REGIONAL
ECONOMIC
ANALYSIS
Pennsylvania | New Jersey | Delaware

Predicting Benchmark Revisions of Payroll Employment Estimates in Third District States

April 23, 2014

The Latest Revision and a New Approach

Last month, the Bureau of Labor Statistics (BLS) released its annual benchmark revisions of regional data from its Current Employment Statistics (CES) program, which affected historical CES estimates of nonfarm payroll employment for all 50 states and 372 metropolitan statistical areas.

Incorporation of employment records from the BLS's Quarterly Census of Employment and Wages (QCEW) drives the revision process. The BLS collects QCEW data from a nearly full count of the nation's employers (about 9.2 million), and the CES maintains a sample size of about 500,000 establishments.

Overall, the benchmark revision process affords the BLS an annual opportunity to improve its estimates by addressing the following five key issues:

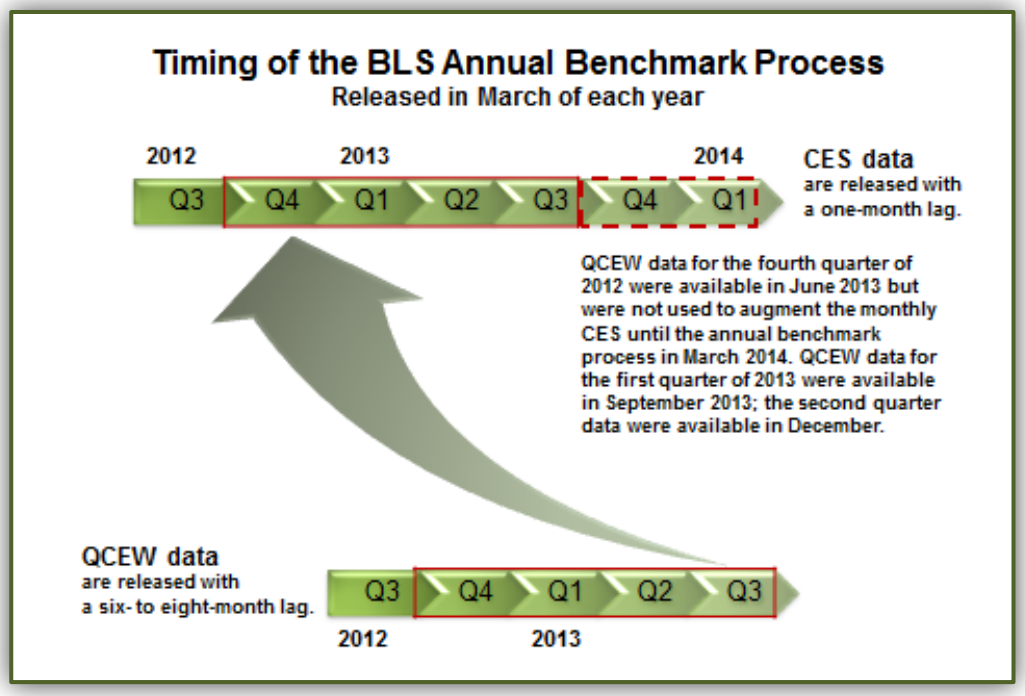
- **Sampling Errors.** Typically, an additional year of population-based QCEW data replaces the sample-based CES estimates.
- **Coverage Differences.** The revision process reconciles small differences in the coverage of industrial sectors by the CES and QCEW programs.
- **Administrative Changes.** Revisions correct errors, add late data, and reclassify firm characteristics (e.g., industrial sector or location).
- **Firm Births and Deaths.** QCEW data capture jobs associated with firm births and deaths that the CES sample misses. The BLS reestimates a birth/death model for the ongoing CES estimates.
- **Seasonal Adjustments.** Seasonal factors are reestimated during the annual benchmark process.

The Latest BLS Revision. This report analyzes the extent of the latest benchmark revisions on employment estimates for the Third District states. Overall, benchmark revisions increased Delaware's employment growth estimates in both 2012 and 2013. Revisions drove estimates of New Jersey's growth rates downward throughout 2012 and in the first half of 2013; however, over the final two quarters of 2013, growth was revised substantially upward, and the net growth effect for the year was slightly upward. For Pennsylvania, the benchmark generated negligible revisions to its growth rates.

