Technical note on seasonal adjustment for Wholesale price index (Manufacturing)

July 1, 2013

Contents

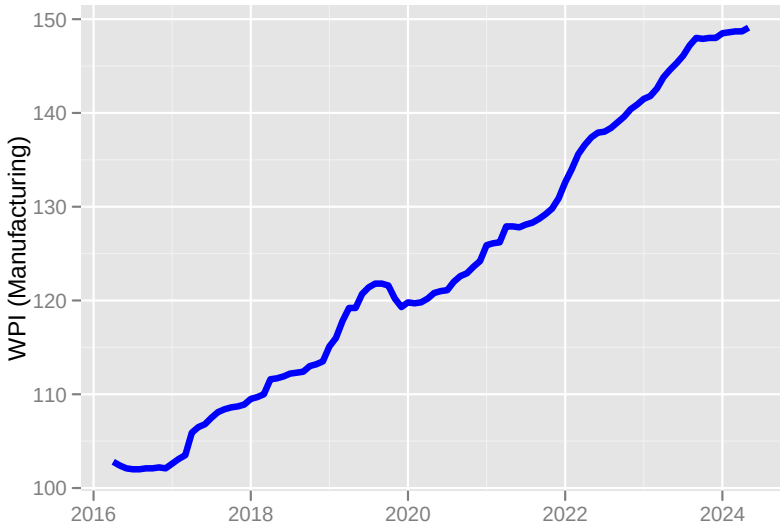
List of Figures

List of Tables

1 Wholesale price index (Manufacturing)

We analyse the monthly data for WPI (Manufacturing) with the new base year from April, 2005 onwards. Figure 1 shows the original plot of the series. The plot does not distinct show seasonal patterns.

Figure 1 Wholesale price index-Manufacturing (Non seasonal adjusted)



2 Steps in the seasonal adjustment procedure

A visually appealing way of looking at the raw data is to plot the growth rates in each of the months across the years. For instance 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

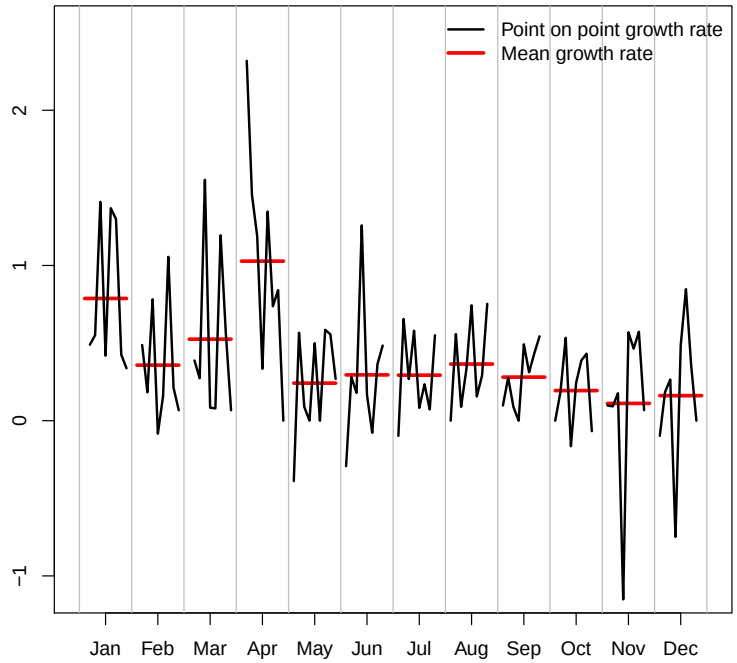


Figure 2 show moderate seasonal peaks in the month of April.

