Revisions in State Establishment-based Employment Estimates Effective January 2019

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Introduction

With the release of the payroll employment estimates for January 2019, nonfarm payroll employment, hours, and earnings data for states and areas were revised to reflect the incorporation of the 2018 benchmarks and the recalculation of seasonal adjustment factors. The revisions affect all not seasonally adjusted data from April 2017 to December 2018, all seasonally adjusted data from January 2014 to December 2018[1], and select series subject to historical revisions before April 2017. This article provides background information on benchmarking methods, business birth/death modeling, seasonal adjustment of employment data, and details of the effects of the 2018 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 2018. This is in line with the average of 0.4 percent for the same measure during the five prior benchmark years of 2013 to 2017. For March 2018, the range of the percentage revision for total nonfarm payroll employment across all states is from -4.4 to 1.4 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 142,000 businesses and government agencies, representing approximately 689,000 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 about 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 size and variance, 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 2018, 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 2017 to September 2018.

UI tax reports are not collected on a timely enough basis to replace CES payroll estimates for the fourth quarter, October 2018 to December 2018. For this period, estimates are revised using the new September 2018 series level derived from the census employment counts. New sample-based estimates are developed from those levels that incorporate updated business birth/death factors.[5]

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[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.

[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 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.

Changes to CES published series

Special notice regarding QCEW recoding

Each first quarter, the QCEW program updates industry assignments to improve the classifications of establishments. In first quarter 2018, approximately 66,000 units were reclassified out of NAICS 425120, Wholesale Electronics Markets and Agents and Brokers. These units moved into other series across all supersectors but were mostly recoded to the wholesale trade, retail trade, transportation and warehousing, and professional and business services industry sectors. Affected CES series were reconstructed, using QCEW microdata back to January 1990 where possible.

Metropolitan statistical area (MSA) updates

CES updated its list of covered areas to include Twin Falls, Idaho beginning in early 2019 with the release of the 2018 benchmark. This was formerly a micropolitan statistical area that now meets the Office of Management and Budget (OMB) criteria to qualify as a metropolitan statistical area (MSA).[6] Due to the availability of only one year of sample history, BLS will not publish any seasonally adjusted data for this area for at least two more years.

Special notice regarding South Carolina Employment and Wages Data

1st, 2nd and 3rd quarter 2018 QCEW data for South Carolina are showing unusual movements, potentially as a result of a change in reporting. These unusual movements coincide with a modernization of the South Carolina unemployment insurance system. BLS is working with its South Carolina partners to identify any impact this system change may have. QCEW data are considered to be preliminary until the release of their final revision.[7]

For the 2018 benchmark, we replaced South Carolina's sample-based estimates from April 2017 through March 2018 with administrative data derived from QCEW. We applied existing CES sample links to the new benchmark level (March 2018) starting with April 2018 through September 2018. Normal estimation procedures, including new or revised microdata and updated birth/death factors were resumed for October 2018 through December 2018. This process was also used for the metropolitan statistical areas wholly in South Carolina. Two metropolitan statistical areas that are partially in South Carolina, Augusta-Richmond County, GA-SC and Charlotte, Concord-Gastonia, NC-SC do contain 2nd and 3rd quarter QCEW employment from South Carolina. Most of the employment in these areas is in Georgia and North Carolina, but South Carolina does contribute a small portion. Unusual movements in these small South Carolina portions could contribute to larger than average revisions for these two areas.

Any summary statistics, including those in tables 1a and 1b (industry), 3a and 3b (areas), and exhibit 1 do not include revisions for South Carolina or metropolitan areas wholly contained within the state. Revisions for Augusta-Richmond County, GA-SC and Charlotte, Concord-Gastonia, NC-SC are included. Benchmark revisions were calculated for South Carolina, for both March and December 2018 and are presented in table 2 but should be interpreted with caution.

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. 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

[6] MSA delineations may be found at https://www.bls.gov/sae/saemsa.htm.
[7] For final revision dates for QCEW Data see https://www.bls.gov/cew/2018-notice-regarding-south-carolina-employment-and-wages-data.htm.

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.[8]

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.[9] 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 2019. The updated birth/death factors are also used as inputs to produce the revised estimates of payroll employment for October 2018 to December 2018.

Seasonal adjustment

CES state and area payroll employment data are seasonally adjusted by a two-step process.[10] BLS uses the X-13 ARIMA-SEATS program to remove the seasonal component of employment time series. 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 September 2018).[11] 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.[12] Seasonally adjusted employment data for the most recent 13 months are published regularly in table D-1.