Our New Approach. The January 2014 report in this series, "Anticipating Benchmark Revisions of Payroll Employment Estimates in Third District States," described our expectations for the now-released benchmark revisions. Our judgment relied heavily upon QCEW trends observable through June 2013 and on our professional experience.

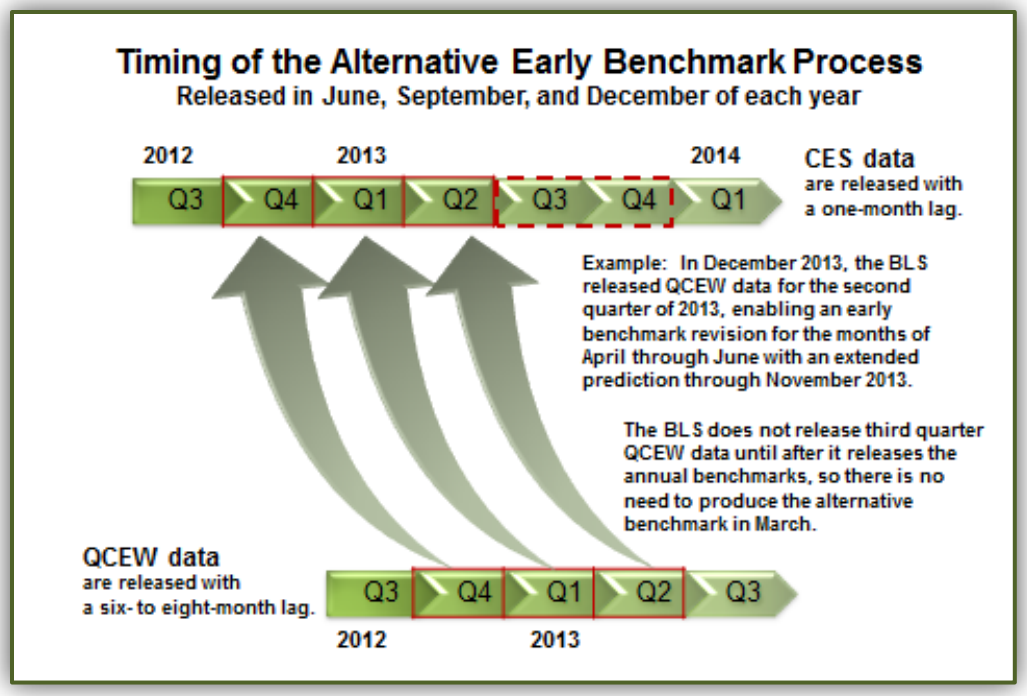
This article advances our approach to anticipating benchmark revisions by explicitly incorporating each release of the QCEW data and taking other steps to address the five issues mentioned above. Ultimately, our process generates alternative seasonally adjusted monthly employment estimates that offer timely revisions on a quarterly basis for the intervening months between the BLS annual benchmarks.

The Opportunity. The BLS process (depicted at right) creates the opportunity to improve upon the monthly CES estimates by benchmarking annually with quarterly data that contain most of the information that is critical for the revision. As months progress beyond the prior benchmark, the likelihood increases that employment trends will diverge from the more accurate representation provided by QCEW data.



Each annual benchmark (released in March) typically incorporates one additional year of monthly QCEW data that have accumulated since the prior benchmark. The original March 2013 CES employment estimates (and all subsequent monthly estimates through December 2013) were based on the prior "March 2012" benchmark, which used QCEW data through September 2012. The recent "March 2013" benchmark used revised data going back many years but, most important, included new QCEW data from October 2012 through September 2013 (shown within the box with a solid red line).

The newly incorporated QCEW data influence the levels of the revised estimates beyond September 2013 (shown within the box with a dashed red line); however, the benchmark process relies principally on the sample estimates of the CES to determine the growth rates.



Our alternative early benchmark process (depicted to the left) incorporates the QCEW data as they are released each quarter. This allows us to incrementally improve the monthly employment estimates and eventually anticipate the subsequent March benchmark revisions with greater accuracy.