2.1 Pre-adjustment analysis

The simplest approach to testing the presence of seasonality in the series is to apply seasonal dummy regression. In this approach, the series is regressed on monthly dummies to check for seasonal pattern. We can estimate:

$$y_t = \beta_0 + \beta_1 \text{Jan}_t + \beta_2 \text{Feb}_t + \beta_3 \text{Mar}_t + \beta_4 \text{May}_t + \beta_5 \text{Jun}_t$$
$$+\beta_6 \text{Jul}_t + \beta_7 \text{Aug}_t + \beta_8 \text{Sep}_t + \beta_9 \text{Oct}_t + \beta_{10} \text{Nov}_t + \beta_{11} \text{Dec}_t + \epsilon_t$$

where Jan_t, Feb_t .... Dec_t are dummy variables. In this formulation, April is the base month. The residual of the regression gives the seasonally adjusted series. For WPI (Manufacturing), the dummies are not significant, which gives an indication that the series does not have significant seasonal pattern.

2.2 Seasonal adjustment with X-12-ARIMA

We seasonally adjust the series through X-12-ARIMA program.

Figure 3 WPI-Manufacturing (NSA and SA)

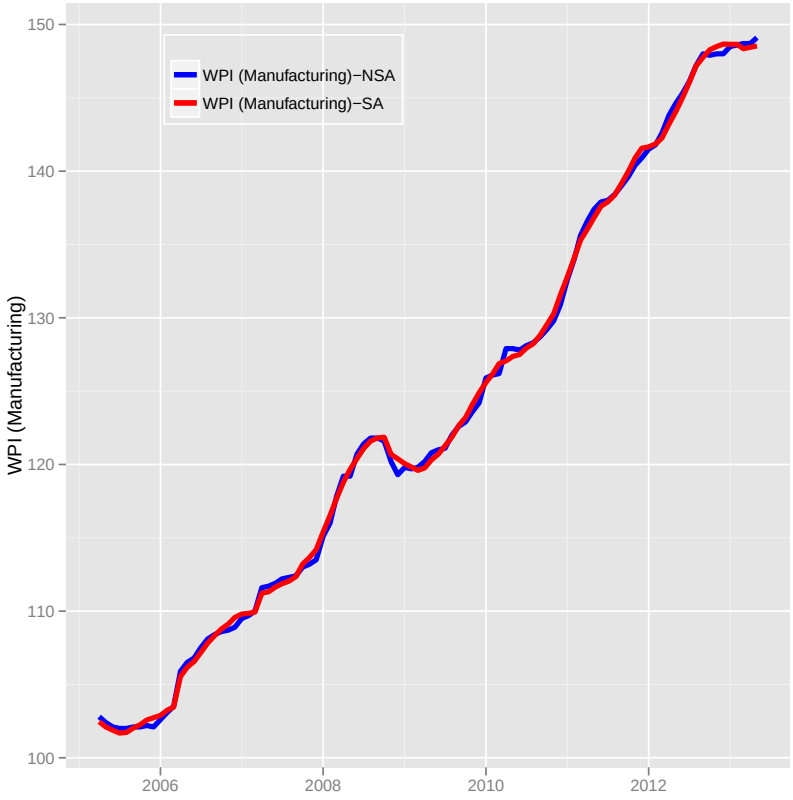


Figure 3 shows the non-seasonally and seasonally adjusted WPI (Manufacturing). The blue line shows the non-seasonally adjusted series and the red line shows the series after filtering the raw series through X-12-ARIMA program. There is not much difference in the two plots. We look at the plots of the growth rates to see the extent of noise reduction after adjustment.

Figure 4 WPI-Manufacturing (NSA and SA- point on point growth rates)

