

Revisions in State Establishment-based Employment Estimates Effective January 2020

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Introduction

With the release of the payroll employment estimates for January 2020, nonfarm payroll employment, hours, and earnings data for states and areas were revised to reflect the incorporation of the 2019 benchmarks and the recalculation of seasonal adjustment factors. The revisions affect all not seasonally adjusted data from April 2018 to December 2019, all seasonally adjusted data from January 2015 to December 2019¹, and select series subject to historical revisions before April 2018. This article provides background information on benchmarking methods, business birth/death modeling, seasonal adjustment of employment data, and details of the effects of the 2019 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 0.5 percent for September 2019. For September 2019, the range of the percentage revision for total nonfarm payroll employment across all states is from -2.1 to 0.9 percent.

Differences in seasonality exist between the population data and the sample-based data in the nonfarm payroll series. These differences are significant enough that the Current Employment Statistics Program (CES) must use a two-step seasonal adjustment process to develop its seasonally adjusted data for states and areas.

Given these differences, the benchmark revisions to the not seasonally adjusted September 2019 estimates are most appropriate to assess the reliability of the estimation process since that month is 12 months after the latest population data used with the release of the 2018 benchmark. Over a 12-month period the seasonal differences between the population and the sample-based data will largely be reconciled in the not seasonally adjusted data.

Benchmark methods

The 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 145,000 businesses and government agencies, representing approximately 697,000 individual worksites, in order to provide detailed industry level data on employment and the hours and earnings of employees on nonfarm payrolls at the national level, 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, includes all other sources of statistical errors in reporting and processing.

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.³ As part of the benchmark process for benchmark year 2019, census-derived employment counts replace CES payroll employment estimates for all subnational CES payroll employment estimates for the period from April 2018 to September 2019.

UI tax reports are not collected on a timely enough basis to replace CES payroll estimates for the fourth quarter, October 2019 to December 2019. For this period, estimates are revised using the new September 2019 series level

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/overview.htm>.

² Further information on the sample size for each state is available at <https://www.bls.gov/sae/additional-resources/current-employment-statistics-sample-by-state.htm>. Information on the national CES sample is available at <https://www.bls.gov/web/empsit/cestn.htm#tb3>.

³ Further information on the BLS Quarterly Census of Employment and Wages program is available at <https://www.bls.gov/cew/>.

derived from the census employment counts. New sample-based estimates are developed from those levels that incorporate updated business birth/death factors and new or revised microdata.⁴

Changes to CES published series

Robust estimation of data types other than all employees

Beginning with the 2019 post-benchmark and January 2020 preliminary state CES estimates, BLS implemented a refinement to the process for estimating average weekly hours, average hourly earnings, average weekly hours, and production employees for states and metropolitan areas. A standard statistical method was implemented to automatically identify highly influential reports and either reduce their weight in estimation or designate them as atypical, in which case they account only for themselves in the estimation process and are not used to represent other firms in the population.⁵ Previously a manual review process was required to identify atypical reports for these data types, whereas a similar, automated procedure has been in use to identify atypical and downweight reports in estimating all employee data since 2010. BLS applied the automated procedure to historical data and has updated the published estimates where the results of the automated procedure were considered to be a substantial improvement.

Special notice regarding Georgia employment and wages data

The preliminary version of third-quarter 2019 QCEW Georgia data that was available at the deadline for establishing the CES benchmark levels did not meet the usual quality standards for use as a CES benchmark file.

As a result, for the 2019 benchmark, BLS replaced Georgia's sample-based estimates from April 2018 through June 2019 with administrative data derived from QCEW. BLS applied existing CES sample links to the new benchmark level for July 2019 through September 2019. Normal estimation procedures, including new or revised microdata and updated birth/death factors, were resumed for October 2019 through December 2019. This process was also used for the metropolitan statistical areas estimated for Georgia which may contain employment from other surrounding states. The Chattanooga, TN-GA metropolitan statistical area contains third-quarter 2019 QCEW employment from Georgia. Most of the employment in this area is in Tennessee, but Georgia does contribute a small portion. Unusual movements in this small Georgia portion could contribute to larger than average revisions for this area.

The QCEW program continues to review and edit third-quarter data for its publication for several weeks after CES has published the benchmarked Georgia data. QCEW data are considered to be preliminary until the release of their final revision⁶.

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 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

⁴ 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>.

⁵ Additional information on the development of the robust estimation of data types other than all employees is available at <https://www.bls.gov/osmr/research-papers/2019/pdf/st190070.pdf>.

⁶ For more information on final revisions to QCEW data see Question 7 at <https://www.bls.gov/cew/questions-and-answers.htm>.

