Technical note on seasonal adjustment for non oil imports

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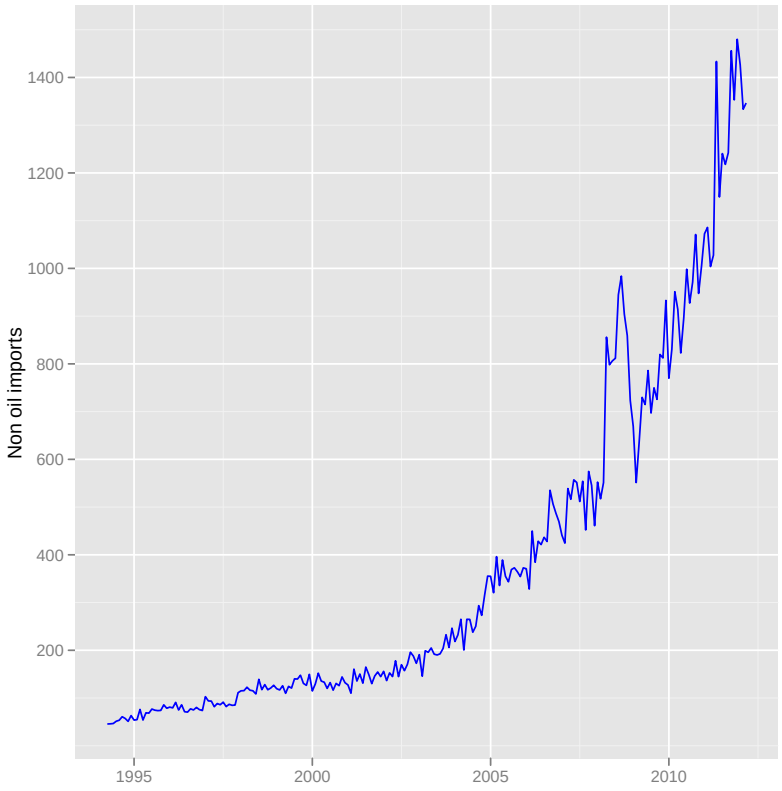
1 Non oil imports

We analyse the monthly data for non oil imports in Rs Billion from April, 1994 onwards. Figure 1 shows the original plot of the series. The plot apparently shows seasonal variations.

Figure 1 Non oil imports (Rs Billion) (Non seasonal adjusted)



1.1 Additive versus multiplicative seasonality

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 the 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

