Calculation of Net Job Gains and Losses

Local Employment Dynamics — All About Jobs

Employment changes are based on the beginning of quarter employment measure, or "B", as reported on QWI Online (as "Total Employment"). This measure requires that an individual receive wages from a firm in the previous and current quarter, based on unemployment insurance wage reports. Data are aggregated by the North American Industry Classification System (NAICS) industrial sector, as well as by gender and age group. This tabulation includes only private sector businesses in all sectors, so NAICS sector 92 (Public Administration) has been excluded.

Weighting to QCEW

The LED B measure is weighted on a statewide level to match the publicly released Quarterly Census of Employment and Wages (QCEW), produced by the Bureau of Labor Statistics (BLS). The benchmark measure used is total private employment in the first month of the quarter (October for fourth quarter employment). The statewide private sector aggregates for LED may differ from the QCEW by up to about 1% due to the noise infusion that is applied as part of the confidentiality protection scheme used in the QWI. The industry-level and state by industry-level growth rates can differ from growth rates computed from QCEW over the same period of time given differences in data sources and methodology.

The most recently available data in the QWI system are considered preliminary, and the weights are applied slightly differently. Because the BLS numbers are not yet available during QWI production, the last quarter is weighted to QCEW based on microdata reports. This can lead to somewhat higher discrepancies in the most recent quarter.

Calculating Growth Rate

The employment growth rate is calculated using the following growth rate measure for say the period 2007:q4 to 2008:q4:

$$\frac{\left(B^{2008q4} - B^{2007q4}\right)}{\left(B^{2007q4} + B^{2008q4}\right)/2}$$

This growth rate measure has the advantage of being symmetric like the log first difference measure of growth rates and also being able to incorporate establishment entry and exit when this measure is used at the micro level (where in measuring the growth rate for entering and exiting establishments employment will be zero prior to entry and after exit). As discussed in Tornquvist, Vartia and Vartia (1985) and Davis, Haltiwanger and Schuh (1996) this growth rate measure is a second order approximation to the log first difference. LED uses this growth rate measure as it can be consistently applied at both the micro and aggregate level.[1]

[1] Tornqvist, Leo, Pentti Vartia, and Yrjo Vartia, 1985, "How Should Relative Change Be Measured?" *American Statistician*, 39(1), 43-46 and Davis, Steven, John Haltiwanger and Scott Schuh. 1996 *Job Creation and Destruction*, MIT Press.

Symmetric growth rate measures like the growth rate measure used by LED are now used by the U.S. statistical agencies on a regular basis. A simple example highlights the problems in interpretation that can arise from using a non-symmetric growth rate measure like the traditional growth rate measure given by (B_{t+1}/B_t)-1. The example compares three growth rate measures for a hypothetical series that takes on values of 100, 125, and 100. Comparisons are made using the traditional growth measure, the LED growth rate measure, and the log first difference. The table below shows that the LED measure and the log first difference measure obtain virtually the same results with the common property that the average growth rate over the two periods averages to zero (reflecting the symmetric nature of both growth rate measures and that the series exhibits no change between the first and last period). The traditional growth rate measure shows an asymmetric pattern with a non-zero average of growth rates even though the series in question exhibits no change between the first and last period. To avoid difficulties in interpreting such asymmetries the statistical agencies have widely adopted the use of symmetric growth rate measures.

Time Period	Value	Traditional Measure % Change	LED Measure % Change	Log First Difference % Change
1	100	--	--	
2	125	25%	22.2%	22.3%
3	100	(20%)	(22.2%)	(22.3%)
Average Growth Rate		2.5%	0%	0%

Updating Frequency

The Net Job Gains and Losses reports are updated once a quarter, towards the beginning of the calendar quarter. With each update, a new calendar quarter will be added to the report for all states for which new data is available. At the time of updating, the numbers appearing on these reports will be consistent with the employment on QWI Online. However, as individual states are updated on QWI Online on a rolling basis, differences may be observed between the two data sources over the course of a quarter. As the entire QWI data series is refreshed in each production quarter, there can be differences in both the most recent as well as historical values.

For a more complete description of the development of the QWI measures, see Technical Paper 2006-1, *The LEHD Infrastructure and the Creation of the Quarterly Workforce Indicators*, located at http://lehd.did.census.gov/led/library/techpapers/tp-2006-01.pdf.