# Taking Account...

## A new look at seasonal adjustment and recessions

In a recent paper, Ryan Greenaway-McGrevy, an economist at the Bureau of Economic Analysis, develops a new approach to seasonal adjustment, one that is likely less prone to the distortionary effects of severe business-cycle fluctuations.

Typically, seasonal adjustment factors are estimated using the history of an individual time series. Popular examples of this univariate approach to seasonal adjustment include filter-based methods, such as X-12-ARIMA and X-13-ARIMA-SEATS, and model-based methods, such as TRAMO-SEATS. In Greenaway-McGrevy's new multivariate approach, a large cross section of time series data is instead used to estimate seasonal effects.

To be sure, the multivariate approach incorporates many of the elements of univariate filter-based methods. In fact, the seasonal components of the time series are estimated using the same seasonal filters used in the conventional filter-based methods. That is, the seasonal components are obtained by taking moving averages of adjacent months or quarters over an individual "de-trended" time series.

The primary difference between the multivariate approach and the univariate filter-based approach concerns the detrending process.

Time series data must be detrended before estimating the seasonal components that are then used to adjust the data. Under a univariate filter-based approach, the trend is estimated based on the individual time series under consideration, typically by smoothing the data via moving averages. Under the multivariate approach, however, the fitted stochastic trend captures both the long-term variation in the time series as well as the high-frequency covariation reflected in a large cross section of time series economic data.

The primary advantage of the multivariate approach is that common, abrupt changes in the levels of the time series—such as those caused by volatile business-cycle swings—do not distort the seasonal patterns generated by the seasonal adjustment model. In contrast, when a univariate smoothing filter is used to estimate the trend component, a sudden change in the level of a time series is graduated over many time periods, and consequently, the de-trended time series will exhibit sustained volatility.

This volatility can generate spurious changes in the seasonal patterns implied by the seasonal filters unless the model is adjusted via an intervention built into the seasonal adjustment procedure. In contrast, under the multivariate approach, a common change in the levels of the time series is accommodated in the fitted trend component—and not the seasonal component—of the model.

Because recessions coincide with declines in indicators captured by the large cross section of time series data, the multivariate approach is likely better at seasonally adjusting data subject to sharp turning points.

The study relies on two evaluation criteria for assessing the seasonal adjustment methods. First, it directly tests whether the recession has distorted the fitted seasonal components of each method. Second, it considers revisions to seasonal components, as these revisions can be a large source of revisions to seasonally adjusted economic data.

The study concludes that the multivariate approach fares better when evaluated by either criterion when applied to a large nominal imports dataset.

There is little evidence of a pervasive change in the multivariate model seasonal components as a result of the recession. In contrast, there is substantial evidence of pervasive change in the univariate seasonal components coinciding with the recession. Also, the revisions to multivariate seasonal components are smaller than the revisions to the univariate seasonal components in 1998–2011.

While the multivariate approach appears to deal with the effects of the recession much better than univariate filter-based methods, additional empirical analysis is required to analyze the performance of the procedure in different contexts.