

# **Revisions in State Establishment-based Employment Estimates Effective January 2007**

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With the release of estimates for January 2007, nonfarm payroll employment, hours, and earnings data for States and areas (tables B-6, B-12, B-13, B-17, and B-18) were revised to reflect the incorporation of March 2006 benchmarks and the recomputation of seasonal adjustment factors for State estimates. The revisions affect all not seasonally adjusted data from April 2005 forward, all seasonally adjusted data from January 2002 forward, and selected series subject to historical revisions. This article offers background information on benchmarking methods and details the effects of the March 2005 benchmark revisions on State and area employment estimates.

## **Benchmark methods**

The Current Employment Statistics (CES) survey, or nonfarm payroll survey, is a Federal/State cooperative program that provides employment, hours, and earnings estimates for States and areas on a timely basis by estimating the number of jobs in the population from a sample of that population. As with data from other sample surveys, CES 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 includes errors in reporting and processing.

To help control both sampling and nonsampling error, the estimates are benchmarked annually to universe employment counts. These counts are derived primarily from employment data reported on unemployment insurance (UI) tax reports that nearly all employers are required to file with State Workforce Agencies. Benchmark levels replace the original sample-based estimates from April of the previous year to March of the benchmark year for each month. For the current 2006 benchmark, estimates from April 2005 to March 2006 were replaced with UI-based universe counts. Once the new level for March 2006 had been determined, the appropriate sample links and birth/death factors were applied to the new level, and the estimates were recalculated for April 2006 forward. The sample links capture the over-the-month change of the sample estimates. A sample link for a given month is calculated by dividing employment reported by survey respondents for that month by employment reported by those same respondents for the previous month. The birth/death factor is an ARIMA-based projection to account for the birth employment not captured through the exclusion of business deaths from the sample link. The over-the-month changes used during the benchmark process may differ slightly from those used to derive the original estimates

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because they include (1) data from respondents that reported too late for inclusion in the previously published estimates, (2) the use of new sample weights, and (3) the inclusion of updated net births estimates. This process was completed and the revised data were released with the January 2006 estimates.

Improvements in the receipt of UI data and in the standardization of State operations have enabled all States to replace estimates with UI data beyond March of the benchmark year. In the March 2006 benchmark, 39 States used third-quarter 2006 UI data (that is, through September 2006) in their benchmarking, and 10 States and the District of Columbia used second-quarter 2006 UI data (through June 2006). Recalculated sample links were then applied to these new levels to derive revised estimates for months after the replacement quarter.

## Benchmark revisions

The percentage differences between March 2006 sample-based estimates and the revised March 2006 benchmark levels are commonly used to report the magnitude of the revisions. The average absolute percentage revision for State total nonfarm estimates is 0.5 percent for March 2006, unchanged from 0.5 percent in March 2005. The average absolute revision from 2001 to 2006 is 0.6 percent. The range of the percentage revision for the States at the total nonfarm level was from -0.8 to 4.2 percent in March 2006. (See

**Table 1. Differences between State employment estimates and benchmarks by industry, March 2001-2006**

Industry	2001	2002	2003	2004	2005	2006
Average absolute percentage differences						
Total nonfarm.....	0.7	0.9	0.6	0.4	0.5	0.5
Natural Resources and Mining.....	(1)	(1)	3.8	5.8	6.5	3.4
Construction.....	(1)	(1)	2.6	2.4	2.8	2.7
Manufacturing.....	(1)	(1)	1.4	1.2	1.3	1.7
Trade, Transportation, and Utilities.....	(1)	(1)	1.0	0.8	0.7	0.5
Information.....	(1)	(1)	2.5	2.5	2.2	1.9
Financial Activities.....	(1)	(1)	1.7	1.0	1.2	0.9
Professional and Business Services.....	(1)	(1)	2.1	1.9	1.7	2.1
Education and Health Services.....	(1)	(1)	1.0	1.1	0.6	0.9
Leisure and Hospitality.....	(1)	(1)	1.3	1.4	1.4	1.2
Other Services.....	(1)	(1)	2.1	2.0	1.9	1.7
Government.....	(1)	(1)	0.8	0.7	0.6	0.7
Average percentage revisions						
Total nonfarm:						
Range.....	-2.9 : 0.9	-2.1 : 2.1	-1.9 : 1.4	-0.9 : 1.8	-1.2 : 1.2	-0.8 : 4.2
Mean.....	-0.5	-0.6	-0.2	0.2	0.1	0.3
Standard deviation.....	0.7	0.9	0.7	0.5	0.6	0.7