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.⁷

The second component relies upon 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 over the past five years. 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 historical residual of births and deaths. 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-13ARIMA-SEATS software.⁸ 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 2020. The updated birth/death factors are also used as inputs to produce the revised estimates of payroll employment for October 2019 to December 2019.

Seasonal adjustment

CES state and area payroll employment data are seasonally adjusted by a two-step process.⁹ BLS uses the X-13ARIMA-SEATS program to remove the seasonal component of employment time series. This process uses the seasonal patterns found in census-derived employment counts to adjust historical benchmark employment data while also incorporating sample-based seasonal patterns to adjust sample-based employment estimates. These two series are independently adjusted then spliced together at the benchmark month (in this case September 2019).¹⁰ 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.¹¹

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 nonfarm, 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 clear and stable 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)

⁷ 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>.

⁸ Further information on X-13ARIMA-SEATS is available on the Census Bureau website at <https://www.census.gov/srd/www/x13as/>.

⁹ 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>.

¹⁰ 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/research-papers/1994/st940350.htm>.

¹¹ A list of all seasonally adjusted employment series is available at <https://www.bls.gov/sae/additional-resources/list-of-published-state-and-metropolitan-area-series/home.htm>.

and metropolitan divisions are not calculated through aggregation but are derived directly by applying the seasonal adjustment procedure to the not seasonally adjusted total nonfarm level.¹²

The seasonal adjustment process requires three years of sample-based employment estimates for a series to be published seasonally adjusted. The Twin Falls, ID MSA was added to CES publication in 2019 and so will not be eligible for publication seasonally adjusted in 2020.

BLS uses concurrent seasonal adjustment for CES state and area data. This method uses all available estimates, including those for the current month, in developing sample-based seasonal factors.¹³ 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 uses 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.¹⁴

Benchmark revisions

Revisions by industry

As noted earlier, the average absolute percentage revision across all states for total nonfarm payroll employment is 0.5 percent for September 2019. For September 2019, the range of the percentage revision for total nonfarm payroll employment across all states is from -2.1 to 0.9 percent. (See table 1.)

Differences in seasonality exist between the population data and the sample-based data in the nonfarm payroll series. These differences are significant enough that CES must use a two-step seasonal adjustment process to develop its seasonally adjusted data for states and areas. Given these differences, the benchmark revisions to the not seasonally adjusted September 2019 estimates are most appropriate to assess the reliability of the estimation process since that month is 12 months after the latest population data used with the release of the 2018 benchmark. Over a 12-month period the seasonal differences between the population and the sample-based data will largely be reconciled in the not seasonally adjusted data.

Historical and current benchmark revisions both at the state and industry level for March and December are included in the appendix.

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 September 2019. 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.

¹² A list of BLS-published areas is available at <https://download.bls.gov/pub/time.series/sm/sm.area>.

¹³ Technical information on concurrent seasonal adjustment for CES state and area data can be found at <https://www.bls.gov/sae/seasonal-adjustment/implementation-of-concurrent-seasonal-adjustment-for-ces-state-and-area-estimates.htm>.

¹⁴ For more information on the presence and treatment of calendar effects in CES data, see <https://www.bls.gov/osmr/research-papers/1996/pdf/st960190.pdf>.

Table 1. Average absolute percentage differences between state employment estimates and benchmarks by industry, not seasonally adjusted, September 2018–September 2019 (all values in percent)

Industry ¹	Sep. 2018 ²	Sep. 2019
Total nonfarm.....	0.6	0.5
Mining and logging.....	4.0	4.7
Construction.....	3.0	2.9
Manufacturing.....	1.5	1.4
Trade, transportation, and utilities.....	1.2	1.2
Information.....	2.4	2.8
Financial activities.....	2.1	1.6
Professional and business services.....	1.5	1.9
Education and health services.....	0.8	1.2
Leisure and hospitality.....	1.7	1.6
Other services.....	4.9	1.9
Government.....	1.1	1.0
Total nonfarm:		
Range.....	-3.2 to 1.0	-2.1 to 0.9
Mean.....	-0.5	-0.3
Standard deviation.....	0.7	0.6

¹ Industry summary statistics are only representative of data for those states where the industry is published at the statewide level. Benchmark data for Puerto Rico and the U.S. Virgin Islands are not included in these summary statistics.

² These summary statistics do not include revisions for South Carolina. See the changes to CES published series section in the [2019 benchmark article](#) 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 2.8 and 1.9 percent, respectively, for September 2019. However, for September 2019, the average absolute level revision across all states for the information industry is 1,300, while the average absolute level revision across all states for the professional and business services industry is 5,900. (See table 2.) Relying on a single measure to characterize the magnitude of benchmark revisions in an industry can potentially lead to an incomplete interpretation.

