9	-0.2	-0.1	-0.2	0.3	0.8
Vermont.....	-1.8	0.5	0.1	(1)	-0.8	-1.5	-0.7
Virginia.....	0.5	0.1	0.3	-0.3	0.6	-0.3	-0.3
Washington.....	0.1	0.1	1.9	0.6	-0.6	-0.4	-0.1
West Virginia.....	0.4	1.0	-0.7	-0.9	1.3	-1.2	-1.9
Wisconsin.....	0.1	2.2	0.6	-0.3	0.2	-0.2	-0.1
Wyoming.....	0.1	1.0	0.4	-0.7	-0.4	0.4	-0.7

(1) Less than +/- 0.05 percent

Exhibit 1. Distribution of percent revisions March 2016 and December 2016 (all values in percent)

Percentiles of Percent Revisions	March 2016	December 2016
20th percentile.....	-0.4	-0.5
40th percentile.....	-0.2	0.0
60th percentile.....	0.0	0.2
80th percentile.....	0.4	0.7
100th percentile.....	0.9	1.2

Revisions by metropolitan statistical areas (MSAs)

For all metropolitan statistical areas (MSAs) published by the CES program, the percentage revisions ranged from -12.4 to 4.8 percent, with an average absolute percentage revision of 1.1 percent across all MSAs for March 2016. (See table 3a.) Comparatively, at the statewide level the range was -1.6 to 0.9 percent, with an average absolute percentage revision of 0.4 percent for March 2016. (See table 1a.) As MSA size decreases so does the sample size, resulting in larger relative standard errors and therefore increasing both the range of percentage revisions and the average absolute percentage revision. Metropolitan areas with 1 million or more employees during March 2016 had an average absolute revision of 0.4 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.3 percent. (See table 3a.)

For December 2016, the percentage revisions ranged from -12.4 to 5.4 percent, with an average absolute percentage revision of 1.4 percent across all published MSAs. (See table 3b.) Comparatively, at the statewide level the range was -1.9 to 1.2 percent, with an average absolute percentage revision of 0.5 percent for December 2016. (See table 1a.) As noted previously, both the range of percentage revisions and the average absolute percentage revision generally increase as the amount of employment in an MSA decreases. Metropolitan areas with 1 million or more employees during December 2016 had an average absolute revision of 0.7 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.7 percent. (See table 3b.)

Table 3a. Benchmark revisions for nonfarm employment in metropolitan areas, March 2016

Measure	All MSAs	MSAs grouped by level of total nonfarm employment			
		Less than 100,000	100,000 to 499,999	500,000 to 999,999	1 million or more
Number of MSAs.....	387 ¹	189	146	20	32
Average absolute percentage revision.....	1.1	1.3	0.9	0.6	0.4
Range.....	-12.4 to 4.8	-12.4 to 4.8	-3.6 to 4.2	-1.4 to 2	-1 to 1.3
Mean.....	-0.2	-0.5	0.1	0.3	0.1
Standard deviation.....	1.5	1.8	1.2	0.8	0.5

