1. Securities.xls

This dataset consists of the monthly rate % of securities. There are 647 rows in this dataset. The starting entry is from April 1953 to February 2007. Firstly, we will be checking for the time series plot. This will provide us with some insight about what kind of trend and seasonality this dataset has.

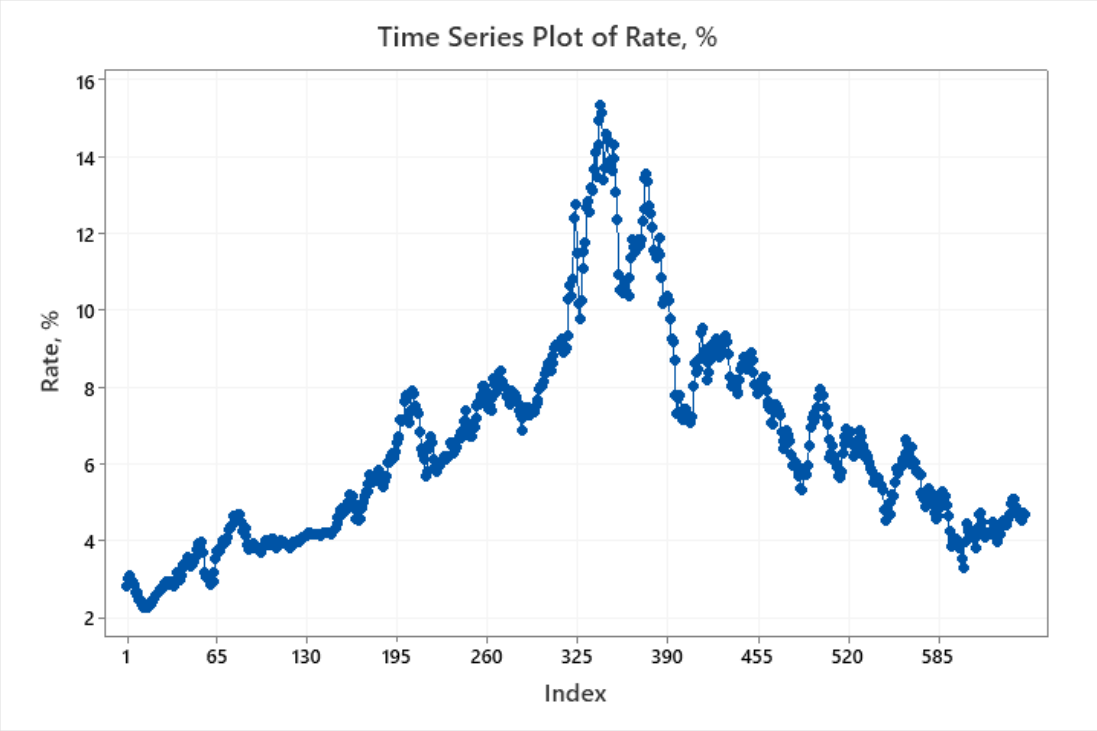


Figure 1 : Time series plot of Securities dataset

The above plot suggests that the monthly change in the Rate% may have a random trend. To verify this let us take a look at the Autocorrelation Function(ACF).

