Moving averages

A moving average is a method to obtain a smoother picture of the behavior of a series. The objective of applying moving averages to a series is to eliminated the irregular component, so that the process is clearer and easier to interpret.

A moving average can be calculated for the purpose of smoothing the original series, or to obtain a forecast. In the first case a "centered" moving average is calculated. In the second case, the forecast for period n is calculated with the m previous values, where m is the number of periods (the order of the moving average) that enter the calculation.

Simple moving average

Two simple moving average processes (not centered, for forecasting purposes) of order 3, and 5 are presented below.

$$y_t^* = \frac{y_{t-3} + y_{t-2} + y_{t-1}}{3}$$

$$y_t^* = \frac{y_{t-5} + y_{t-4} + y_{t-3} + y_{t-2} + y_{t-1}}{5}$$

Weighted moving average

A weighted moving average can be produced by repeated application of a simple averaging. For instance, for a moving average of order 3, applying a moving average again yields:

$$\begin{aligned} y_t^{**} &= \frac{y_{t-2}^* + y_{t-1}^* + y_t^*}{3} \\ &= \frac{\frac{y_{t-5}+y_{t-4}+y_{t-3}}{3} + \frac{y_{t-4}+y_{t-3}+y_{t-2}}{3} + \frac{y_{t-3}+y_{t-2}+y_{t-1}}{3}}{3} \\ &= \frac{y_{t-5} + 2y_{t-4} + 3y_{t-3} + 2y_{t-2} + y_{t-1}}{9} \end{aligned}$$