(1) Due to incomparability between NAICS and SIC industry definitions below total nonfarm levels, 2001-2002 differences are unavailable at the major industry level.

NOTE: The range indicates the lowest and highest percentage revision at the total nonfarm level. The mean is the sum of all the items in a series divided by the number of items. The standard deviation is a widely used measure of dispersion. It measures the extent to which the individual items in a series are scattered about the mean of the series and indicates the reliability of the mean. For example, the March 2004 standard deviation (0.5) is lower than that of March 2001 (0.7). This is an indication that there is higher variation among State total nonfarm revisions in March 2001 (that is, the mean is less representative of the group) than in March 2004 (that is, the mean is more representative of the group). The standard deviation is found by taking the difference of each item in a series from the mean of the series, squaring each difference, summing the squared differences, dividing the result by the number of items, and obtaining the square root of that figure.

table 1.)

For the 2006 benchmark, comparisons between major industry sectors may be made only from 2003 forward. (See table 1.) The incomparability in previous years is a result of the conversion from the Standard Industrial Classification (SIC) system to the 2002 North American Industry Classification System (NAICS); a historical time series of unbenchmarked NAICS data does not exist for previous years. Total nonfarm data remain comparable and are included for the past 5 years.

The direction of the revisions indicates whether the March 2006 benchmark levels were greater or less than the original sample-based estimates. Historically, State estimates have underestimated March employment levels during periods of economic growth and overestimated these levels during periods of economic decline. For the current benchmark, 36 States revised total nonfarm payroll employment upward, while 14 States and the District of Columbia had downward revisions. (See table 2.) The tendency toward underestimation of employment is reflected by the mean 0.3 percent revision across all States for total nonfarm employment.

For metropolitan statistical areas (MSAs) published by the CES program, the percentage revisions ranged from -7.7 to 10.2 percent, with an average absolute percentage revision of 1.1 percent across all MSAs.<sup>1</sup> Comparatively at the State level, the range was -0.8 to 4.2 percent, with an average absolute percentage revision of 0.5 percent. (See table 1.) Generally, as MSA size decreases, both the range of percentage revisions and the average absolute percentage revision increases. (See table 3.) Metropolitan areas with an annual average of 1 million or more employees in 2006 had an average absolute revision of 0.5 percent, while metropolitan areas with fewer than 100,000 employees had an average absolute revision of 1.3 percent.

## **Historical Data Revisions**

In addition to this year's standard benchmark revisions, BLS has completed a comprehensive review of all its published State and area employment estimates to remove non-economic series breaks from publication and improve the quality of its historical time series data. There are two primary sources of series breaks in CES employment data: administrative redefinitions and establishment coding changes, known collectively as non-economic code changes. Administrative redefinitions are major changes to the classification systems, either industrial or geographic, used to categorize data. Recent examples of administrative redefinitions in CES include the change in industry classification from the Standard Industrial Classification (SIC) manual to NAICS as well as the Office of Management and Budget's redefinition of Metropolitan Statistical Areas (MSAs). Establishment coding changes occur when a firm is reclassified within the current set of definitions. Coding changes can be the result of either erroneous initial classification or a gradual change in the firm's production and/or employment over time. These series have been revised as far back into their historical data as necessary to improve the series; in some cases these revisions can extend back through the entire published history of the series. The revisions cover roughly one-third of the CES State and Area employment time series and are in addition to the standard revisions associated with the annual benchmark.