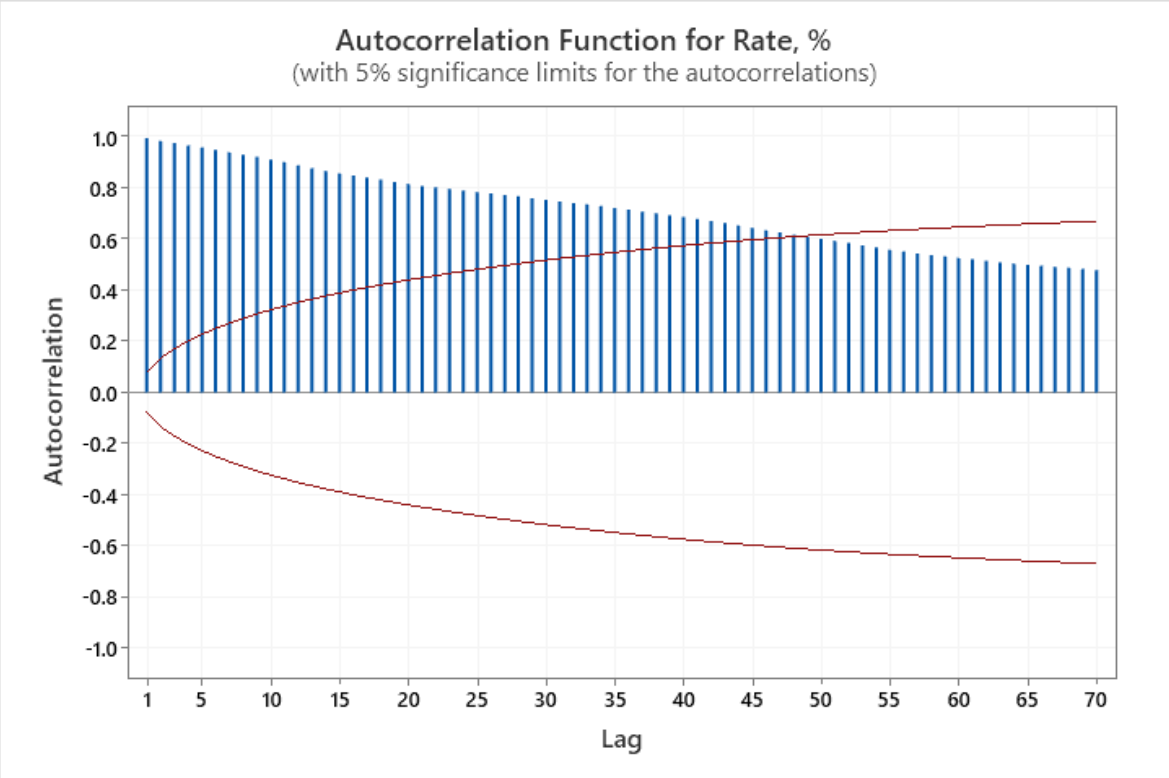


Figure 2 : ACF with default lag

The ACF with default lag is plotted and is shown in the figure above. We can observe that the plot does not get close to zero and we can conclude that there is no trend for this dataset. Let us take the ACF with lag 12 since we are given monthly records of Rate%.