Table 2. Average absolute level differences between state employment estimates and benchmarks by industry, not seasonally adjusted, September 2018–September 2019 (all values payroll employment)

Industry ¹	Sep. 2018 ²	Sep. 2019
Total nonfarm.....	13,400	13,400
Mining and logging.....	600	700
Construction.....	3,400	3,100
Manufacturing.....	2,700	2,900
Trade, transportation, and utilities.....	6,600	4,700
Information.....	1,100	1,300
Financial activities.....	2,100	1,900
Professional and business services.....	5,000	5,900
Education and health services.....	2,700	4,700
Leisure and hospitality.....	4,600	4,500
Other services.....	3,100	1,800
Government.....	5,200	3,400
Total nonfarm:		
Range.....	-101,600 to 21,000	-85,200 to 37,300
Mean.....	-11,300	-8,100
Standard deviation.....	20,000	21,500

¹ Industry summary statistics are only representative of data for those states where the industry is published at the statewide level. Benchmark data for Puerto Rico and the U.S. Virgin Islands are not included in these summary statistics.

² These summary statistics do not include revisions for South Carolina. See the changes to CES published series section in the [2019 benchmark article](#) for more information.

Revisions by state

For September 2019, 15 states revised nonfarm payroll employment upward, while 35 states and the District of Columbia revised payroll employment downward. (See table 3 or map 1.) The distribution of percent revisions for September 2019, March 2019 and December 2019 can be found in exhibit 1.

Table 3. Percent differences between nonfarm payroll employment benchmarks and estimates by state, not seasonally adjusted, September 2018–September 2019 (all values in percent)

State	Sep. 2018	Sep. 2019
Alabama.....	-0.2	-1.0
Alaska.....	0.4	0.1
Arizona.....	(1)	0.3
Arkansas.....	0.8	-0.5
California.....	(1)	-0.5
Colorado.....	-0.4	0.2
Connecticut.....	-0.3	-0.7
Delaware.....	-0.2	-0.7
District of Columbia.....	-0.4	-0.2
Florida.....	(1)	-0.9
Georgia.....	-0.2	-0.2
Hawaii.....	-1.3	-1.0
Idaho.....	0.3	0.2
Illinois.....	0.1	-1.2
Indiana.....	0.2	-0.1
Iowa.....	-0.3	-0.5
Kansas.....	-0.5	-1.1
Kentucky.....	-0.1	-1.0
Louisiana.....	-0.3	-0.4
Maine.....	-0.2	0.6
Maryland.....	-0.4	(1)
Massachusetts.....	-1.1	(1)
Michigan.....	-0.3	-0.4
Minnesota.....	-0.6	0.5
Mississippi.....	-0.9	-1.0
Missouri.....	-0.8	-0.7
Montana.....	-0.3	0.1
Nebraska.....	-0.9	-0.7
Nevada.....	(1)	-1.0
New Hampshire.....	-1.6	-0.8
New Jersey.....	-0.9	0.2
New Mexico.....	-1.2	-0.1
New York.....	0.2	-0.1
North Carolina.....	-0.8	(1)
North Dakota.....	-0.1	0.6
Ohio.....	-1.3	-0.3
Oklahoma.....	-0.3	0.7
Oregon.....	-0.7	-0.3
Pennsylvania.....	-0.5	0.3
Rhode Island.....	-1.3	(1)
South Carolina.....	0.8 ¹	0.7
South Dakota.....	-0.7	-1.5
Tennessee.....	-0.1	0.3
Texas.....	-0.8	-0.2
Utah.....	0.1	-0.3
Vermont.....	1.0	-0.1
Virginia.....	-0.7	0.9
Washington.....	-0.9	-0.6
West Virginia.....	-3.2	-2.1
Wisconsin.....	-0.5	-0.3
Wyoming.....	-0.9	0.3

(1) Less than +/- 0.05 percent

¹ Revisions for South Carolina are included in this table. Users are cautioned given the unusual movements in the South Carolina QCEW data. See the changes to CES published series section in the [2019 benchmark article](#) for more information.

Exhibit 1. Distribution of percent revisions, March 2019, September 2019, and December 2019 (all values in percent)

Percentiles of Percent Revisions	March 2019	September 2019	December 2019
20th percentile.....	-0.3	-0.8	-0.7
40th percentile.....	(1)	-0.4	-0.3
60th percentile.....	0.2	-0.1	-0.1
80th percentile.....	0.5	0.2	0.3
100th percentile.....	1.7	0.9	1.1

