Economic Trends

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Combining GDP and GDI for a Better Measure of the Economy Could Be Tricky

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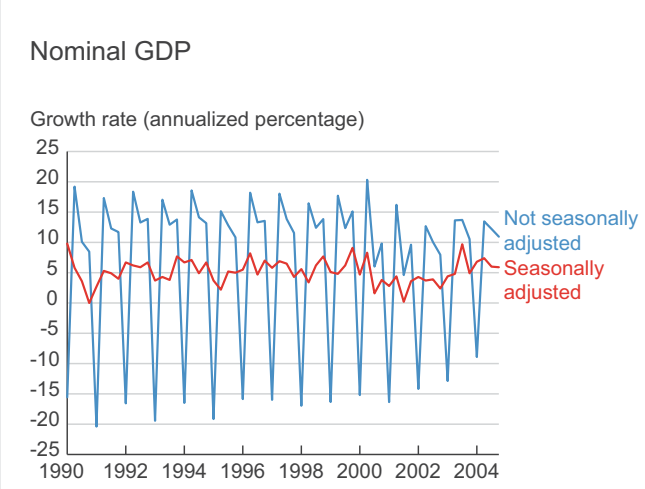
After the Bureau of Economic Analysis (BEA) released its latest estimate of real GDP growth for the first quarter of 2015—a disappointing -0.2 percent—economists began looking for reasons for the sudden decline. A host of transitory factors, like unusually harsh winter weather and the port shutdown on the West Coast, were the most commonly mentioned causes of the aberration in the data. Another factor which has received attention from many sources is residual seasonality. Residual seasonality is when a statistical process called seasonal adjustment fails to do its job. Seasonal adjustment should remove predictable patterns in a data series, like GDP, which arise due to timing within a year and make it harder to see the broader trend.

For instance, seasonal factors like increased spending during the winter holiday season or high energy bills in the summer may cause GDP to change sharply in one period and then move sharply in the opposite direction in the next period when the seasonal factor has passed. By measuring how these factors have affected the series in the past, one can filter out the effect, leaving a smoother, seasonally-adjusted data series. The figure to the right plots the growth rates of unadjusted GDP (the unadjusted data were only published in nominal terms, up until 2005) along with



Source: Bureau of Economic Analysis.

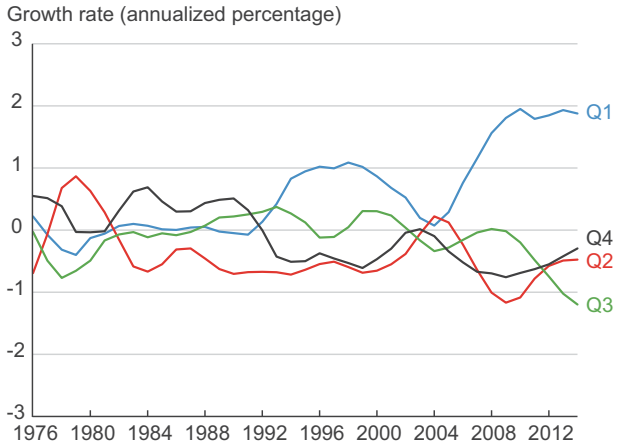
seasonally adjusted GDP. The seasonally adjusted series is much less volatile.

After a series has been properly adjusted, there should not be any predictable differences between the data in one period and the data in another period (such as summer vs. winter or Q1 vs. Q3). When such a difference is still present, we say that there is residual seasonality in the data. When the BEA constructs a big data series like GDP, it tries to remove seasonal factors from the many individual data series underlying it. However, when those individual series get added together, the aggregated result can contain residual seasonality. In that case, one can seasonally adjust the aggregated series to remove the residual seasonality. The top figure at right shows how much a second round of seasonal adjustment adds to or subtracts from each quarter's estimates of real GDP growth. Notice that Q1 growth rates must be adjusted up while the other quarters must be adjusted down (that is, Q1 real GDP growth is predictably low relative to the rest of the year).

Another measure of economic activity called gross domestic income (GDI) is often used along with GDP to get a better picture of the state of the economy. While GDP and GDI measure economic activity differently, in theory, the two should be equal. For a host of measurement reasons, however, they usually deviate from each other a little bit. Importantly for interpreting the recent growth data, real GDI does not display the same residual seasonality that real GDP does. The middle figure at right plots the quarterly seasonal adjustments to real GDI. Notice that no single quarter stands out as predictably needing more positive or negative adjustment than any other quarter.