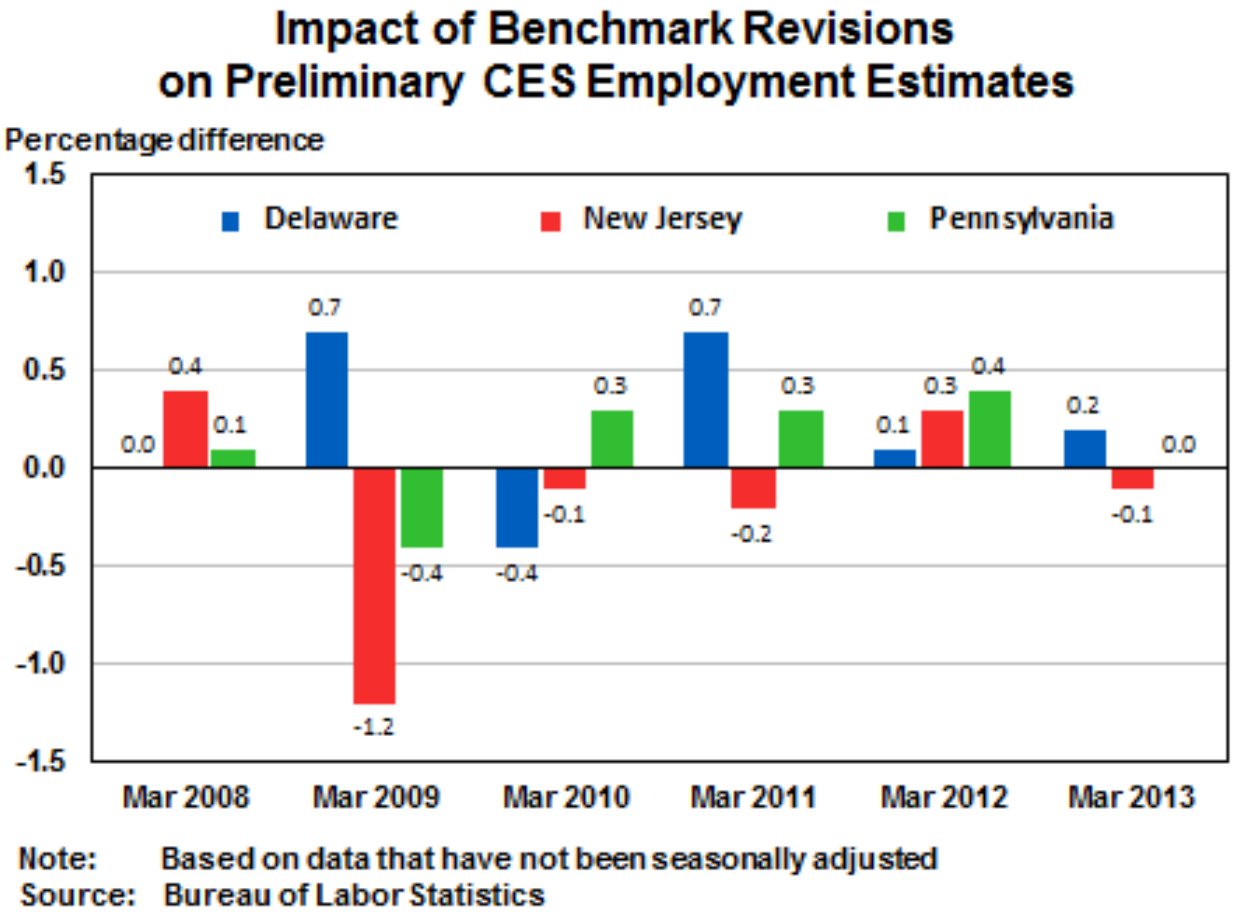
Unfortunately, the BLS does not release September QCEW data until just after it releases the benchmarks, so our best prediction will be based on three fewer months than the BLS benchmark process uses.

Benchmark Results for Third District States

The magnitude of benchmark revisions is often judged by the percentage differences between the revised CES employment estimates and the original CES estimates using data prior to seasonal adjustments. The BLS calculates these differences for March of the benchmark year.

The chart below shows that the March 2013 benchmark revisions for the Third District states were small in historical terms. For Delaware, the revision was up 0.2 percent; for New Jersey, it was down 0.1 percent; and, for Pennsylvania, the revision was essentially unchanged. Over the past six years, larger revisions have occurred. For example, New Jersey's employment estimate was revised downward by 1.2 percentage points in the 2009 benchmark; Delaware's employment estimates were revised upward by 0.7 percentage point in 2009 and again in 2011.

This does not mean that the revisions were inconsequential for the Third District states; the comparisons of pre- and postbenchmark data in one month cannot capture the full effect of the benchmarking process.