(1) Less than +/- 0.05 percent

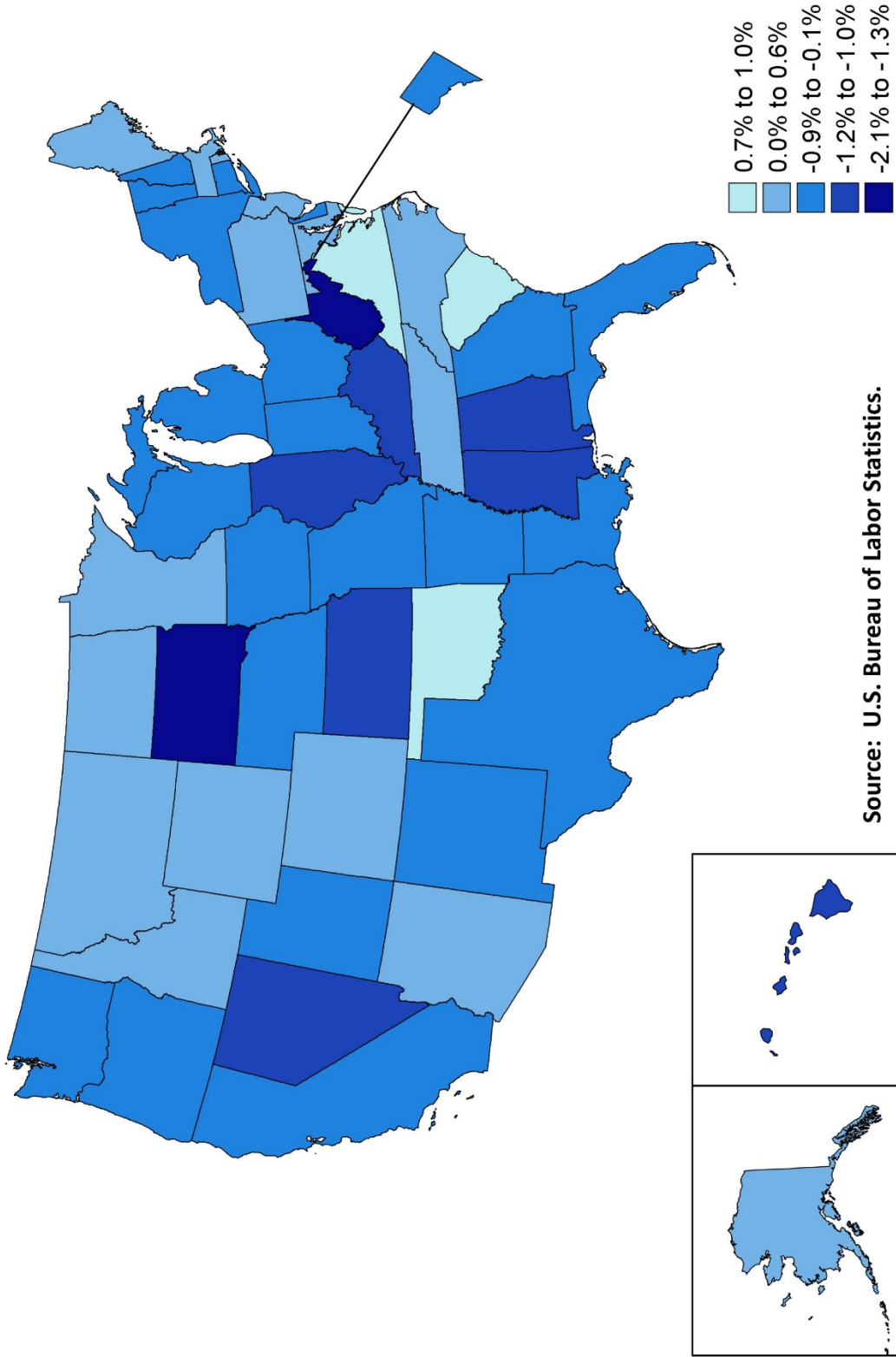
Revisions by MSA

For all metropolitan statistical areas (MSAs) published by the CES program, the total nonfarm percentage revisions for September 2019 ranged from -8.5 to 5.0 percent, with an average absolute percentage revision of 1.2 percent across all published MSAs. (See table 4.) For comparison, at the statewide level, the range was from -2.1 to 0.9 percent, with an average absolute percentage revision of 0.5 percent for September 2019. (See table 1.) In general, both the range of percentage revisions and the average absolute percentage revision increase as the amount of employment in an MSA decreases. Metropolitan areas with 1 million or more employees during September 2019 had an average absolute revision of 0.7 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.4 percent. (See table 4.)