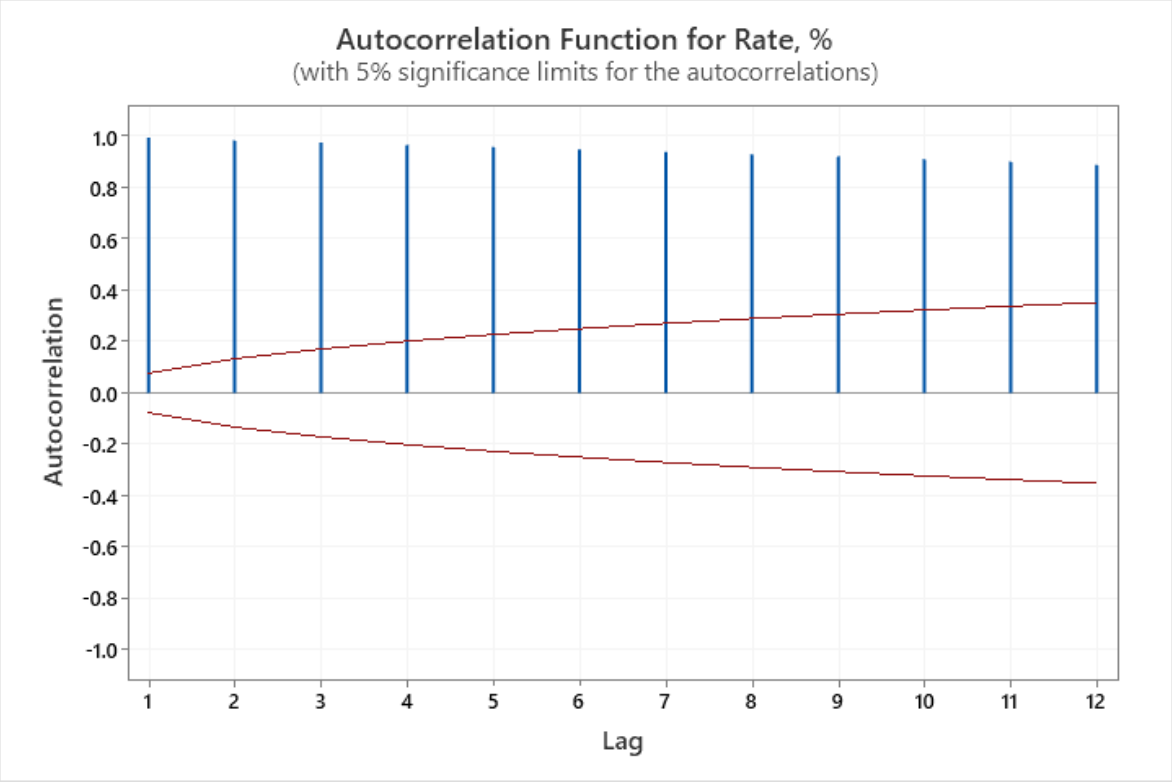
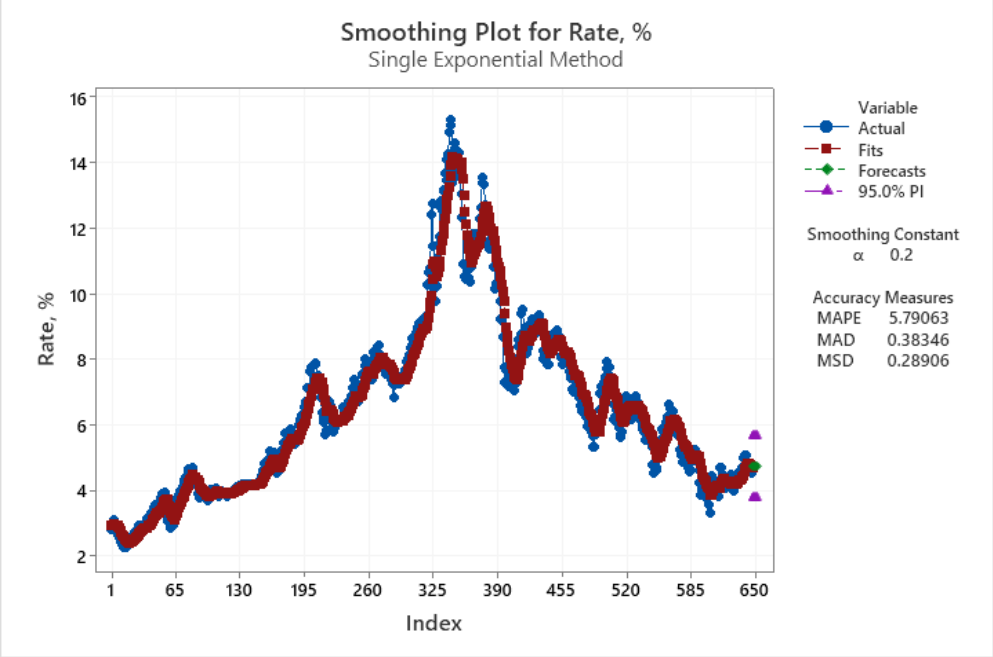
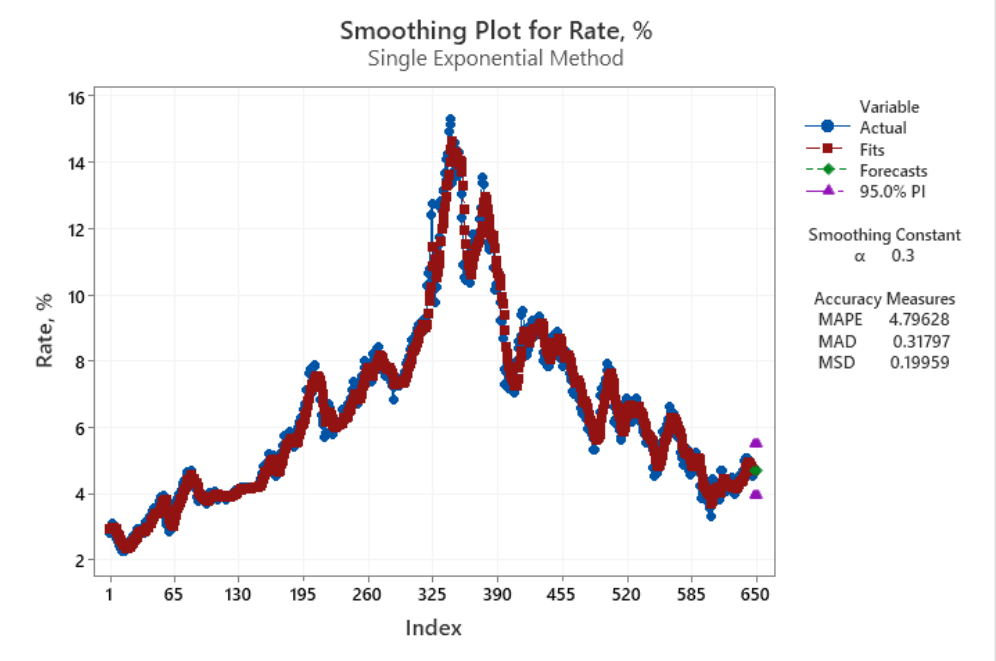


Figure 3 : ACF with lag 12

Since there is no trend we will be utilizing single exponential smoothing with varying alpha values to come up with a model.