Impact of Benchmark Revisions on the Third District States*									
	Delaware			New Jersey			Pennsylvania		
	Pre-	Post-	Revision	Pre-	Post-	Revision	Pre-	Post-	Revision
Total payroll employment levels (thousands):									
2012	421.5	422.6	0.3%	3,932.2	3,910.0	-0.6%	5,742.6	5,728.7	-0.2%
2013	430.6	432.8	0.5%	3,942.3	3,928.8	-0.3%	5,761.6	5,758.1	-0.1%
Annual growth rates:									
2012	0.9%	1.4%	0.5%	1.7%	1.1%	-0.6%	0.6%	0.4%	-0.2%
2013	2.2%	2.4%	0.3%	0.3%	0.5%	0.2%	0.3%	0.5%	0.2%
Quarterly growth rates:									
2012 Q1	0.2%	0.3%	0.1%	0.7%	0.7%	-0.1%	0.7%	0.7%	0.0%
Q2	-0.3%	0.2%	0.5%	0.0%	0.0%	0.0%	-0.4%	-0.5%	-0.1%
Q3	0.1%	0.2%	0.1%	0.2%	0.2%	0.0%	0.1%	0.2%	0.1%
Q4	0.8%	0.7%	-0.2%	0.7%	0.2%	-0.5%	0.2%	0.0%	-0.2%
2013 Q1	0.8%	0.6%	-0.2%	0.4%	0.5%	0.1%	0.1%	0.2%	0.2%
Q2	-0.4%	0.2%	0.7%	0.6%	0.2%	-0.4%	0.1%	-0.2%	-0.3%
Q3	0.9%	0.6%	-0.3%	0.0%	0.2%	0.3%	0.2%	0.2%	0.1%
Q4	1.0%	1.0%	0.0%	-0.7%	-0.5%	0.2%	0.0%	0.2%	0.2%

*Notes:

Column subtitles below the state names represent: Prebenchmark estimates, Postbenchmark estimates, and Revisions as described in the last note.

All calculations used seasonally adjusted data.

Employment levels and annual growth rates used year-end (December) estimates; quarterly rates used estimates for end-of-quarter months.

Annual growth rates are year-over-year percentage changes; quarterly growth rates are simple nonannualized percentage changes.

Revisions of the levels are expressed in percentage terms; revisions of the growth rates are expressed as simple differences of their percentages.

To evaluate the impact of the benchmark process over the entire revision period on the measure of key import for most analysts, we focus on payroll job growth rates using seasonally adjusted data over the past two years (see table above). [1]

The most significant changes to estimates of employment levels were an upward revision for Delaware in 2013 and a downward revision for New Jersey in 2012. The most significant revision to annual growth rates was an upward revision for Delaware in 2012 and a downward revision for New Jersey in 2012. In contrast, the Pennsylvania employment estimates were relatively unaffected by revisions (in terms of both levels and annual growth rates in 2012 and 2013). [2]

All three states showed positive growth in total payroll employment over the course of 2013, both pre- and postrevision. In addition, the relative ranking of

[1] This report focuses on 2012 and 2013 because the main impacts of the revisions were limited to the months after March 2012. Updated seasonal adjustment factors affected the data prior to 2012 but generated negligible changes in growth rates.

[2] Note that the largest annual revisions of levels are not necessarily found at the same time as the largest growth rate revisions because levels reflect the cumulative effect of the period-by-period changes.

those increases among the states did not change after the revision. For the prior year, employment growth in Delaware is now deemed to be higher than employment growth in New Jersey.

Each state showed an almost equal number of positive and negative revisions to its estimates of quarterly growth rates. In addition, revisions turned negative growth rates positive in a few quarters, while a positive growth rate became negative in Pennsylvania once, during the third quarter of 2013.

Can We Predict Benchmark Revisions?