Table 4. Benchmark revisions for nonfarm employment in metropolitan areas for September 2019, not seasonally adjusted

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.....	389	185	152	16	36
Average absolute percentage revision.....	1.2	1.4	1.1	0.5	0.7
Range.....	-8.5 to 5.0	-8.5 to 5.0	-6.1 to 4.6	-1.5 to 0.5	-1.8 to 2.0
Mean.....	-0.5	-0.7	-0.3	-0.3	-0.2
Standard deviation.....	1.6	1.8	1.4	0.6	0.9

Map 1. Percent differences between nonfarm payroll employment benchmarks and estimates by State, September 2019



Appendix

Table A1. Average absolute percentage differences between state employment estimates and benchmarks by industry, not seasonally adjusted, March 2014–March 2019 and December 2019 (all values in percent)

Industry ²	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018 ³	Mar. 2019	Dec. 2019
Total nonfarm.....	0.5	0.4	0.4	0.4	0.4	0.4	0.5
Mining and logging.....	2.8	4.2	4.5	3.7	3.6	3.4	4.8
Construction.....	3.0	2.6	2.3	2.5	2.1	3.5	3.0
Manufacturing.....	1.2	1.3	1.3	1.3	1.2	1.3	1.3
Trade, transportation, and utilities.....	0.7	0.6	0.8	0.7	1.0	0.8	1.1
Information.....	2.0	2.6	3.0	2.7	2.2	2.3	2.8
Financial activities.....	2.0	1.9	2.3	1.6	1.5	1.5	1.4
Professional and business services.....	1.6	1.6	1.4	1.5	1.3	1.6	1.8
Education and health services.....	0.9	0.9	0.8	0.8	0.8	1.0	1.2
Leisure and hospitality.....	1.4	1.4	1.5	1.6	1.3	1.3	1.7
Other services.....	2.4	2.1	2.4	2.7	4.4	1.8	1.9
Government.....	0.9	0.7	0.5	0.8	0.8	0.6	1.0
Total nonfarm:							
Range.....	-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	-2.1 to 1.7	-2.1 to 1.1
Mean.....	0.1	(1)	-0.1	-0.1	-0.1	0.1	-0.2
Standard deviation.....	0.6	0.5	0.6	0.5	0.8	0.6	0.6

(1) Less than +/- 0.05 percent

² Industry summary statistics are only representative of data for those states where the industry is published at the statewide level. Benchmark data for Puerto Rico and the U.S. Virgin Islands are not included in these summary statistics.

³ These summary statistics do not include revisions for South Carolina. See the changes to CES published series section in the [2019 benchmark article](#) for more information.

Table A2. Average absolute level differences between state employment estimates and benchmarks by industry, not seasonally adjusted, March 2014–March 2019 and December 2019 (all values payroll employment)

Industry ¹	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018 ²	Mar. 2019	Dec. 2019
Total nonfarm.....	11,500	9,200	7,700	7,100	9,200	8,200	12,000
Mining and logging.....	400	800	500	500	300	300	600
Construction.....	2,800	2,500	2,700	2,200	2,300	2,900	3,100
Manufacturing.....	1,700	2,200	2,200	2,200	1,900	2,100	2,900
Trade, transportation, and utilities.....	2,600	2,700	3,300	2,600	4,900	3,100	4,500
Information.....	900	1,100	1,400	1,000	1,200	1,200	1,300
Financial activities.....	2,100	1,900	2,300	1,600	1,500	2,000	2,000
Professional and business services.....	3,900	5,100	4,400	3,300	4,000	4,100	5,400
Education and health services.....	3,400	3,700	3,000	3,200	3,100	3,800	4,800
Leisure and hospitality.....	3,500	2,600	2,900	3,400	3,000	2,600	5,000
Other services.....	2,000	1,800	1,800	2,200	2,400	1,500	1,900
Government.....	3,900	2,600	2,300	3,000	3,400	2,100	3,400
Total nonfarm:							
Range.....	-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	-35,200 to 30,400	-78,300 to 33,100
Mean.....	5,500	-2,400	200	-2,300	1,200	1,900	-6,600
Standard deviation.....	20,200	17,400	11,600	11,000	16,200	11,400	19,000

¹ Industry summary statistics are only representative of data for those states where the industry is published at the statewide level. Benchmark data for Puerto Rico and the U.S. Virgin Islands are not included in these summary statistics.

² These summary statistics do not include revisions for South Carolina. See the changes to CES published series section in the [2019 benchmark article](#) for more information.