We have found out that single exponential smoothing will be utilised since there is no trend that can be seen for this dataset. Given below are single smoothing plots with 3 different alpha values, 0.2, 0.3, and 0.4.


Smoothing Plot for Rate, %
Single Exponential Method
Rate, %
Index
Variable
Actual
Fits
Forecasts
95.0% PI
Smoothing Constant
α 0.2
Accuracy Measures
MAPE 5.79063
MAD 0.38346
MSD 0.28906


Smoothing Plot for Rate, %
Single Exponential Method
Rate, %
Index
Variable
Actual
Fits
Forecasts
95.0% PI
Smoothing Constant
α 0.3
Accuracy Measures
MAPE 4.79628
MAD 0.31797
MSD 0.19959

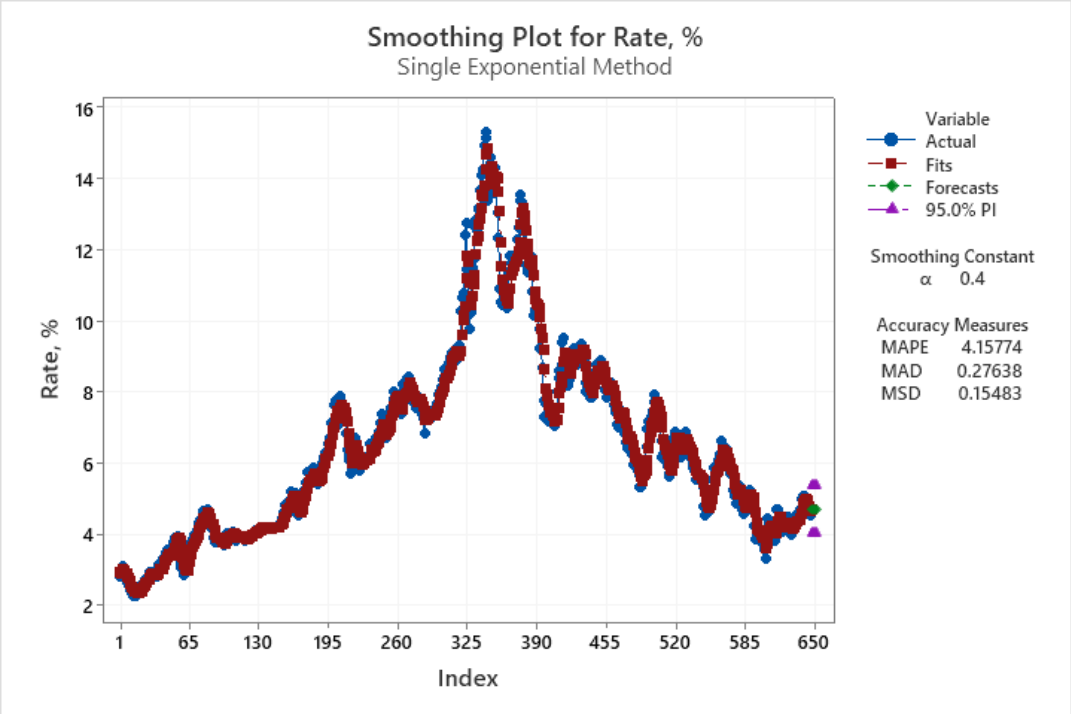


Figure 4,5,6 : Single exponential method with alpha values as 0.2,0.3,0.4 respectively

As the smoothing constant increases we can observe that the accuracy measures get better. And we can look at the graph and see that the range for the PI gets smaller as well. The difference between these models is small but we will be considering the model from Figure 6.

Given below are the next 5 forecasted values(648 to 652) for this model.

Forecasts

Period	Forecast	Lower	Upper
648	4.70817	4.03106	5.38528
649	4.70817	4.03106	5.38528
650	4.70817	4.03106	5.38528
651	4.70817	4.03106	5.38528
652	4.70817	4.03106	5.38528