Technical note on seasonal adjustment for imports

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1 Imports

We analyse the monthly data for imports in Rs Billion from April, 1994 onwards. Figure 1 shows the original plot. The plot apparently shows seasonal variations, which are increasing over time.

Figure 1 Imports (Non seasonal adjusted)
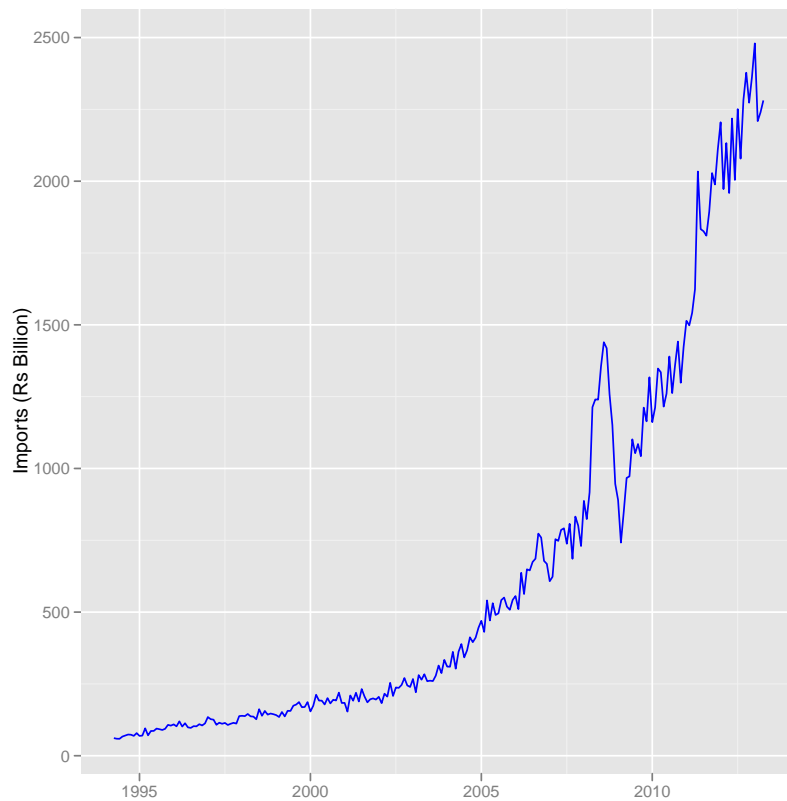
1.1 Detection of additive versus multiplicative seasonality

Before seasonally adjusting the series, X-12-ARIMA has the capability to determine the mode of seasonal adjustment decomposition to be performed i.e whether multiplicative or additive seasonal adjustment decomposition is appropriate for the series. For the given series, multiplicative seasonal adjustment is considered appropriate on the basis of model selection criteria.

2 Steps in the seasonal adjustment procedure

Given that the series shows some form of seasonality, it is important to model it before the application of seasonal adjustment procedure. Seasonality in time series can be deterministic or stochastic. Stochastic seasonality can be stationary or non-stationary.

A visually appealing way of looking at the raw data is to plot the growth rates in each of the months across the years i.e the growth of April over March in each of the years from 1994 onwards. This gives us some idea of the presence of seasonal peaks, if any in the series.

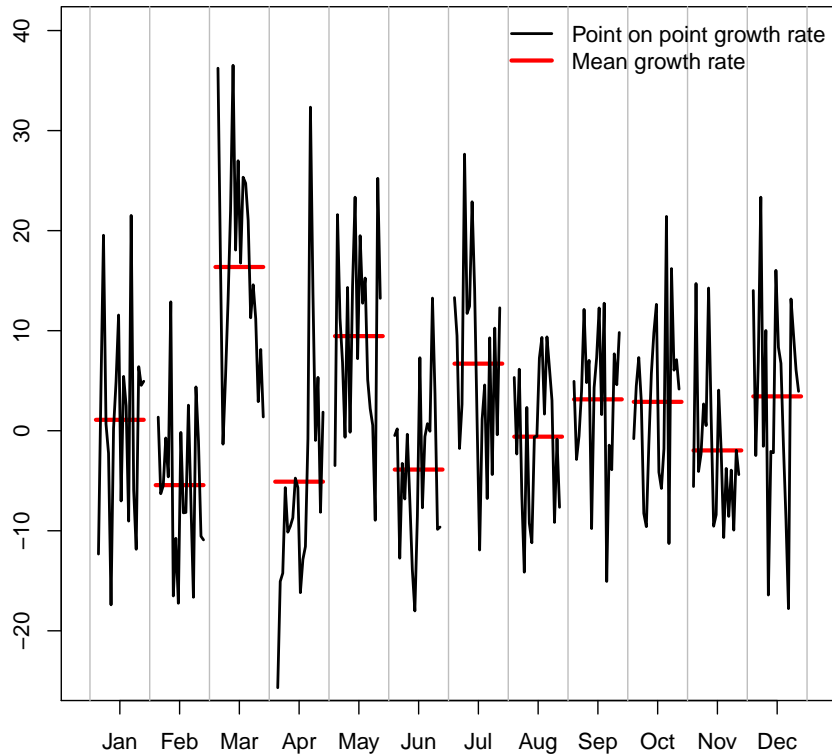**Figure 2** Monthly growth rates across the years