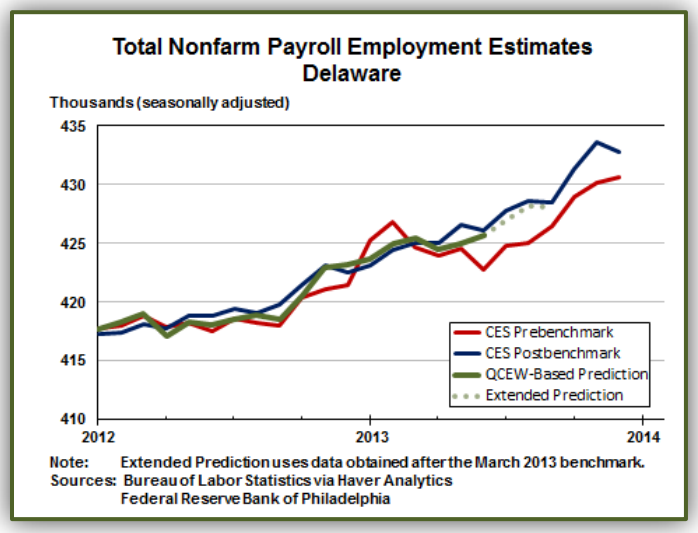
The prebenchmark analysis of the differences between CES and QCEW trends that was discussed in our January report proved to be accurate for revisions through June 2013; we anticipated that the revisions would increase total nonfarm payrolls in Delaware, decrease total nonfarm payrolls in New Jersey, and have almost no change in Pennsylvania.

However, the previous analysis was not based on explicitly derived alternatives to the prebenchmark CES estimates. We now report results from generating "early benchmark" alternatives and compare the results with the official postbenchmark CES data. Construction of our early benchmark series incorporates the QCEW data, applies ratio adjustments by sector, and updates seasonal adjustment factors.[3] These steps address the five issues identified earlier: sampling errors, coverage differences, administrative changes, firm births and deaths, and seasonal adjustments.

In the following series of charts, we depict total nonfarm payroll jobs (seasonally adjusted) from the BLS's pre- and postbenchmark CES for Delaware, New Jersey, and Pennsylvania. Our benchmark prediction is depicted by a dark green line through June 2013, with an extension to September 2013 shown as a dotted dark green line.[4]

In all three states, employment trends of the postbenchmark CES closely followed the pattern produced by our series based on the QCEW data (i.e., employment trends from QCEW data are more reliable than those from CES estimates).

Delaware. On an annualized basis, the prebenchmark CES described employment growth of 5.1 percent over the five months from September 2012 to February 2013. This was followed by a job decline of 2.8 percent through June 2013. The benchmark revisions smoothed that pattern to 2.7 percent growth followed by 1.2 percent growth, respectively.



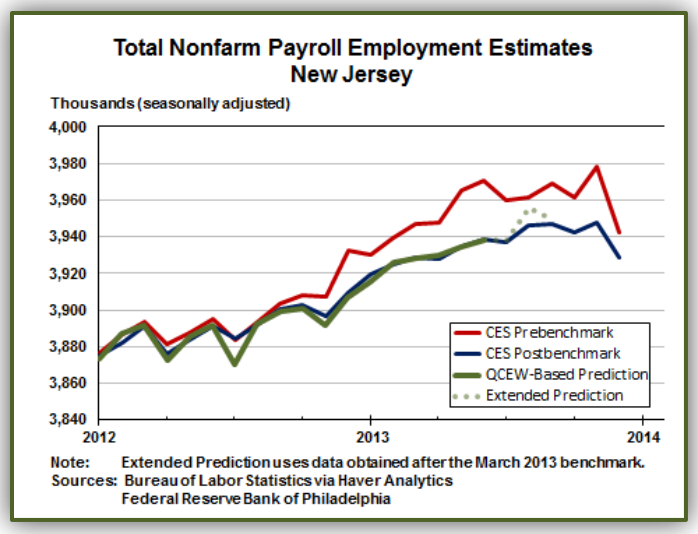
By comparison, our early benchmark alternative showed 3.8 percent growth followed by 0.5 percent growth. As analysts tracking the Delaware economy, we greatly prefer our early benchmark alternative that more closely approximated the eventual revised employment trends to the CES series.

Fortunately, over the entire one-year period (September 2012 through September 2013) for which new QCEW data were incorporated, overall growth estimates in Delaware were nearly identical at just over 2.0 percent before and after the revisions.

[3] For more details about our approach, see the inset on page 7.

[4] The extension uses QCEW data for the third quarter of 2013 that were not publicly available until after the benchmark revisions were released.

