

Early Benchmark Methodology

The Federal Reserve Bank of Philadelphia has developed early benchmark estimates of monthly state payroll employment on a quarterly basis to predict the subsequent annual benchmark revisions by the Bureau of Labor Statistics (BLS). Our process enhances the monthly Current Employment Survey (CES) payroll employment data with the more comprehensive Quarterly Census of Employment and Wages (QCEW) payroll employment data. The CES provides a timely estimate of monthly state employment data, but the QCEW follows about five months later with a more complete picture, covering more than 95 percent of all employers. Our methodology was adapted from an approach pioneered by the Federal Reserve Bank of Dallas and further modified to accommodate all 50 states and the District of Columbia.¹

The estimate of U.S. employment obtained from the sum of our early benchmark state estimates is not designed nor intended to be an accurate measure of national employment. Moreover, the BLS routinely [warns](#) that because of statistical limitations, it “does not compile a ‘sum-of-states’ employment series and cautions users that such a series is subject to a relatively large and volatile error structure.” This caveat also applies to our early benchmark series.

What Are the Timing and Scope of the Revisions?

Every March, the BLS releases revised estimates of monthly nonfarm payroll employment for states as part of its CES program. For these revisions, the BLS incorporates data from the QCEW, new seasonal adjustment factors, and other corrections to make the data revisions more accurate.² Since the QCEW is released quarterly — just over five months after the end of a quarter — researchers at the Philadelphia Fed are able to create our own early benchmark estimates on a more timely basis.

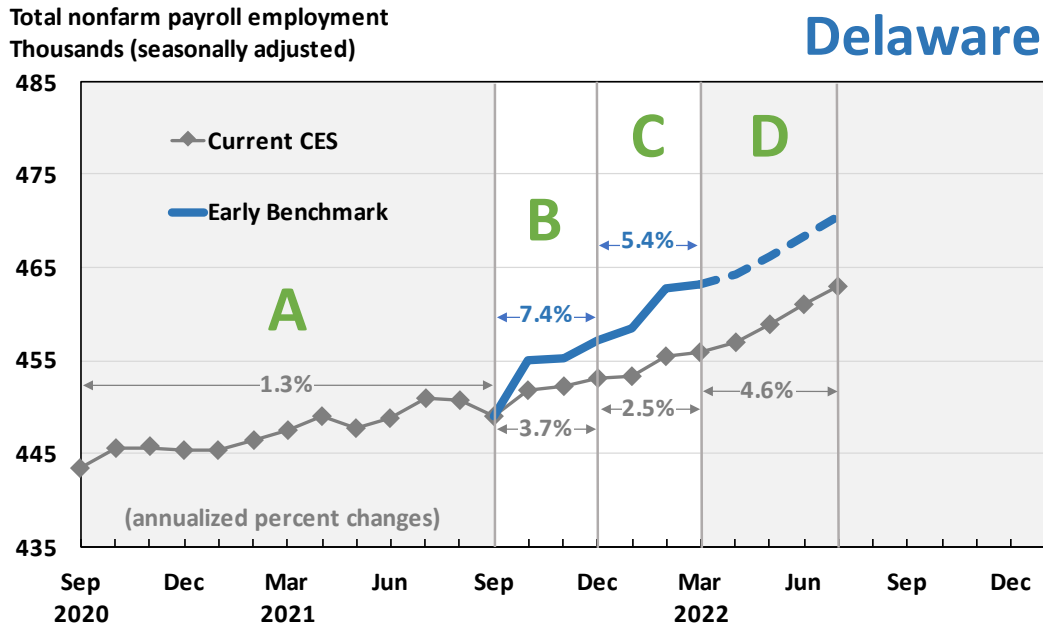
Our early benchmark process does not attempt to be as comprehensive as the BLS process, as we do not have access to all the data that the BLS uses. Therefore, we accept the BLS’s benchmarked CES estimates as the base employment level for each state. Once QCEW data are released for periods beyond the latest benchmarked CES estimates, we produce our early benchmark estimates.

Figure 1 on the next page illustrates the timing of data published by the Philadelphia Fed and the BLS for a given quarter.

¹ For more details on the methodology developed by the Federal Reserve Bank of Dallas, see its [Early Benchmarking web page](#).

² For more details on the methodology used by the Bureau of Labor Statistics (BLS), see the [SAE Methods Overview Page](#).

Figure 1: Delaware - 2022 Q1 Vintage



Period A: The current CES estimates are based on an annual benchmark revision (released in March 2022). Because these CES estimates incorporated QCEW data through September 2021, period A depicts only the CES estimates that have passed through at least one annual benchmark process. Our analysis is only intended to revise BLS estimates that have not yet passed through an annual benchmark process.³

Period B: Our first early benchmark estimate for the fourth quarter of 2021 was produced when fourth quarter QCEW data were released in June 2022.

Period C: When QCEW data for the first quarter of 2022 were released in September 2022, we produced our early benchmark estimate for the first quarter of 2022 (period C) and revised our estimate for the fourth quarter of 2021 (period B). This process is repeated for each release of quarterly QCEW data until the BLS releases its annual benchmark revisions.

Period D: For months in which QCEW data are not yet available, we use sector-level growth rates from the CES to project our March early benchmark estimates for April through July. The dotted line in period D of Figure 1 represents the extended projection of our early benchmark estimates.

³ Each vintage of QCEW data can contain revisions to the data sets' entire historical period. Our procedure of accepting the BLS's most recent benchmarked CES data (Period A in Figure 1) as the base employment level for each state introduces the possibility that our estimates do not account for revisions to historical employment levels that occasionally occur. However, the choice to accept the BLS's benchmarked CES data does not impact our ability to capture the growth rates of subsequent state-level QCEW data that will be used to revise CES data for quarters that have not yet gone through an annual benchmark process.

What Procedures Are Followed?

To achieve greater precision in the estimation of the overall employment growth rate, we link newly released QCEW data with benchmarked CES data at the sector level. This allows us to better capture the unique growth rate and seasonal pattern in each sector. We match CES industry sectors to their most similar QCEW sectors on a state-by-state basis, as some states have a more extensive list of sectors than others.

The sector-level QCEW series are seasonally adjusted using the U.S. Census Bureau's X-12 program. To reduce potential impacts of extreme employment changes during the pandemic period on our seasonal adjustment process, we:

- switched from a multiplicative to an additive process;
- excluded data after December 2019;⁴ and
- forecast seasonal factors for 2020 through 2022.

However, these changes to our seasonal adjustment process may create a discrepancy between the BLS data revisions and our early benchmark estimates in March 2023.⁵ This divergence may persist for several years until the pandemic-impacted data from 2020 and 2021 have aged out of the analysis.

Within periods B and C in Figure 1, the growth rates of the seasonally adjusted QCEW series are used to project the CES levels for each sector from September 2021 — the last month with which the BLS had access to QCEW data for its annual benchmark.⁶ These sector-level series are then aggregated for each state to create our early benchmark estimates of payroll employment for October 2021 through March 2022.

What Makes a Revision Significant?

Every March, the BLS releases standard errors for their state CES estimates.⁷ We use these standard errors to create a range of expected variance due to sampling error for the state CES estimates. If our early benchmark revision estimates are outside this range, we consider the revision to be significant.

⁴ Next year, we will evaluate whether to include data beginning in 2022 or in 2023.

⁵ These discrepancies will be most pronounced for quarterly growth rates but should be relatively small for annual comparisons.

⁶ The BLS provides seasonally adjusted CES data.

⁷ For more details on the BLS's standard errors of the CES State and Area Estimates, see [Reliability of CES State and Area Estimates](#).