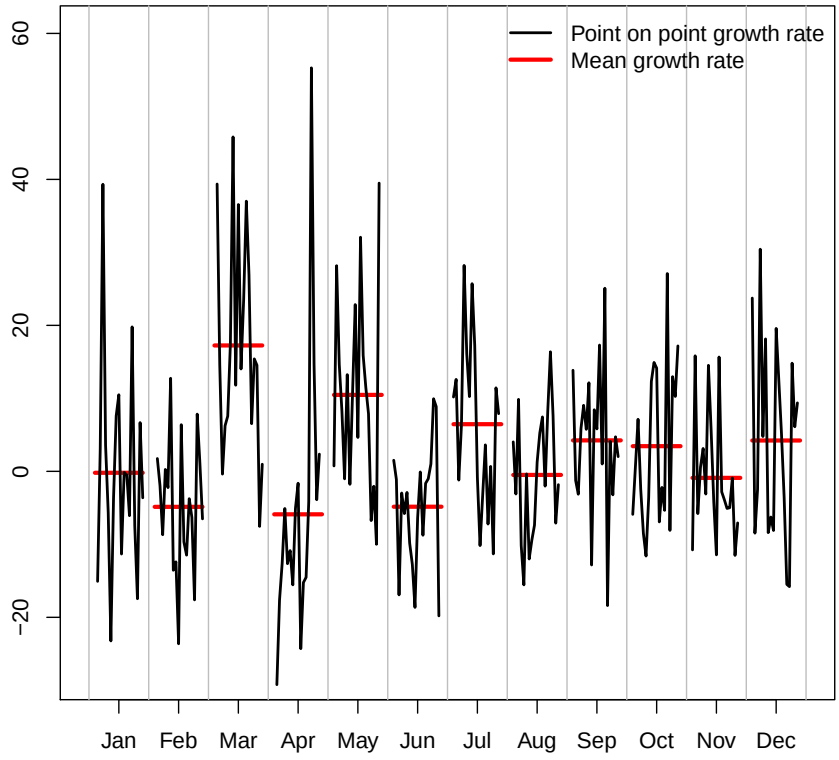


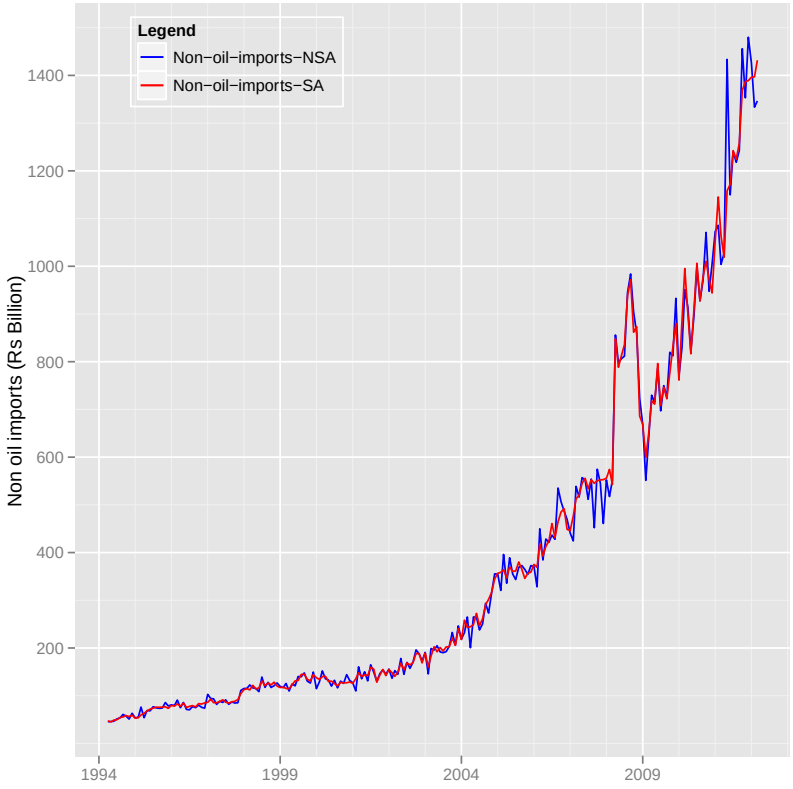
Figure 2 does not show distinct seasonal peaks in any of the months across the years. Thus the series does not show identifiable seasonality.

2.1 Seasonal adjustment with X-12-ARIMA

We verify the above test indications with X-12-ARIMA program.

Figure 3 shows the non-seasonally and seasonally adjusted Non oil imports. The blue line shows the non-seasonally adjusted series and the red line shows the seasonally adjusted series. Figure shows that from 2007 onwards, the blue and red lines are superimposing each other. This shows the ineffectiveness of seasonal adjustment. The series does not show identifiable seasonality, which can be detected by the X-12-ARIMA program.

Figure 3 Non oil imports (NSA and SA)



2.2 Diagnostic checks

After seasonal adjustment, a series of diagnostic checks are performed to test for the presence of identifiable seasonality in the series.

2.2.1 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 for Non oil imports is 0.9. The moving seasonality is 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 4 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 a high degree of distinct seasonality (as is evident from the M7 statistic), the figure for non seasonally adjusted growth rate does not show distinct peaks at the seasonal frequencies.

4 Sliding spans diagnostics

Sliding span diagnostics are descriptive statistics of how the seasonal adjustments and their month-to-month changes vary when the span of data used to calculate them is altered in a systematic way.
It is based on the idea that for a month common to more than one overlapping spans, the percent change of its adjusted value from the different spans should not exceed the threshold value and for a month common to more than one span, the difference between the month on month change from the different spans should not exceed the threshold value (the threshold value being 0.03).
Sliding span gives the percentage of months (A%) for which the seasonal adjustment is unstable (the difference in the seasonally adjusted values for a particular month from more than one span should not exceed 0.03). It also gives the percentage of months (MM%) for which the month on month changes of the seasonally adjusted values is unstable i.e exceeding the threshold value. The seasonal adjustment produced by the procedure chosen should not be used if A% $>$ 25.0 ($>$ 15.0 is considered problematic) or if M M % $>$ 40.0.
For Non oil imports A% is 25.2 and MM% is 28.4. A% is a problematic statistic for the series.

Figure 4 Non oil imports Spectral (NSA and SA)