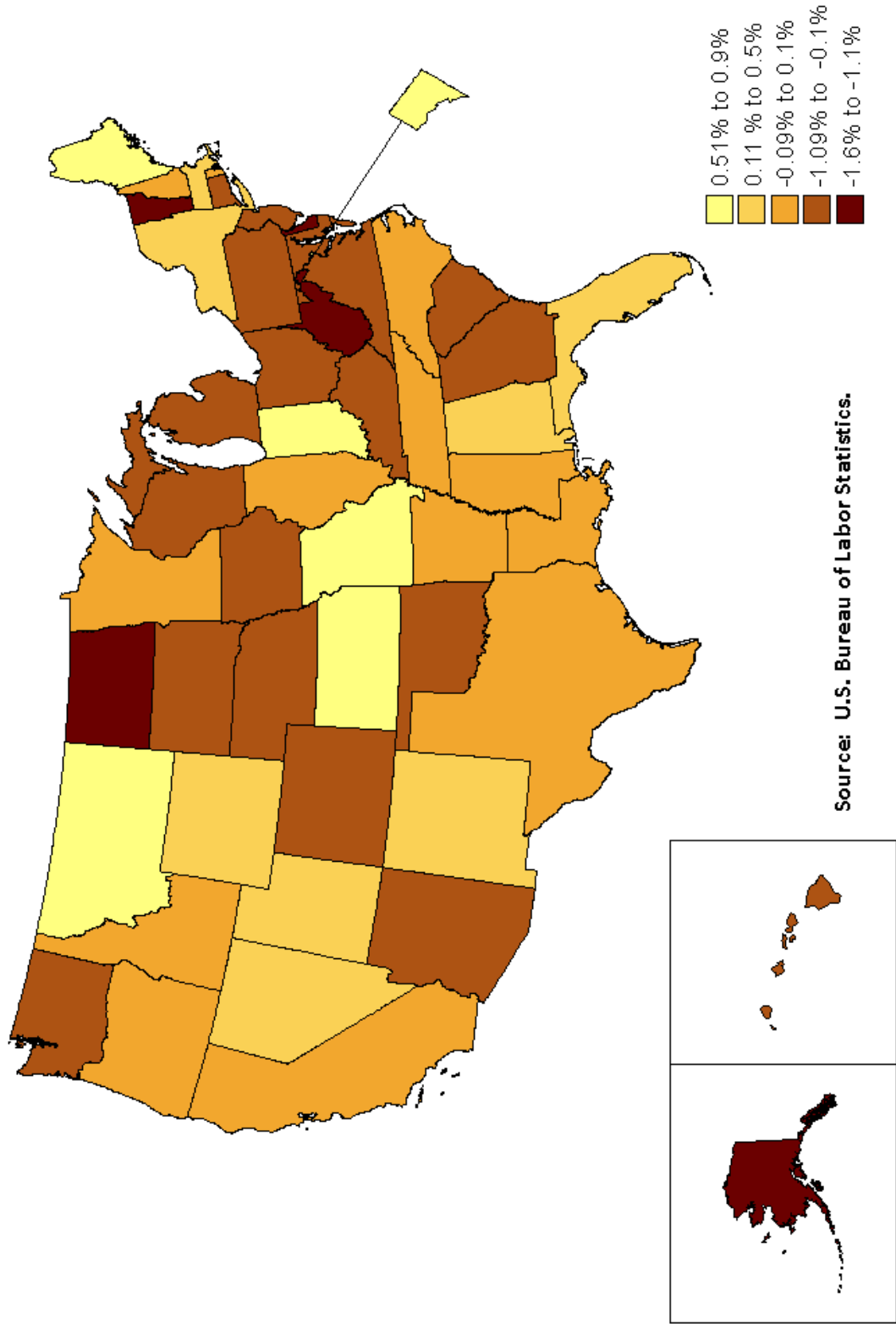
¹ Does not include Enid, OK.

Table 3b. Benchmark revisions for nonfarm employment in metropolitan areas, December 2016

