

ILLUSTRATION BY AJAY MOHANTY



Measuring the drama in the economy

Seasonal adjustment is a powerful tool to obtain better and faster insights into the macroeconomy

We are in a time of great changes in the macroeconomy, with the combination of difficult initial conditions, demonetisation, and the goods and services tax (GST). The seasonally adjusted data shows that the listed firms got strong growth in the October-December 2016 and January-March 2017 quarters. After that, growth dropped to roughly 5 per cent nominal from April to September this year. These features of the data are not visible in the conventional year-on-year changes.

Listed firms release financial results every quarter. They generally have a strong finance department and a statutory auditor. Hence, their data is fairly error-free. By adding up information for all listed companies, we get a good sense of business cycle conditions.

Doing this right requires many elements of care. We remove oil companies because fluctuations in oil prices do not reflect Indian business cycle conditions. We remove financial firms because there are problems with the results of financial firms such as banks, which overstate their performance by hiding bad loans. We construct an index by computing growth across two consecutive quarters using only the firms observed in both quarters (<https://goo.gl/yqKaMz>). Finally, we seasonally adjust this index.

Once seasonal adjustment has been done, we are allowed to compute the quarter-on-quarter change. This yields the 'POPSAA', i.e. the Point-On-Point Seasonally Adjusted Annualised Rate of Change. As an example, the value of 5.98 per cent for July-September 2015 says that if the pace of change from April-June 2015 to July-September 2015 was kept up for a year, this would be growth of 5.98 per cent in nominal rupees.

The change over a year is the average of the four

POPSAA changes over the four quarters. (If monthly data is used, the change over a year is the average of POPSAA changes in 12 months.) In the table, we see that the average of four latest POPSAA values tallies with the year-on-year (YOY) value.

This table serves as a nice demonstration of the power of seasonal adjustment in understanding what is happening in the economy. If we look at the YOY data, it appears that growth was in the 0-3 per cent range in the early quarters. Then there was an upsurge where growth steadily accelerated to 3.5, then 6.6, then 7.08, and then 8.09. This seems like an economy that is getting back on its feet, with four consecutive quarters of improvements.

Seasonal adjustment permits us to delve into the change in each quarter. Instead of looking at the average of the latest four changes, we are able to see the change in each quarter. This tells us three things.

First, in the five quarters from July-September 2015 to July-September 2016, average growth was 1.29 per cent. This was a fairly anaemic rate of change.

Then came the quarters of October-December 2016 and January-March 2017, which had a mixture of demonetisation and the impending GST. Contrary to what most people expected, the growth of the top line of large firms actually accelerated in these two quarters. The average value for growth here was 10.44 per cent. We do not have an insight into why this acceleration took place, but it did take place.

After this, many complex forces came into action. Demonetisation and the GST had created a disruption in the economy and this may have given a drag on growth. At the same time, greater formalisation of the economy, particularly through the GST, favoured larger firms. The outcome that we see in the table is that in the two quarters from April to September this

GROWTH OF NON-FINANCE NON-OIL LISTED FIRMS' REVENUE

Quarter	POPSAA (%)	4-quarter average of POPSAA (%)	% YOY
Jul-Sep 2015	5.98	2.72	2.89
Oct-Dec 2015	-5.23	0.22	0.01
Jan-Mar 2016	0.38	1.28	1.08
Apr-Jun 2016	5.60	1.68	2.00
Jul-Sep 2016	-0.34	0.10	0.19
Oct-Dec 2016	8.96	3.65	3.54
Jan-Mar 2017	11.92	6.54	6.64
Apr-Jun 2017	5.94	6.62	7.08
Jul-Sep 2017	4.35	7.79	8.09

POPSAA: Point-On-Point Seasonally Adjusted Annualised Rate of Change

year, growth was at 5.94 per cent and 4.35 per cent.

Since the YOY measure is the average of the latest four values, we see a steady acceleration from July-September 2016 onwards. In October-December 2016, there was one quarter of strong growth and three weak quarters, which averaged 3.54 per cent. In the latest quarter, this average comes to 8.09 per cent, which is the highest value in the YOY series in the table. However, the average conceals the changes. In reality, what happened was that in the two quarters with the disruptions, we got sharp growth of 8.96 per cent and 11.92 per cent. After that, growth has dropped down to the range of 4 to 6 per cent.

Hypothetically, suppose the October-December 2017 quarter has POPSAA growth of 5 per cent. This would be a stable outcome, with a continuation of the previous two quarters of 4-6 per cent growth. But the average of the four latest values would lose the reading for October-December 2016. This would give a YOY value of 6.8 per cent. This would look like a decline in the YOY value when compared with the previous value of 8.09 per cent. However, the true picture (in this scenario) is stable 5 per cent growth.

Many time series are very volatile and there is a case for smoothing through various methods such as moving averages. As an example, the time series of corporate profits are extremely volatile and smoothing is useful. But the use of smoothing should be a choice of the statistician. A fixed four-quarter average applied to all quarterly data, or a fixed 12-month average applied to all monthly data, is inappropriate.

Seasonal adjustment is thus a powerful tool to obtain better and faster insights into the macroeconomy. At the National Institute of Public Finance and Policy, a great deal of work has taken place on the statistical methods (<https://goo.gl/hhVpqM>). We find that our hand-crafted methods significantly improve upon black box seasonal adjustment. But we find that even black box seasonal adjustment is better than doing no seasonal adjustment. We have used these methods with great success for a decade now, to obtain faster insights into business cycle conditions. A library of long, seasonally adjusted series is the foundation of our measurement of the business cycle, including dating, coincident indicator and leading indicator.

The writer is a professor at National Institute of Public Finance and Policy, New Delhi



SNAKES & LADDERS

AJAY SHAH