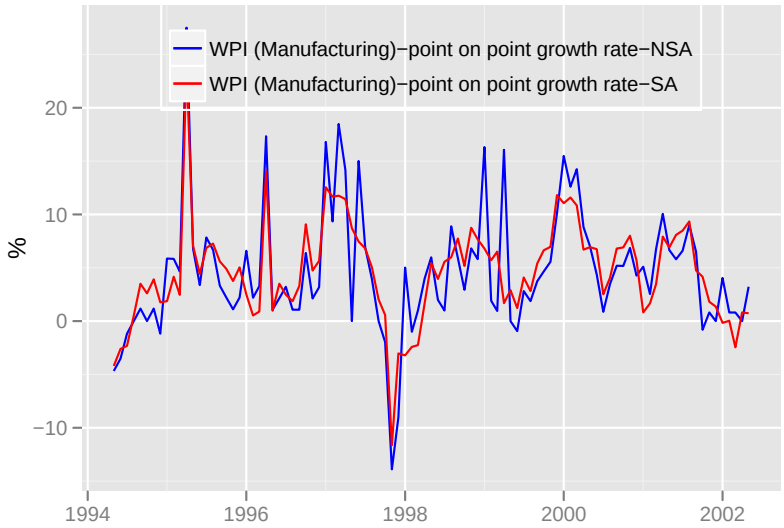


Figure 4 shows the point on point growth of the raw and seasonally adjusted series. The standard deviation of the growth rate of the raw series is 5.83 and that of the adjusted series is 4.66. There is not much difference in the standard deviation of the growth rate of the unadjusted and adjusted series.

2.3 Diagnostic checks

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

2.3.1 Presence of identifiable seasonality

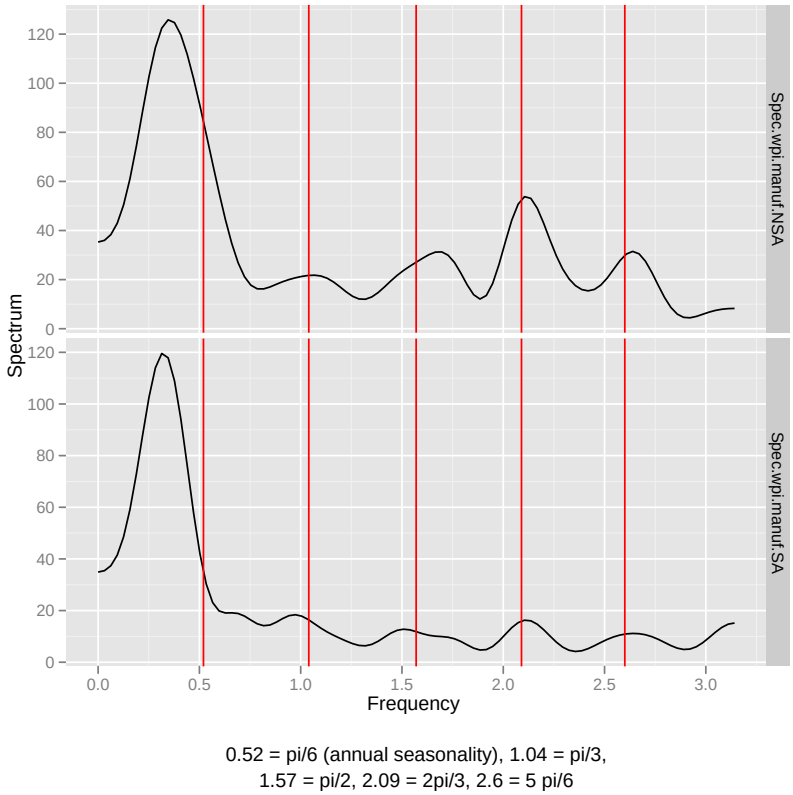
The statistic M7 shows the amount of moving seasonality present relative to stable seasonality. It shows the combined result for the test of stable and moving seasonality in the series. A value lesser than 1 is desirable to show identifiable seasonality in the series.

The value of M7 for WPI (Manufacturing) is 0.44

2.3.2 Spectral representation

Figure 5 shows the spectral plot of the growth rate of the unadjusted and seasonally adjusted series. Spectral plot is an important tool of the frequency domain analysis. It 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, the figure for non seasonally adjusted growth rate does not show distinct peaks at the seasonal frequencies.

Figure 5 WPI- Manufacturing Spectral (NSA and SA)



Considering the results from all these tests, we report the non-seasonally adjusted annualised rate.