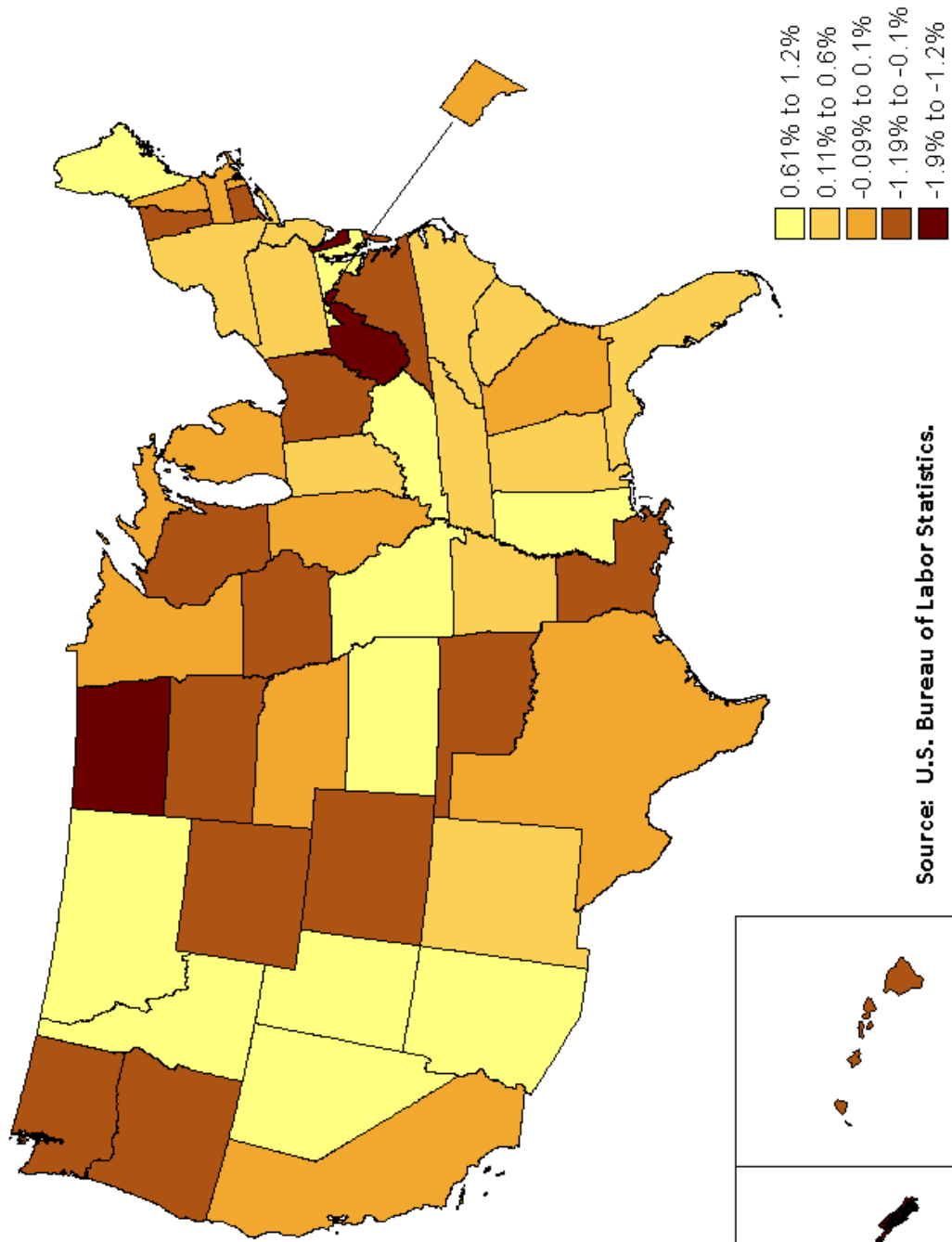
Measure	All MSAs	MSAs grouped by level of total nonfarm employment			
		Less than 100,000	100,000 to 499,999	500,000 to 999,999	1 million or more
Number of MSAs.....	387 ¹	189	146	20	32
Average absolute percentage revision.....	1.4	1.7	1.3	0.7	0.7
Range.....	-12.4 to 5.4	-12.4 to 5.4	-3.9 to 4.7	-1 to 1.7	-1.3 to 2.5
Mean.....	0.0	-0.2	0.3	0.4	0.3
Standard deviation.....	1.9	2.3	1.6	0.8	0.9

¹ Does not include Enid, OK.

Map 1. Percent differences between nonfarm payroll employment benchmarks and estimates by State, March 2016



Map 2. Percent differences between nonfarm payroll employment benchmarks and estimates by State, December 2016