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 U.S. 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 U.S. 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

[8] 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.
[9] Further information on X-13 ARIMA-SEATS is available on the Census Bureau website at https://www.census.gov/srd/www/x13as/.
[10] 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.
[11] 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.
[12] A list of all seasonally adjusted employment series is available at https://www.bls.gov/sae/saeseries.htm.

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.[13]

BLS implemented concurrent seasonal adjustment for CES state and area data in 2018. This method uses all available estimates, including those for the current month, in developing sample-based seasonal factors.[14] Concurrent sample-based seasonal factors are created every month for the current month's preliminary estimates as well as the previous month's final estimates in order to incorporate the real-time estimates.

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.[15]

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 2018. As noted earlier, the average absolute percentage revision across all states for total nonfarm payroll employment is 0.4 percent for March 2018. This is in line with the average of 0.4 percent for the same measure during the five prior benchmark years of 2013 to 2017. For March 2018, the range of the percentage revision for total nonfarm payroll employment across all states is from -4.4 to 1.4 percent. (See table 1a.)

For December 2018, the average absolute percentage revision for state total nonfarm payroll employment is 0.6 percent. This is in line with the average of 0.6 percent for the same measure during the five prior benchmark years of 2013 to 2017. The range of the percentage revision for state total nonfarm payroll employment is from -3.6 to 1.4 percent for December 2018. (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 2018. 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.

[13] A list of BLS MSAs is available at https://download.bls.gov/pub/time.series/sm/sm.area.

[14] Technical information on concurrent seasonal adjustment for CES state and area data can be found at https://www.bls.gov/sae/saeconcurrent.htm.

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

Table 1a. Absolute percentage differences between state employment estimates and benchmarks by industry, not seasonally adjusted, March 2013–March 2018 and December 2018 (all values in percent)

Industry	Mar. 2013[2]	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018[3]	Dec. 2018[3]
Total nonfarm	0.4	0.5	0.4	0.4	0.4	0.4	0.6
Mining and logging	3.7	2.8	4.2	4.5	3.7	3.6	4.4
Construction	3.1	3.0	2.6	2.3	2.5	2.1	3.1
Manufacturing	1.4	1.2	1.3	1.3	1.3	1.2	1.5
Trade, transportation, and utilities	1.0	0.7	0.6	0.8	0.7	1.0	1.3
Information	2.2	2.0	2.6	3.0	2.7	2.2	2.7
Financial activities	1.6	2.0	1.9	2.3	1.6	1.5	2.2
Professional and business services	1.8	1.6	1.6	1.4	1.5	1.3	1.6
Education and health services	1.6	0.9	0.9	0.8	0.8	0.8	0.9
Leisure and hospitality	1.4	1.4	1.4	1.5	1.6	1.3	1.8
Other services	2.1	2.4	2.1	2.4	2.7	4.4	5.2
Government	0.7	0.9	0.7	0.5	0.8	0.8	1.2
Total nonfarm:							
Range	-0.7 to 2.9	-1.5 to 2.0	-1.8 to 1.3	-1.6 to 0.9	-1.0 to 1.2	-4.4 to 1.4	-3.6 to 1.4
Mean	0.3	0.1	(1)	-0.1	-0.1	-0.1	-0.5
Standard deviation	0.6	0.6	0.5	0.6	0.5	0.8	0.7

(1) Less than +/- 0.05 percent

[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] These summary statistics do not include revisions for South Carolina. See the changes to CES published series section for more information.

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 2.7 and 1.6 percent, respectively, for December 2018. However, for December 2018, the absolute level revision across all states for the information industry is 1,200, while the absolute level revision across all states for the professional and business services industry is 5,000. (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, not seasonally adjusted, March 2013–March 2018 and December 2018 (all values payroll employment)