Table A3. Percent differences between nonfarm payroll employment benchmarks and estimates by state, not seasonally adjusted, March 2014–March 2019 and December 2019 (all values in percent)

State	Mar. 2014	Mar. 2015	Mar. 2016	Mar. 2017	Mar. 2018	Mar. 2019	Dec. 2019
Alabama.....	-0.1	-0.3	0.4	0.8	0.2	-0.2	-0.9
Alaska.....	-0.2	0.2	-1.1	0.2	-0.4	-0.6	0.1
Arizona.....	0.1	-0.2	-0.3	0.5	0.4	0.4	0.2
Arkansas.....	-0.7	-0.6	(1)	-0.2	1.4	0.5	-0.4
California.....	0.7	-0.7	(1)	(1)	0.3	(1)	-0.3
Colorado.....	0.5	0.7	-0.5	0.4	-0.2	0.1	0.4
Connecticut.....	-0.1	-1.0	-0.2	-0.2	-0.2	-0.5	-0.3
Delaware.....	0.3	0.4	-1.1	0.1	0.3	0.5	-0.9
District of Columbia.....	0.3	0.4	0.9	0.3	-0.1	0.3	-0.2
Florida.....	-0.1	-0.2	0.5	-0.1	(1)	-0.1	-0.8
Georgia.....	0.7	-0.3	-0.6	-0.8	0.3	0.1	-0.3
Hawaii.....	0.6	0.7	-0.7	0.4	-0.7	-0.1	-0.7
Idaho.....	2.0	-0.4	(1)	0.4	-0.1	0.4	0.6
Illinois.....	0.5	0.2	0.1	0.3	0.4	-0.6	-1.3
Indiana.....	-0.1	-0.1	0.6	-0.3	0.6	0.1	(1)
Iowa.....	(1)	-0.5	-0.3	-0.5	-0.2	-0.1	-0.4
Kansas.....	0.5	-0.2	0.9	-0.4	-0.4	(1)	-1.2
Kentucky.....	0.3	-0.6	-0.2	-0.9	0.2	-0.4	-1.2
Louisiana.....	0.5	0.3	(1)	0.1	0.2	0.5	-0.2
Maine.....	-0.7	0.3	0.6	0.2	0.4	0.7	0.4
Maryland.....	-0.3	-0.2	-0.1	-1.0	0.4	0.3	-0.3
Massachusetts.....	0.1	0.5	0.5	-0.2	0.2	0.7	0.1
Michigan.....	1.1	-0.6	-0.5	-0.2	-0.1	-0.1	-0.1
Minnesota.....	-0.6	-0.1	0.1	(1)	(1)	0.5	0.4
Mississippi.....	(1)	0.2	0.1	0.5	-1.1	-0.4	-0.8
Missouri.....	-1.5	0.4	0.7	-0.3	-0.4	-0.3	-0.5
Montana.....	0.2	1.3	0.8	-0.8	0.1	0.2	0.3
Nebraska.....	0.7	(1)	-0.2	-0.2	-0.3	-0.1	-0.5
Nevada.....	-0.6	0.7	0.2	0.8	0.4	-0.5	-1.0
New Hampshire.....	-0.3	-0.1	(1)	-0.3	-0.2	0.2	-0.4
New Jersey.....	0.5	(1)	-0.2	(1)	-0.9	(1)	0.1
New Mexico.....	0.5	-0.4	0.2	-0.8	0.1	0.3	-0.1
New York.....	0.6	0.1	0.4	0.1	0.7	0.3	-0.1
North Carolina.....	-0.1	-0.5	0.1	(1)	(1)	0.5	(1)
North Dakota.....	-1.4	-1.8	-1.6	-1.0	1.2	1.2	0.7
Ohio.....	0.4	0.1	-0.2	(1)	-0.5	-0.1	-0.3
Oklahoma.....	-0.3	0.5	-0.5	-0.1	0.1	0.7	0.8
Oregon.....	-0.4	(1)	0.1	0.2	(1)	-0.1	-0.1
Pennsylvania.....	0.2	-0.1	-0.2	(1)	(1)	0.3	0.2
Rhode Island.....	-0.2	0.1	(1)	-0.7	-0.6	1.7	(1)
South Carolina.....	0.5	-0.2	-0.1	0.5	0.8 ²	0.2	0.6
South Dakota.....	0.8	(1)	-0.1	-0.6	-0.3	-1.6	-1.4
Tennessee.....	0.4	0.4	(1)	-0.5	-0.1	0.4	0.3
Texas.....	0.1	0.1	0.1	-0.4	-0.3	0.2	-0.2
Utah.....	-0.1	-0.2	0.3	-0.1	-0.1	-0.3	-0.2
Vermont.....	(1)	-0.8	-1.5	-0.7	-0.1	0.6	(1)
Virginia.....	-0.3	0.6	-0.3	-0.2	0.2	0.4	0.8
Washington.....	0.6	-0.6	-0.4	-0.2	-0.2	-0.7	-0.6
West Virginia.....	-0.9	1.3	-1.2	0.2	-4.4	-2.1	-2.1
Wisconsin.....	-0.3	0.2	-0.2	(1)	0.2	0.1	-0.1
Wyoming.....	-0.7	-0.4	0.4	1.2	-0.1	0.1	1.1

(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 South Carolina QCEW data. See the changes to CES published series section in the [2019 benchmark article](#) for more information.