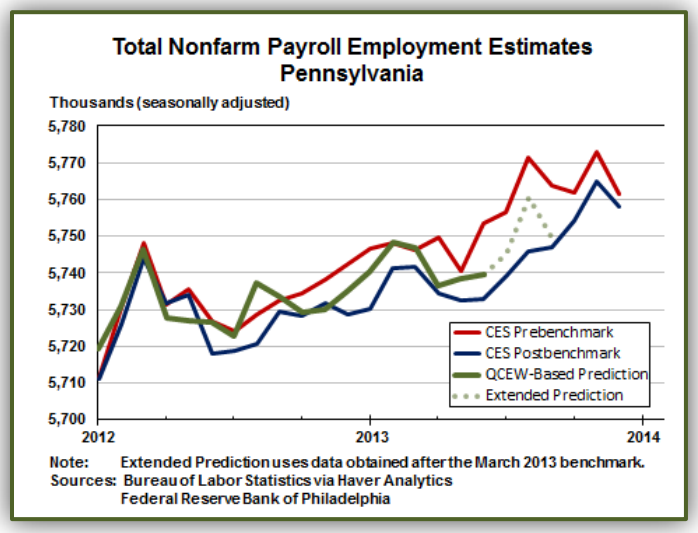
New Jersey. Trends diverged between New Jersey's pre- and postbenchmark estimates immediately after 2012's third quarter. This timing corresponds with the last period of QCEW data used by the prior benchmark revision. Two months (December 2012 and May 2013) contributed significantly to an ongoing overstated growth rate for New Jersey throughout the following year.



By the end of the entire one-year period through September 2013, for which new QCEW data were incorporated, the prebenchmark CES numbers depicted a 1.7 percent growth rate. The revised CES estimates described a smoother 1.2 percent growth rate, which was nearly indistinguishable from the 1.3 percent predicted by our alternative approach.

Excessive volatility observed in the final quarter of 2013 will likely be smoothed away by next year's benchmark process; however, we should be able to confidently assess that change when the BLS releases its fourth quarter 2013 QCEW data on June 19, 2014.

Pennsylvania. Trends also diverged between Pennsylvania's estimates; however, the gap between the pre- and postbenchmark series averaged less than 0.2 percent of the prerevision value for the 12 months ending in June 2013. The QCEW-based series correctly



predicted that the benchmark effects would generally be downward and very small in relative terms.

For the entire one-year period through September 2013, the prebenchmark CES numbers depicted a 0.5 percent growth rate, while the revised CES estimates and our alternative approach indicated a 0.3 percent growth rate.

The alternative QCEW-based series that we constructed is not perfectly correlated with the revised CES series and should not be used to claim that the BLS benchmark process was incomplete or misguided in any sense.

Our approach necessarily takes several shortcuts compared with the BLS methodology. In addition, the BLS staff has access to additional details from both sets of data that are used to reconcile the differences in CES and QCEW employment data. Nonetheless, the exercise demonstrates the usefulness of constructing alternative measures of employment that take advantage of all publicly available information, specifically, incorporating QCEW information sooner than the annual CES benchmark revisions.

Summary

The recently announced benchmark revisions for state payroll employment had relatively minor effects on annual growth estimates for the Third District states; however, the growth patterns throughout the year changed in several cases. The March 2013 benchmark revisions were very similar to our anticipated revisions from our January report and from the results of using the more comprehensive approach described in this report. In essence, we confirm that analysts can more accurately determine employment trends in a state by replacing sample-based CES trends with trends in the larger QCEW-based population on a timelier basis than the annual CES benchmark revisions.

How We Constructed Our Early Benchmark Estimates

Our QCEW-based predictions for Delaware, New Jersey, and Pennsylvania were designed to approximate the BLS benchmark revisions in an expedient fashion. We specifically addressed the following five aspects of the benchmark process: sampling errors, coverage differences, administrative changes, firm births and deaths, and seasonal adjustments. However, our process does not attempt to be as comprehensive as the BLS process, nor do we have access to all of the data that the BLS uses.[1]

Primarily, we incorporate the population-based QCEW data, which significantly help to reduce sampling errors, correct some administrative changes, and largely capture firm births and deaths. Coverage differences are estimated with a simple ratio approach, and seasonal adjustments are reapplied each quarter in a more timely fashion than the BLS, but using somewhat less sophisticated methods.