Industry	Mar. 2013[1]	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018[2]	Dec. 2018[2]
Total nonfarm	16,900	11,500	9,200	7,700	7,100	9,200	14,800
Mining and logging	600	400	800	500	500	300	800
Construction	2,700	2,800	2,500	2,700	2,200	2,300	3,400
Manufacturing	1,500	1,700	2,200	2,200	2,200	1,900	2,700
Trade, transportation, and utilities	3,900	2,600	2,700	3,300	2,600	4,900	6,600
Information	800	900	1,100	1,400	1,000	1,200	1,200
Financial activities	2,000	2,100	1,900	2,300	1,600	1,500	2,200
Professional and business services	4,100	3,900	5,100	4,400	3,300	4,000	5,000
Education and health services	12,000	3,400	3,700	3,000	3,200	3,100	3,200
Leisure and hospitality	2,900	3,500	2,600	2,900	3,400	3,000	4,500
Other services	2,000	2,000	1,800	1,800	2,200	2,400	3,200
Government	2,500	3,900	2,600	2,300	3,000	3,400	5,500
Total nonfarm:							
Range	-13,700 to 428,200	-40,800 to 103,800	-103,600 to 21,200	-26,500 to 40,400	-44,900 to 16,400	-37,600 to 66,500	-107,300 to 15,400
Mean	13,800	5,500	-2,400	200	-2,300	1,200	-12,500
Standard deviation	60,800	20,200	17,400	11,600	11,000	16,200	21,200

[1] 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.

[2] These summary statistics do not include revisions for South Carolina. See the changes to CES published series section for more information.

Revisions by state

For March 2018, 24 states revised nonfarm payroll employment upward, while 26 states and the District of Columbia revised payroll employment downward. (See table 2 or map 1.)

For December 2018, 11 states revised nonfarm payroll employment upward, while 39 states and the District of Columbia revised payroll employment downward. (See table 2 or map 2.) The distribution of percent revisions for March 2018 and December 2018 can be found in exhibit 1.

Table 2. Percent differences between nonfarm payroll employment benchmarks and estimates by state, not seasonally adjusted, March 2013–March 2018 and December 2018 (all values in percent)

State	Mar. 2013	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018	Dec. 2018
Alabama	0.4	-0.1	-0.3	0.4	0.8	0.2	-0.3
Alaska	0.1	-0.2	0.2	-1.1	0.2	-0.4	0.7
Arizona	0.3	0.1	-0.2	-0.3	0.5	0.4	0.1
Arkansas	-0.5	-0.7	-0.6	(1)	-0.2	1.4	0.9
California	2.9	0.7	-0.7	(1)	(1)	0.3	0.1
Colorado	0.5	0.5	0.7	-0.5	0.4	-0.2	-0.5
Connecticut	0.2	-0.1	-1.0	-0.2	-0.2	-0.2	-0.4
Delaware	0.2	0.3	0.4	-1.1	0.1	0.3	-0.6
District of Columbia	1.1	0.3	0.4	0.9	0.3	-0.1	-0.6
Florida	0.3	-0.1	-0.2	0.5	-0.1	(1)	(1)
Georgia	(1)	0.7	-0.3	-0.6	-0.8	0.3	-0.4
Hawaii	1.0	0.6	0.7	-0.7	0.4	-0.7	-1.1
Idaho	0.2	2.0	-0.4	(1)	0.4	-0.1	-0.1
Illinois	0.1	0.5	0.2	0.1	0.3	0.4	-0.1
Indiana	-0.2	-0.1	-0.1	0.6	-0.3	0.6	(1)
Iowa	-0.1	(1)	-0.5	-0.3	-0.5	-0.2	-0.3
Kansas	-0.2	0.5	-0.2	0.9	-0.4	-0.4	-0.6
Kentucky	-0.3	0.3	-0.6	-0.2	-0.9	0.2	-0.3
Louisiana	-0.1	0.5	0.3	(1)	0.1	0.2	-0.6
Maine	(1)	-0.7	0.3	0.6	0.2	0.4	-0.1
Maryland	-0.4	-0.3	-0.2	-0.1	-1.0	0.4	-0.3
Massachusetts	1.2	0.1	0.5	0.5	-0.2	0.2	-1.3
Michigan	0.9	1.1	-0.6	-0.5	-0.2	-0.1	-0.4
Minnesota	(1)	-0.6	-0.1	0.1	(1)	(1)	-0.5
Mississippi	-0.7	(1)	0.2	0.1	0.5	-1.1	-0.9
Missouri	1.1	-1.5	0.4	0.7	-0.3	-0.4	-1.0
Montana	0.6	0.2	1.3	0.8	-0.8	0.1	-0.2
Nebraska	1.3	0.7	(1)	-0.2	-0.2	-0.3	-1.0
Nevada	0.5	-0.6	0.7	0.2	0.8	0.4	0.1
New Hampshire	(1)	-0.3	-0.1	(1)	-0.3	-0.2	-1.7
New Jersey	-0.1	0.5	(1)	-0.2	(1)	-0.9	-0.8
New Mexico	0.2	0.5	-0.4	0.2	-0.8	0.1	-1.2
New York	(1)	0.6	0.1	0.4	0.1	0.7	0.2
North Carolina	-0.3	-0.1	-0.5	0.1	(1)	(1)	-0.9
North Dakota	-0.2	-1.4	-1.8	-1.6	-1.0	1.2	-0.1
Ohio	0.9	0.4	0.1	-0.2	(1)	-0.5	-1.3
Oklahoma	0.4	-0.3	0.5	-0.5	-0.1	0.1	-0.4
Oregon	0.2	-0.4	(1)	0.1	0.2	(1)	-0.7
Pennsylvania	(1)	0.2	-0.1	-0.2	(1)	(1)	-0.7
Rhode Island	0.4	-0.2	0.1	(1)	-0.7	-0.6	-1.4
South Carolina	0.2	0.5	-0.2	-0.1	0.5	0.8[2]	0.7[2]
South Dakota	-0.1	0.8	(1)	-0.1	-0.6	-0.3	-0.4
Tennessee	-0.2	0.4	0.4	(1)	-0.5	-0.1	(1)
Texas	(1)	0.1	0.1	0.1	-0.4	-0.3	-0.8
Utah	-0.2	-0.1	-0.2	0.3	-0.1	-0.1	0.1
Vermont	0.1	(1)	-0.8	-1.5	-0.7	-0.1	1.4
Virginia	0.3	-0.3	0.6	-0.3	-0.2	0.2	-0.6
Washington	1.9	0.6	-0.6	-0.4	-0.2	-0.2	-1.0
West Virginia	-0.7	-0.9	1.3	-1.2	0.2	-4.4	-3.6
Wisconsin	0.6	-0.3	0.2	-0.2	(1)	0.2	-0.7
Wyoming	0.4	-0.7	-0.4	0.4	1.2	-0.1	-0.9