Table A4. Benchmark revisions for nonfarm employment in metropolitan areas for March 2019, not seasonally adjusted

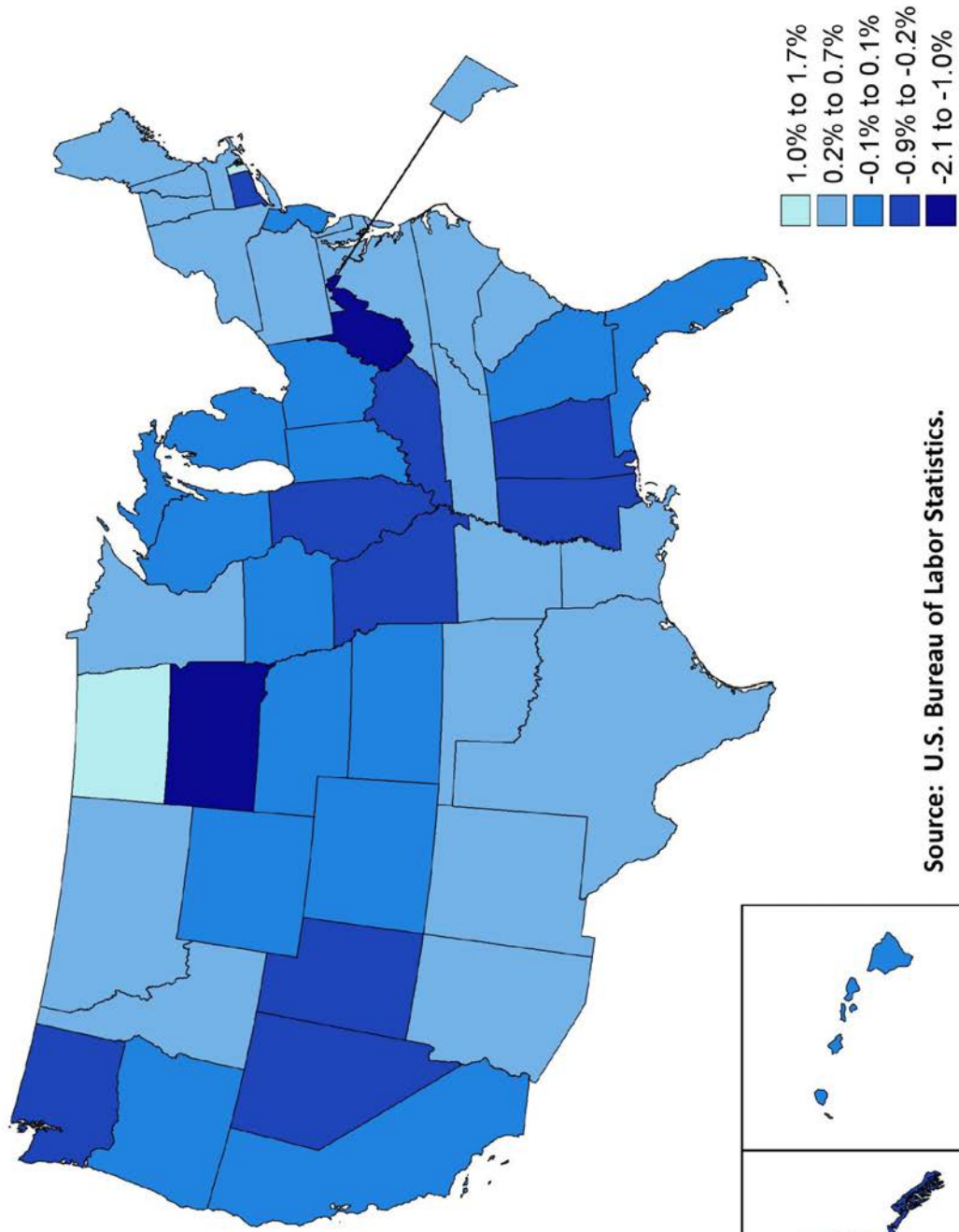
Measure	All MSAs	MSAs grouped by level of total nonfarm employment			
		Less than 100,000	100,000 to 499,999	500,000 to 999,999	1 million or more
Number of MSAs.....	389	185	152	16	36
Average absolute percentage revision.....	1.0	1.2	0.9	0.5	0.5
Range.....	-6.2 to 3.8	-6.2 to 3.8	-3.4 to 3.3	-0.4 to 1.3	-1.0 to 2.0
Mean.....	-0.1	-0.2	(1)	0.3	0.1
Standard deviation.....	1.3	1.5	1.1	0.5	0.6

