Is it a trend or a level shift? Yes, Simpson's Paradox also exists in Time Series Analysis!

Posted on Apr 30, Posted by [Tom Reilly](#) Category [Forecasting](#)

You have data that is decreasing. You have three areas where the data seems to level off. Is it a trend or is it two level shifts?

If you have any knowledge about what drives the data then by all means use a causal variable. What to do if you have none? It then becomes an interesting and very debatable topic.

How many periods determines a level shift might be a big factor here.

Simpson's Paradox is where you have a **global** significance, but not **local**. From a global perspective, sure there is a trend. From a local, there is no trend. Who is to say that the overall trend will continue? Who is to say that the trend won't? Maybe it will go up?

Actuals - monthly

Periods 2010/9 to 2013/3(Seasonality of 12)
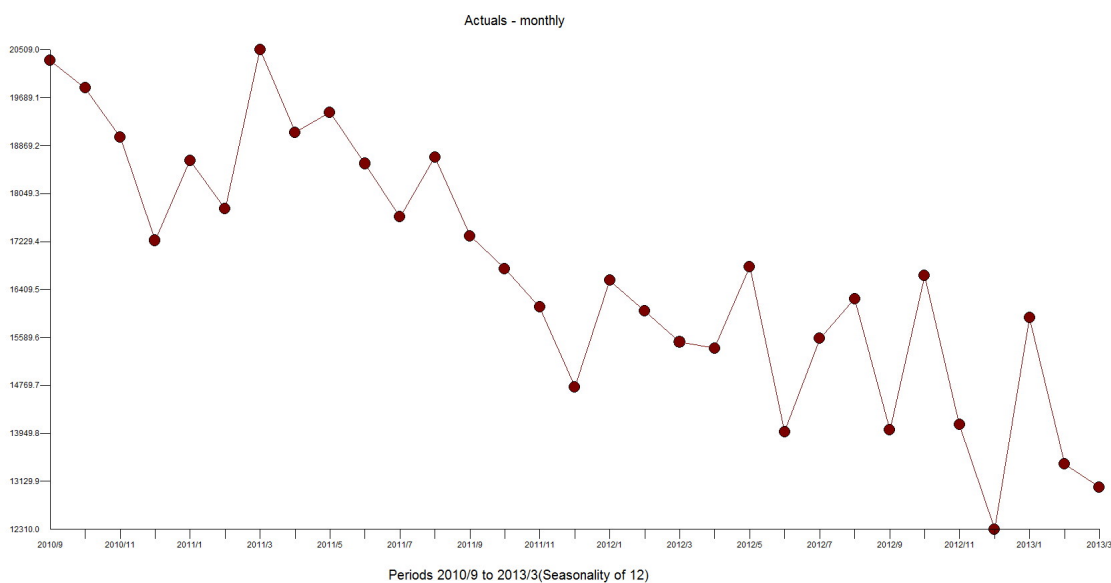
If you run this without making assumptions, you get two level shifts at period 14 and 25 and some outliers using the following data

20324 19856 19012 17247 18616 17786 20509 19097 19437 18562 17648 18672 17324 167
65   1
6108
14742
16567
16041
15511
15403
16797
13977
15570
16249
14005
16645
14098
12310
15923
13422
13030

Y(T) = 18776.   monthly
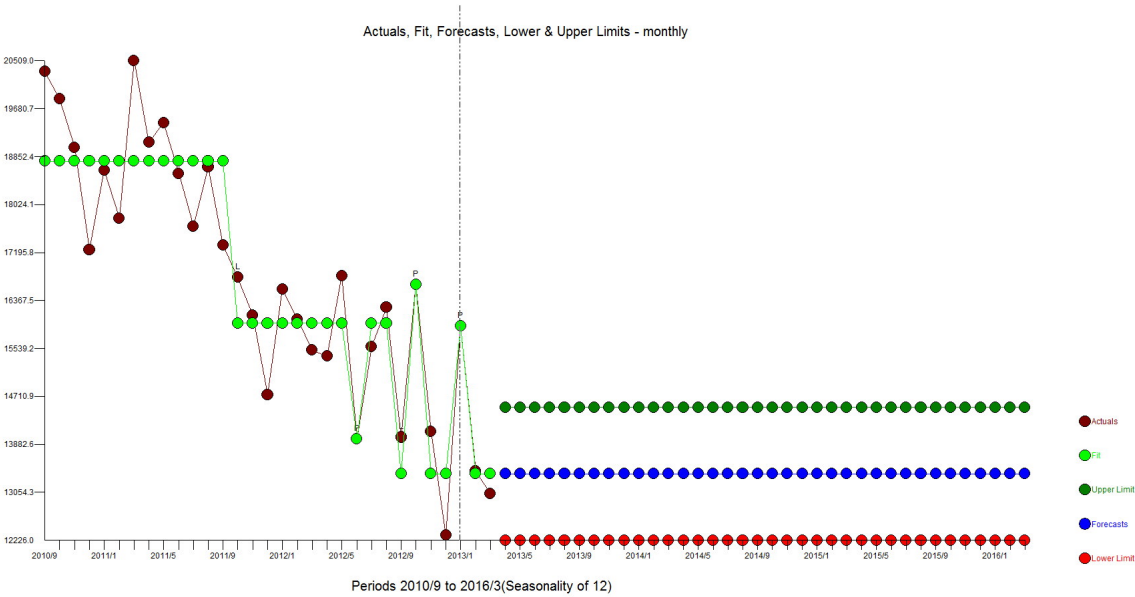
+[X1(T)][(- 2800.9   )]   :LEVEL SHIFT   14   2011/ 10

+[X2(T)][(- 2602.3   )]   :LEVEL SHIFT   25   2012/ 9

+[X3(T)][(+ 3272.0   )]   :PULSE   26   2012/ 10

+[X4(T)][(- 1998.3   )]   :PULSE   22   2012/ 6

+[X5(T)][(+ 2550.0   )]   :PULSE   29   2013/ 1

+   + [A(T)]

Actuals, Fit, Forecasts, Lower & Upper Limits - monthly

Periods 2010/9 to 2016/3(Seasonality of 12)

Tags: Tagged in: [time series forecasting trends level shifts seasonality outliers](#)