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<sup>1</sup> The CES program published employment series for 367 MSAs in 2006. The list of BLS standard MSAs is available at <http://www.bls.gov/sae/>.

**Table 2. Percent differences between nonfarm payroll employment benchmarks and estimates by State, March 2001-2006**

State	2001	2002	2003	2004	2005	2006
Alabama.....	-0.7	-0.8	(1)	0.5	0.1	0.2
Alaska.....	0.4	1.0	0.6	-0.3	0.2	0.6
Arizona.....	0.2	0.5	0.2	0.8	0.9	0.7
Arkansas.....	-0.4	-0.6	-0.6	0.7	0.5	1.0
California.....	-0.4	-1.2	-0.5	(1)	(1)	0.3
Colorado.....	-0.5	-0.6	-0.9	0.8	-0.1	0.3
Connecticut.....	-0.7	-0.1	-0.6	0.3	-0.7	0.3
Delaware.....	-0.4	-1.2	0.1	1.8	-0.8	(1)
District of Columbia.....	0.3	2.1	0.2	0.1	0.7	-0.5
Florida.....	-0.6	-0.3	(1)	0.6	0.5	-0.1
Georgia.....	-1.6	1.0	-1.3	0.1	1.2	0.4
Hawaii.....	-0.5	0.3	0.2	0.2	0.4	-0.3
Idaho.....	0.9	-1.2	0.7	0.2	0.9	-0.2
Illinois.....	-0.7	-0.9	-0.9	-0.1	-0.1	0.4
Indiana.....	-1.5	-0.8	0.6	0.1	-0.8	0.1
Iowa.....	-1.3	-1.2	-0.4	0.1	0.8	-0.1
Kansas.....	-0.4	-2.1	-1.8	-0.3	-0.3	0.5
Kentucky.....	-1.3	-2.0	-0.2	-0.1	-0.2	0.4
Louisiana.....	-1.4	-1.9	0.4	0.7	(1)	4.2
Maine.....	-0.6	-0.8	-0.2	0.4	-1.2	0.4
Maryland.....	-0.4	0.9	-0.3	0.1	-0.7	0.4
Massachusetts.....	-0.3	-1.4	-0.9	0.3	-0.6	0.8
Michigan.....	-1.6	-2.0	-0.4	0.2	0.3	-0.3
Minnesota.....	0.4	-0.5	-0.1	-0.2	-0.5	0.7
Mississippi.....	-0.9	-0.8	-1.1	0.3	0.1	0.1
Missouri.....	-0.4	0.6	1.4	-0.6	0.2	0.6
Montana.....	-0.5	-0.2	1.0	0.9	0.8	0.9
Nebraska.....	-0.7	-0.6	-0.2	1.5	-0.2	-0.6
Nevada.....	-0.4	-2.1	1.4	0.4	-0.2	0.2
New Hampshire.....	0.6	-1.2	-0.6	0.5	-0.6	-0.2
New Jersey.....	(1)	-0.2	-1.0	-0.9	-0.6	0.1
New Mexico.....	0.7	0.1	-0.4	0.1	(1)	0.7
New York.....	-0.5	-0.9	0.2	(1)	-0.1	0.1
North Carolina.....	-1.3	-0.9	-1.3	-0.5	0.9	0.6
North Dakota.....	-0.1	-1.1	0.2	0.1	0.2	0.3
Ohio.....	-0.1	-1.5	-0.1	0.3	-0.3	(1)
Oklahoma.....	0.8	-1.8	-0.9	0.8	0.5	0.5
Oregon.....	0.2	-0.7	-0.2	(1)	0.4	-0.8
Pennsylvania.....	-0.4	(1)	-0.5	0.4	-0.2	(1)
Rhode Island.....	-0.1	-0.5	0.3	-0.4	-0.8	-0.5
South Carolina.....	-2.9	-1.6	0.9	-0.3	1.0	(1)
South Dakota.....	-0.5	-1.0	-0.5	-0.1	0.1	-0.1
Tennessee.....	-0.9	-2.1	-0.4	0.4	0.4	0.4
Texas.....	-0.5	-0.2	-0.6	0.3	0.8	0.6
Utah.....	-0.4	-0.1	-0.2	0.9	0.2	0.6
Vermont.....	(1)	0.6	-1.9	(1)	-0.7	0.1
Virginia.....	-0.3	-0.3	-0.1	-0.3	0.2	0.1
Washington.....	-0.8	-0.2	-0.4	-0.2	0.4	-0.2
West Virginia.....	-0.2	-0.1	-0.8	1.4	-0.1	0.7
Wisconsin.....	-0.6	-1.4	-0.5	-0.6	0.2	-0.2
Wyoming.....	0.5	-0.5	-0.3	0.7	0.8	1.6