(1) Less than +/- 0.05 percent

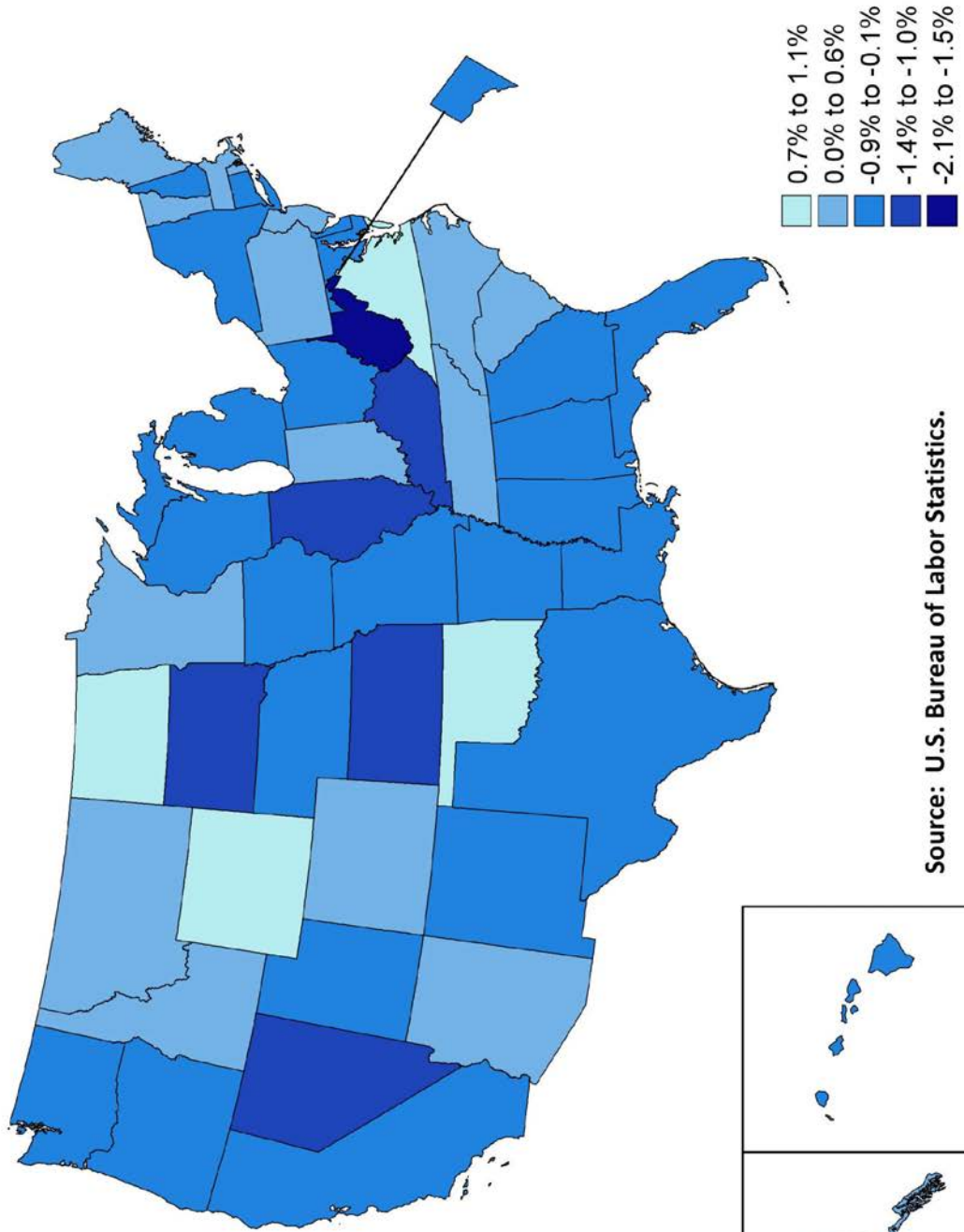
Table A5. Benchmark revisions for nonfarm employment in metropolitan areas for December 2019, not seasonally adjusted

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.....	389	185	152	16	36
Average absolute percentage revision.....	1.2	1.3	1.1	0.5	0.7
Range.....	-6.3 to 5.0	-5.6 to 4.8	-6.3 to 5.0	-1.6 to 0.9	-1.9 to 1.9
Mean.....	-0.4	-0.5	-0.3	-0.2	-0.2
Standard deviation.....	1.6	1.8	1.5	0.7	0.8

Map A1. Percent differences between nonfarm payroll employment benchmarks and estimates by State, March 2019



Map A2. Percent differences between nonfarm payroll employment benchmarks and estimates by State, December 2019



Source: U.S. Bureau of Labor Statistics.

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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/publications/benchmark-article/home.htm>.