Appendix

Table A1. Redelineated areas published seasonally adjusted beginning in 2017

Area Code	Area Title	Area Code	Area Title
10380	Aguadilla-Isabela, PR	37620	Parkersburg-Vienna, WV
14010	Bloomington, IL	38540	Pocatello, ID
14020	Bloomington, IN	38660	Ponce, PR
14540	Bowling Green, KY	40340	Rochester, MN
16620	Charleston, WV	41884	San Francisco-Redwood City-South San Francisco, CA Metropolitan Division
16740	Charlotte-Concord-Gastonia, NC-SC	43340	Shreveport-Bossier City, LA
16974	Chicago-Naperville-Arlington Heights, IL Metropolitan Division	43580	Sioux City, IA-NE-SD
18880	Crestview-Fort Walton Beach-Destin, FL	43900	Spartanburg, SC
19660	Deltona-Daytona Beach-Ormond Beach, FL	44060	Spokane-Spokane Valley, WA
21060	Elizabethtown-Fort Knox, KY	45500	Texarkana, TX-AR
21780	Evansville, IN-KY	47020	Victoria, TX
24340	Grand Rapids-Wyoming, MI	47580	Warner Robins, GA
24780	Greenville, NC	48900	Wilmington, NC
24860	Greenville-Anderson-Mauldin, SC	49180	Winston-Salem, NC
25060	Gulfport-Biloxi-Pascagoula, MS	72104	Brockton-Bridgewater-Easton, MA NECTA Division
26580	Huntington-Ashland, WV-KY-OH	72850	Danbury, CT NECTA
26820	Idaho Falls, ID	73050	Dover-Durham, NH-ME NECTA
27180	Jackson, TN	73604	Haverhill-Newburyport-Amesbury Town, MA-NH NECTA Division
28940	Knoxville, TN	74804	Lowell-Billerica-Chelmsford, MA-NH NECTA Division
29020	Kokomo, IN	75550	New Bedford, MA NECTA
29180	Lafayette, LA	76524	Peabody-Salem-Beverly, MA NECTA Division
31540	Madison, WI	76600	Pittsfield, MA NECTA
34100	Morristown, TN	76900	Portsmouth, NH-ME NECTA
34820	Myrtle Beach-Conway-North Myrtle Beach, SC-NC	78100	Springfield, MA-CT NECTA
35084	Newark, NJ-PA Metropolitan Division	78700	Waterbury, CT NECTA
35614	New York-Jersey City-White Plains, NY-NJ Metropolitan Division	79600	Worcester, MA-CT NECTA
36260	Ogden-Clearfield, UT	93562	Orange-Rockland-Westchester, NY
37460	Panama City, FL		

Table A2. Redelineated areas not published seasonally adjusted in 2017

Area Code	Area Title	Area Code	Area Title
31740	Manhattan, KS	74204	Lawrence-Methuen Town-Salem, MA-NH NECTA Division
37964	Philadelphia, PA Metropolitan Division ¹	78254	Taunton-Middleborough-Norton, MA NECTA Division
41540	Salisbury, MD-DE		

¹ Redelineated and added to BLS published areas.

Table A3. New areas added to CES publication in 2015 not published seasonally adjusted

Area Code	Area Title	Area Code	Area Title
10540	Albany, OR	25940	Hilton Head Island-Bluffton-Beaufort, SC
11640	Arecibo, PR	26140	Homosassa Springs, FL
13220	Beckley, WV	27980	Kahului-Wailuku-Lahaina, HI
14100	Bloomsburg-Berwick, PA	33220	Midland, MI
15680	California-Lexington Park, MD	33874	Montgomery County-Bucks County-Chester County, PA
16060	Carbondale-Marion, IL	35100	New Bern, NC
16540	Chambersburg-Waynesboro, PA	42034	San Rafael, CA
19300	Daphne-Fairhope-Foley, AL	42700	Sebring, FL
20524	Dutchess County-Putnam County, NY	43420	Sierra Vista-Douglas, AZ
20700	East Stroudsburg, PA	44420	Staunton-Waynesboro, VA
20994	Elgin, IL Metropolitan Division	45540	The Villages, FL
21420	Enid, OK ¹	47460	Walla Walla, WA
23900	Gettysburg, PA	48060	Watertown-Fort Drum, NY
24260	Grand Island, NE	74854	Lynn-Saugus-Marblehead, MA
24420	Grants Pass, OR	93565	Middlesex-Monmouth-Ocean, NJ
25220	Hammond, LA	97962	Delaware County, PA

