# Data

TOTAL FORESTRY STATISTICS, U.S. GEOLOGICAL SURVEY. [All values in metric tons], annual from 1900 to 2014

























# Estimation

 As autocorrelation was present in all the models, the HAC standard errors need to be considered for inference



Estimating the four given models and evaluating their performance led us to conclude that the quadratic trend is significant in both specifications. Graphs of the residuals as well as the goodness of fit and information criteria noticeably improved by its addition.

Since the dependent variable is different among the two transformations, we cannot directly compare the level and log quadratic models. It is therefore not clear which one is better. Visualizing the production series and its log transformation, the latter exhibits distribution closer to the Gaussian, therefore we favor the log model.

# Forecast

When comparing the RMSEs on the last 10 forecasts, we can see that the quadratic models performed better as expected by their in-sample superiority. However, our preferred log model did not do as well in the out of sample forecast as the linear one. It is worth noting that the graph of our series shows that there was a drop in forestry production during the last 10 recorded years. Perhaps the log model would otherwise do better.





The 2050 forecasts are presented for both quadratic trend model. Productionf4, productionf5 represents the log and the level model, respectively. Both forecasts are for the forestry series in levels. It is visible that the production is forecasted to be higher by the log specification.





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In the level model, the null hypothesis is that the coefficients for variables 4, 5, and 6 are equal to zero. The p-value for both the F-statistic and the chi-square test are less than 0.05, indicating strong evidence against the null hypothesis. Therefore, we can reject the null hypothesis and conclude that at least one of the coefficients is not equal to zero.

In the log model, the null hypothesis is the same, but the p-values for both the F-statistic and chi-square test are greater than 0.05, indicating that there is not enough evidence to reject the null hypothesis. Therefore, we cannot conclude that any of the coefficients are significantly different from zero.

As there is auto correlation in all the models, HAC standard errors are considered. Doing so led us to conclude that the quadratic model is better in this scenario too.

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