(1) Less than +/- 0.05 percent

[2] Revisions for South Carolina are included in this table. Users are cautioned given the unusual movements in the SC QCEW data. See the changes to CES published series section for more information.

Exhibit 1. Distribution of percent revisions, March 2018 and December 2018 (all values in percent)

Percentiles of Percent Revisions	March 2018[2]	December 2018[2]
20th percentile.....	-0.3	-1.0
40th percentile.....	-0.1	-0.6
60th percentile.....	0.1	-0.4
80th percentile.....	0.3	(1)
100th percentile.....	1.4	1.4

(1) Less than +/- 0.05 percent

[2] These summary statistics do not include revisions for South Carolina. See the changes to CES published series section for more information.

Revisions by MSA

For all metropolitan statistical areas (MSAs) published by the CES program, the percentage revisions ranged from -6.1 to 5.5 percent, with an average absolute percentage revision of 1.0 percent across all MSAs for March 2018. (See table 3a.) Comparatively, at the statewide level the range was -4.4 to 1.4 percent, with an average absolute percentage revision of 0.4 percent for March 2018. (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 2018 had an average absolute revision of 0.4 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.2 percent. (See table 3a.)

For December 2018, the percentage revisions ranged from -8.4 to 7.9 percent, with an average absolute percentage revision of 1.3 percent across all published MSAs. (See table 3b.) Comparatively, at the statewide level the range was -3.6 to 1.4 percent, with an average absolute percentage revision of 0.6 percent for December 2018. (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 2018 had an average absolute revision of 0.6 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.6 percent. (See table 3b.)

Table 3a. Benchmark revisions for nonfarm employment in metropolitan areas for March 2018, not seasonally adjusted[2]

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…….	381	182	147	18	34
Average absolute percentage revision…….	1.0	1.2	0.9	0.5	0.4
Range……	-6.1 to 5.5	-6.1 to 4.8	-5.2 to 5.5	-1.3 to 1.7	-0.7 to 0.8
Mean.....	(1)	-0.1	0.2	0.1	0.1
Standard deviation…….....	1.4	1.7	1.2	0.7	0.4