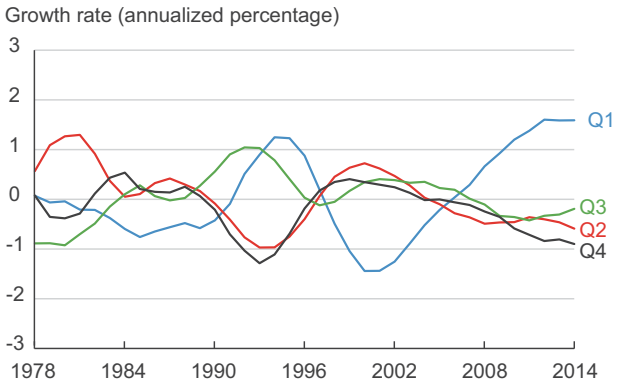
Some economists have suggested that using a mixture of real GDP and real GDI could be a better measure of economic activity. Soon, the BEA will produce a 50/50 mixture of the two data series. While we do not know the exact details of how that mixture will be produced, one can use the published GDP and GDI data to

Seasonal Adjustment to GDP Data



Source: Bureau of Economic Analysis.

Seasonal Adjustment to GDI Data



Source: Bureau of Economic Analysis.

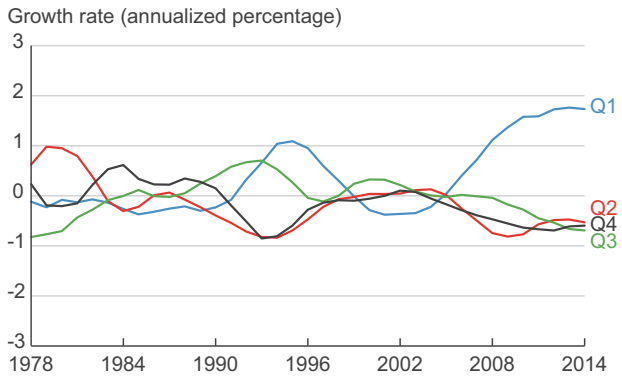
construct a 50/50 mixture and investigate it for any residual seasonality.

To do so, take the GDP and GDI data, calculate the quarterly growth rates for each series, and then average them. Do the same for the twice-seasonally-adjusted GDP and GDI data. Differencing these growth rates should give an indication of whether the seasonality in the GDP data is mitigated or amplified by the GDI data. The top figure at right plots the results of this exercise.

Although combining GDI with GDP appears to soften the degree of seasonality, the recent residual seasonality in the first quarter nevertheless persists (bottom figure at right). Even though GDI over the past 25 years has only weakly tended to be lower in the first quarter than in the following quarters, its seasonal pattern moved similarly to that of GDP. As a result, the 50/50 mix still has residual seasonality.

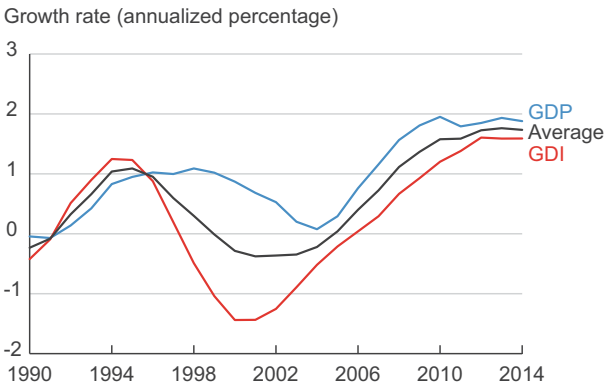
Removing predictable seasonal fluctuations from large data series like GDP and GDI may not be a straightforward exercise. Sometimes the combination of seasonally adjusted series can by chance have residual seasonality. In addition, applying different weights to the component series can produce quite different seasonal behavior in the aggregate. Ultimately, there is no one-size-fits-all method for completely removing the effects of seasonal movements in the data. This is especially true for measures of macroeconomic performance like GDP and GDI, which are built up from many smaller components. In the case of the low 2015 Q1 GDP growth estimate from the BEA, many policymakers and market watchers discounted the reading in part because it fit with the residual seasonality present in the data. Some have argued that we should use a 50/50 mix of GDP and GDI to get a more accurate picture of the state of the economy. While this may be true, one should still be on guard for residual seasonality in the mixed data.

Seasonal Adjustment to GDP/GDI Mix Data



Source: Bureau of Economic Analysis.

Seasonal Adjustment to Q1 BEA Data



Source: Bureau of Economic Analysis.

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