Figure 2 shows that there are no explicit peaks in any of the months across the years. The mean growth rates for all the months across the years are not markedly different from each other.

2.1 Seasonal adjustment of imports with X-12-ARIMA

We verify the above test indications with X-12-ARIMA program. We then check for the presence of identifiable seasonality on the basis of diagnostic procedures

2.1.1 Presence of identifiable seasonality

The statistic M7 shows the amount of moving seasonality present relative to stable seasonality. It shows the combined result for the test of stable and moving seasonality in the series. A value lesser than 0.7 is desirable to show identifiable seasonality in the series. The value of M7 statistic for imports is 0.88.

M7 statistic shows that moving seasonality is quite high relative to stable seasonality. A high value of M7 statistic shows that there is no identifiable seasonality in the series.

3 Spectral representation

Figure 3 shows the spectral plot of the growth rate of the unadjusted and seasonally adjusted series. Spectral plot, an important tool of the frequency domain analysis shows the portion of variance of the series contributed by cycles of different frequencies.

Since the series does not have distinct seasonality, the figure for non seasonally adjusted growth rate does not show distinct peaks at the seasonal frequencies.

Figure 3 Imports spectral plot (NSA and SA)
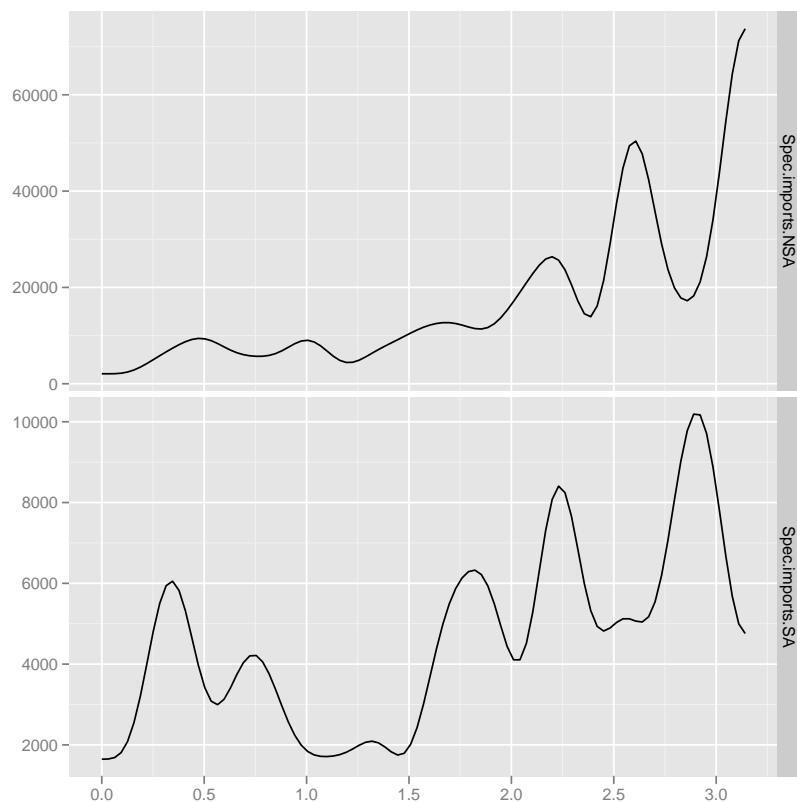
With the latest data, the M7 statistic and the spectral plots do not show the presence of identifiable seasonality in the series. We do not perform seasonal adjustment of the series and report non-seasonally adjusted annualised month-on-month growth rates (NSAAR) for imports.