<sup>1</sup> Less than ± 0.05 percent.

**Table 3. Benchmark revisions for total nonfarm employment in metropolitan areas, March 2006**

Measure	All MSAs	MSA's grouped by level of total nonfarm employment			
		Less than 100,000	100,000 to 499,999	500,000 to 999,999	More than 1 million
Number of MSA's.....	367	177	141	23	26
Average absolute percentage revision.....	1.1	1.3	0.4	0.6	0.5
Range.....	-7.7 : 10.2	-7.7 : 8.6	-2.7 : 10.2	-0.6 : 1.9	-0.7 : 2.3
Mean.....	0.2	-0.2	0.2	0.5	0.1
Standard Deviation.....	1.5	1.8	1.4	0.7	0.7

<sup>1</sup> Less than  $\pm 0.05$  percent.

### Seasonal adjustment

BLS uses a two-step seasonal adjustment process for adjusting State nonfarm payroll employment estimates. This process uses UI seasonal trends to adjust the benchmarked historical data, but incorporates sample seasonal trends to adjust the current sample-based estimates in the post benchmark months.

By accounting for the differing seasonal patterns of the benchmark data and the sample-based estimates, this technique yields an improved seasonally adjusted series for analyzing over-the-month employment change. Concurrent with this year's benchmark update, the CES program has expanded publication of seasonally adjusted data to include sector employment estimates at the statewide level where the sectors passed seasonal adjustment, as well as total nonfarm estimates for select metropolitan areas. Only areas that were not affected by the March 2005 MSA redefinition were eligible for seasonal adjustment. For more information about expanded seasonal adjustment and a list of all seasonally adjusted CES State and area employment series please visit <http://www.bls.gov/sae/2006bmk.htm>. The latest seasonally adjusted nonfarm payroll employment data for all States and the District of Columbia are available on the BLS Internet.<sup>2</sup> Data for the most recent 13 months are regularly shown in table B-6 of this publication.

### Additional information

Historical State and area employment, hours, and earnings data are available at <http://www.bls.gov/sae/> on the BLS Internet site. Users may access the data via various retrieval tools at this address. Any questions on how to access the data through the Internet should be directed to [webmaster@bls.gov](mailto:webmaster@bls.gov). Inquiries for additional information on the methods or estimates derived from the CES survey should be sent to: U.S. Bureau of Labor Statistics, Room 4860, 2 Massachusetts Avenue, NE, Washington, DC 20212-0001. The telephone number is (202) 691-6995; fax (202) 691-6820. The e-mail address is [sminfo@bls.gov](mailto:sminfo@bls.gov).

<sup>2</sup> Seasonally adjusted and unadjusted data may be accessed via the public data retrieval engine at <http://data.bls.gov/cgi-bin/dsrv?sm>.