(1) Less than +/- 0.05 percent

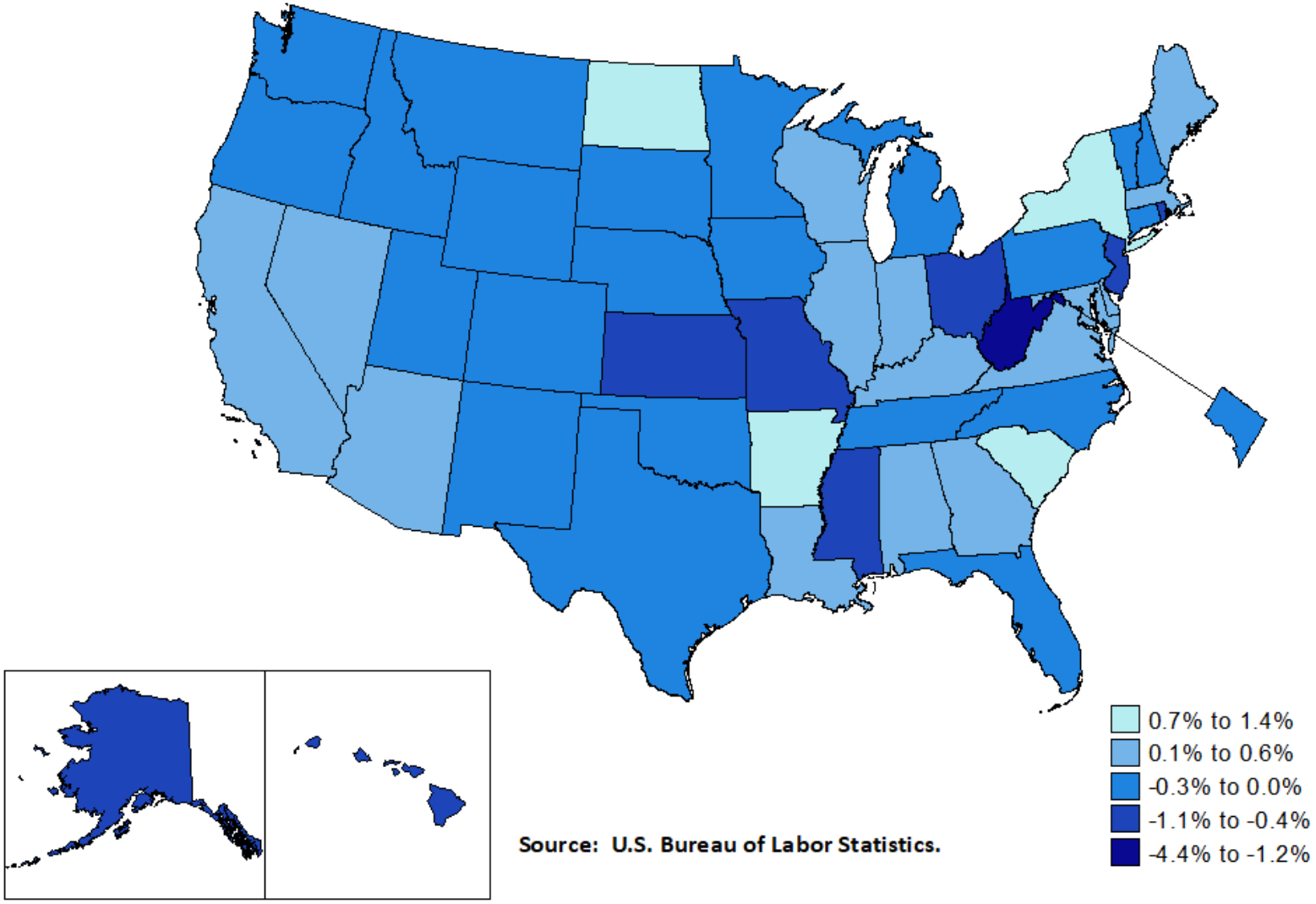
[2] These summary statistics do not include revisions for South Carolina. See the changes to CES published series section for more information.

Table 3b. Benchmark revisions for nonfarm employment in metropolitan areas for December 2018, not seasonally adjusted [1]

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……..	381	182	147	18	34
Average absolute percentage revision……..	1.3	1.6	1.2	0.7	0.6
Range…….	-8.4 to 7.9	-8.4 to 7.9	-5.4 to 7.5	-1.6 to 1.7	-1.7 to 1.6
Mean.....	-0.4	-0.4	-0.3	-0.4	-0.3
Standard deviation…….....	1.8	2.1	1.6	0.8	0.8