Our first step matched 18 CES industry sectors with their most similar QCEW sectors. Next, the ratio of the CES employment levels to the QCEW employment levels was computed for each sector using data for 12 months centered on March 2012 (the month of the previous benchmark). This ratio was then applied to each sector's full history of QCEW data as a means to crudely account for differences in how the two programs define and measure specific sectors. A primary example is how the CES derives employment estimates for non-UI employment (jobs not covered by unemployment insurance).[2]

In the third step, the QCEW series, which was multiplied by a ratio for each sector, was seasonally adjusted using the X12 routine (with the default parameters for multiplicative seasonal factors). These sector-based seasonally adjusted series were then aggregated to create the predictions of the benchmark total nonfarm payroll estimates for each state.

[1] For details on the BLS benchmark process, see the BLS articles titled "Revisions in State Establishment-Based Employment Estimates Effective January 2014" and "Technical Notes for the Current Employment Statistics Survey." These articles explain the role of benchmark months, how estimates of employment that are not UI-covered (and thus not counted in the QCEW data) are derived, business birth–death estimations, methods to smooth large administrative corrections between current benchmarks and prior benchmarks, how growth rate adjustments are made in postbenchmark periods, and seasonal adjustments.

[2] In most sectors, this ratio was in the 0.99 to 1.01 range, meaning non-UI employment is very low in this sector. Using a ratio of exactly 1.0 for these cases does not affect the results in any noticeable manner.

References and Suggested Reading

"Anticipating Benchmark Revisions of Payroll Employment Estimates in Third District States," Federal Reserve Bank of Philadelphia Regional Economic Analysis, January 29, 2014, available at philadelphiafed.org/research-and-data/regional-economy/releases/regional-economic-analysis/QCEW2014January.pdf (last accessed April 22, 2014).

Berger, Franklin D. and Keith R. Phillips, "Reassessing Texas Employment Growth," Federal Reserve Bank of Dallas, *Southwest Economy*, July–August 1993, available at www.dallasfed.org/assets/documents/research/swe/1993/swe9304a.pdf (last accessed April 22, 2014).

Bureau of Labor Statistics, "CES National Benchmark Article: BLS Establishment Survey National Estimates Revised to Incorporate March 2013 Benchmarks," last modified February 7, 2014, available at www.bls.gov/web/empsit/cesbmart.pdf (last accessed April 10, 2014).

Bureau of Labor Statistics, "County Employment and Wages: Third Quarter 2013," news release, March 19, 2014, available at http://www.bls.gov/news.release/pdf/cewqtr.pdf (last accessed April 10, 2014).

Bureau of Labor Statistics, "Reliability of State and Area Estimates," last modified March 18, 2014, available at www.bls.gov/sae/790stderr.htm (last accessed April 10, 2014).

Bureau of Labor Statistics, "Revisions in State Establishment-Based Employment Estimates Effective January 2014," available at www.bls.gov/sae/ benchmark2014.pdf (last accessed April 10, 2014).

Bureau of Labor Statistics, "Technical Notes for the Current Employment Statistics Survey," last modified February 7, 2014, available at www.bls.gov/ces/cestn.pdf (last accessed April 10, 2014).

Groen, Jeffrey, "Seasonal Differences in Employment Between Survey and Administrative Data," BLS Working Paper 443, February 2011, available at www.bls.gov/osmr/abstract/ec/ec110010.htm (last accessed April 10, 2014).

Haltom, Nicholas L., Vanessa D. Mitchell, and Ellis W. Tallman, "Payroll Employment Data: Measuring the Effects of Annual Benchmark Revisions, Federal Reserve Bank of Atlanta, *Economic Review,* Second Quarter 2005, available at www.frbatlanta.org/filelegacydocs/erq205_haltom.pdf (last accessed April 22, 2014).

Federal Reserve Bank of Philadelphia Research Department Contacts:

Paul R. Flora
Research & Policy Support Manager/
Senior Economic Analyst
Phone: 215-574-6649
paul.flora@phil.frb.org

Elif Sen
Economic Analyst
Phone: 215-574-6424
elif.sen@phil.frb.org

Michael Boldin
Senior Economic Analyst
Phone: 215-574-3415
michael.boldin@phil.frb.org

Tosmai Puenpatom
Senior Economic Analyst
Phone: 215-574-3852
tosmai.puenpatom@phil.frb.org

Mike Trebing
Senior Economic Analyst
Phone: 215-574-6426
mike.trebing@phil.frb.org

www.philadelphiafed.org/research-and-data/regional-economy/