¹ New MSA in 2017

Table B. Unified series structure detail

Dropped Series	Series Title	Recoded Series	Series Title
10210013	Oil and Gas Extraction, Well Drilling, and Support Activities	10211000	Oil and Gas Extraction
10210013	Oil and Gas Extraction, Well Drilling, and Support Activities	10213111	Drilling Oil and Gas Wells
10210013	Oil and Gas Extraction, Well Drilling, and Support Activities	10213112	Support Activities for Oil and Gas Operations
20230067	Building, Development, and General Contracting, and Heavy Construction	20236000	Construction of Buildings
20230067	Building, Development, and General Contracting, and Heavy Construction	20237000	Heavy and Civil Engineering Construction
31330012	Primary Metal and Fabricated Metal Product Manufacturing	31331000	Primary Metal Manufacturing
31330012	Primary Metal and Fabricated Metal Product Manufacturing	31332000	Fabricated Metal Product Manufacturing
31330035	Machinery and Electrical Equipment, Appliance, and Component Manufacturing	31333000	Machinery Manufacturing
31330035	Machinery and Electrical Equipment, Appliance, and Component Manufacturing	31335000	Electrical Equipment, Appliance, and Component Manufacturing
31330045	Computer and Electronic Product Manufacturing, and Electrical Equipment, Appliance, and Component Manufacturing	31334000	Computer and Electronic Product Manufacturing
31330045	Computer and Electronic Product Manufacturing, and Electrical Equipment, Appliance, and Component Manufacturing	31335000	Electrical Equipment, Appliance, and Component Manufacturing
31330049	Computer and Electronic Product Manufacturing, and Miscellaneous Manufacturing	31334000	Computer and Electronic Product Manufacturing

31330049	Computer and Electronic Product Manufacturing, and Miscellaneous Manufacturing	31339000	Miscellaneous Durable Goods Manufacturing
32310012	Food Manufacturing, and Beverage and Tobacco Product Manufacturing	32311000	Food Manufacturing
32310012	Food Manufacturing, and Beverage and Tobacco Product Manufacturing	32312000	Beverage and Tobacco Product Manufacturing
32310035	Textile Mills, Textile Mill Products, and Apparel Manufacturing	32313000	Textile Mills
32310035	Textile Mills, Textile Mill Products, and Apparel Manufacturing	32314000	Textile Product Mills
32310035	Textile Mills, Textile Mill Products, and Apparel Manufacturing	32315000	Apparel Manufacturing
32320023	Paper Manufacturing, and Printing and Related Support Activities	32322000	Paper Manufacturing
32320023	Paper Manufacturing, and Printing and Related Support Activities	32323000	Printing and Related Support Activities
32320045	Petroleum and Coal Products Manufacturing, and Chemical Manufacturing	32324000	Petroleum and Coal Products Manufacturing
32320045	Petroleum and Coal Products Manufacturing, and Chemical Manufacturing	32325000	Chemical Manufacturing
32320046	Petroleum and Coal Products Manufacturing, and Plastics and Rubber Products Manufacturing	32324000	Petroleum and Coal Products Manufacturing
32320046	Petroleum and Coal Products Manufacturing, and Plastics and Rubber Products Manufacturing	32326000	Plastics and Rubber Products Manufacturing
42440082	Clothing and Clothing Accessory Stores, and General Merchandise Stores	42448000	Clothing and Clothing Accessories Stores
42440082	Clothing and Clothing Accessory Stores, and General Merchandise Stores	42452000	General Merchandise Stores
43480023	Trucking, Couriers and Messengers, and Warehousing and Storage	43484000	Truck Transportation
43480023	Trucking, Couriers and Messengers, and Warehousing and Storage	43492000	Couriers and Messengers
43480023	Trucking, Couriers and Messengers, and Warehousing and Storage	43493000	Warehousing and Storage
55520012	Credit Intermediation and Related Activities, and Monetary Authorities	55522000	Credit Intermediation and Related Activities including Monetary Authorities - Central Bank
55520045	Insurance Carriers and Related Activities, and Funds and Trusts	55524000	Insurance Carriers and Related Activities
55520045	Insurance Carriers and Related Activities, and Funds and Trusts	55523000	Financial Investments and Related Activities including Financial Vehicles
65620013	Health Care	65621000	Ambulatory Health Care Services
65620013	Health Care	65622000	Hospitals
65620013	Health Care	65623000	Nursing and Residential Care Facilities

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Additional information

Historical state and area employment, hours, and earnings data are available on the BLS website at www.bls.gov/sae. Inquiries for additional information on the methods or estimates derived from the CES survey should be sent by email to sminfo@bls.gov. Assistance and response to inquiries by telephone is available Monday through Friday, during the hours of 8:30 am to 4:30 pm EST by dialing (202) 691-6559.