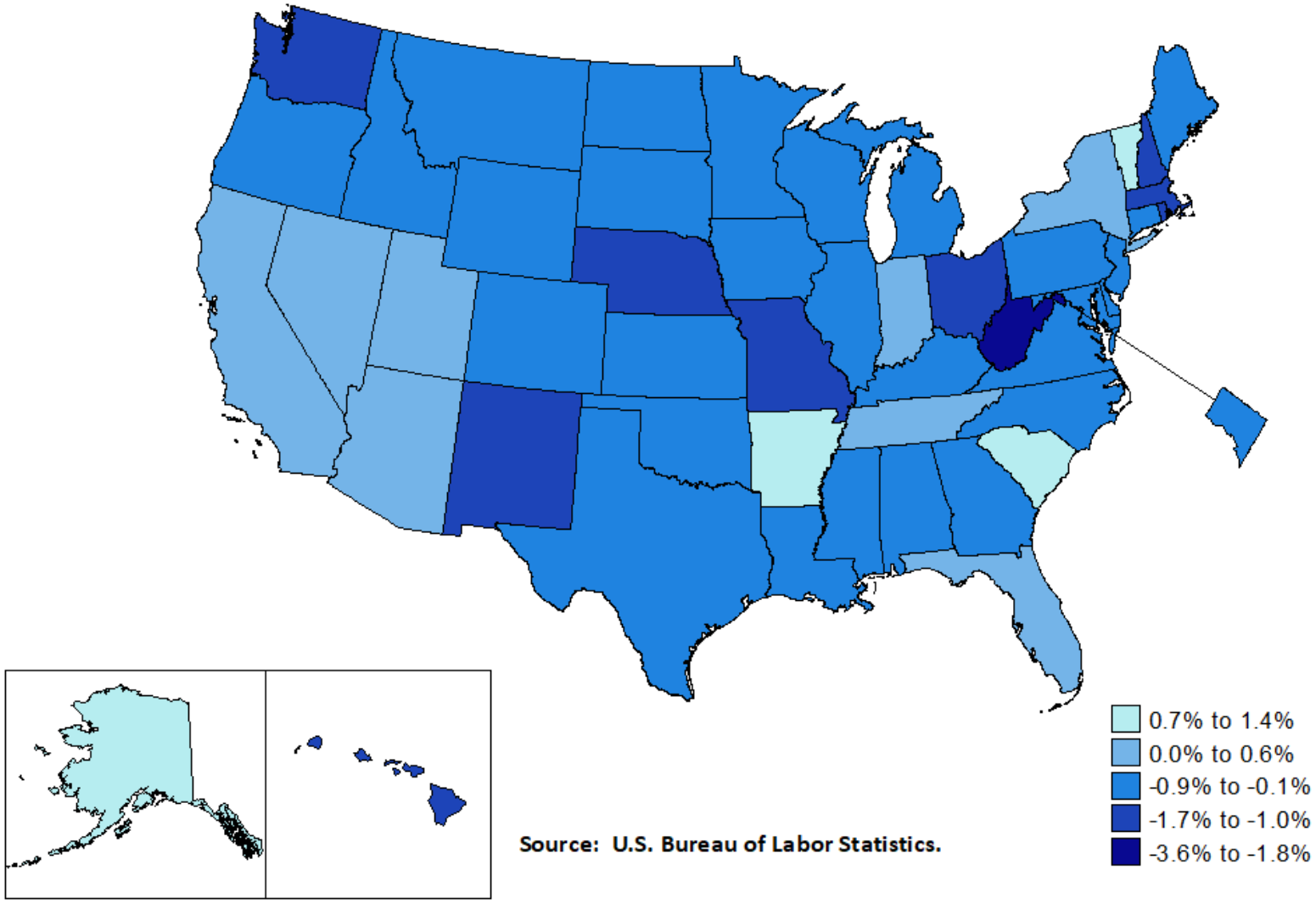
[1] These summary statistics do not include revisions for South Carolina. See the changes to CES published series section for more information.

Map 1. Percent differences between nonfarm payroll employment benchmarks and estimates by State, March 2018



Source: U.S. Bureau of Labor Statistics.

Map 2. Percent differences between nonfarm payroll employment benchmarks and estimates by State, December 2018



Source: U.S. Bureau of Labor Statistics.

Appendix

Table A1. New area added to CES publication in 2017, not published seasonally adjusted in 2019

Area Code	Area Title
21420	Enid, OK

Table A2. New area added to CES publication in 2019, not published seasonally adjusted in 2019

Area Code	Area Title
46300	Twin Falls, ID

Table of figures

Tables

Exhibits

Maps

Additional information

Historical state and area employment, hours, and earnings data are available on the BLS website at https://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.

Previously released benchmark articles for CES state and area data are available at https://www.bls.gov/sae/saebmk.htm.