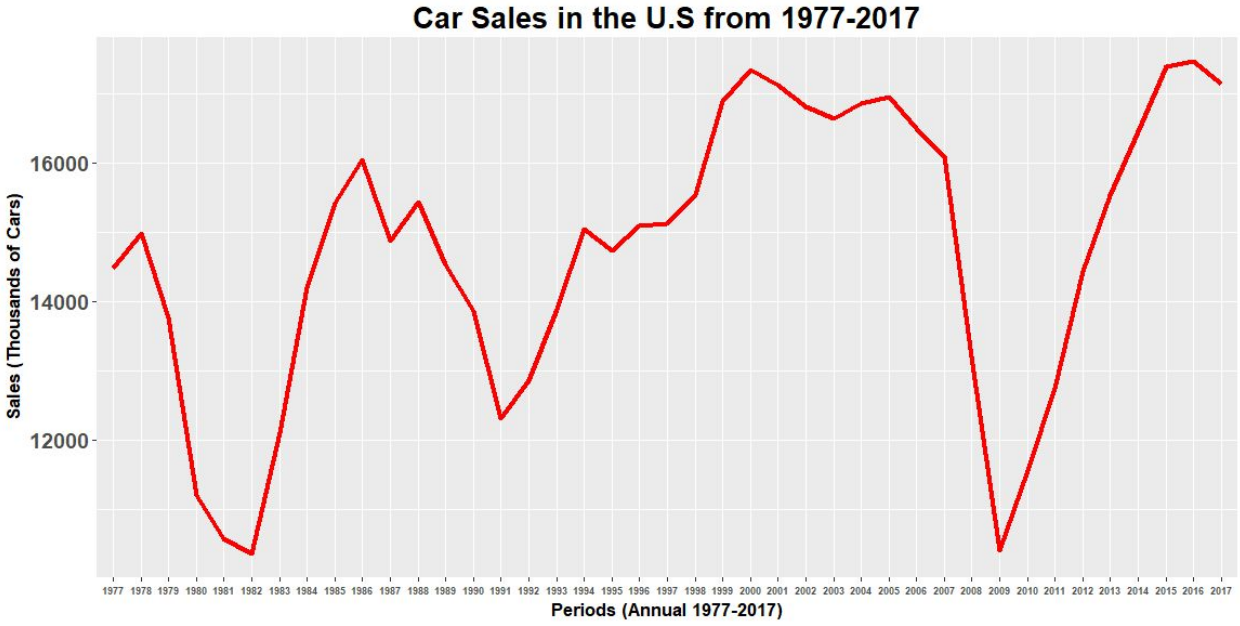
Michael Candella

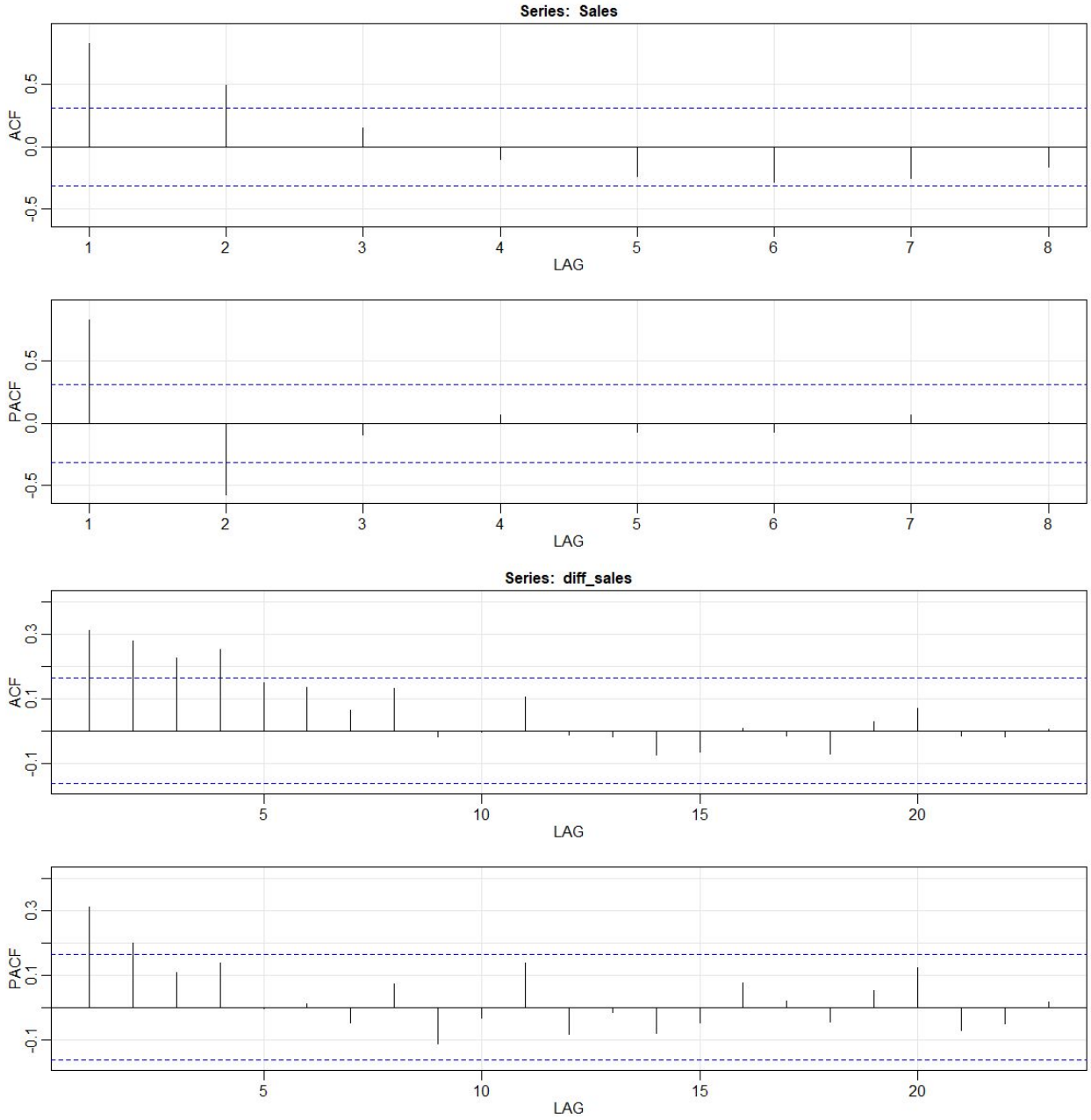
Sample Financial Forecast

Introduction: In this report, I examine the Cars Sold in the United States from the years 1977 to 2017 and wish to find the best fitted time-series model for this data set in order to forecast out 5 years ahead.



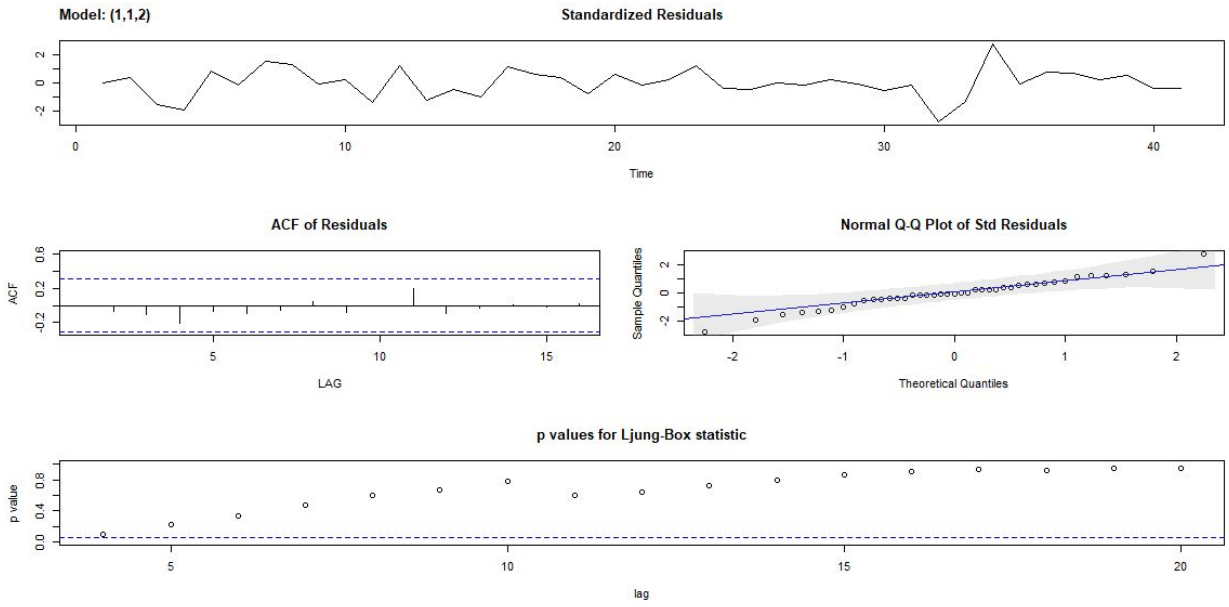
To do this we must first look at the Time-Series itself, judging by the graph it is clear that there is no seasonality in this data so a seasonal model is not necessary at this time.

After determining the seasonality of a Time-Series, we must next look at the autocorrelation function and the partial-autocorrelation function of both the time-series and the differenced time-series data.

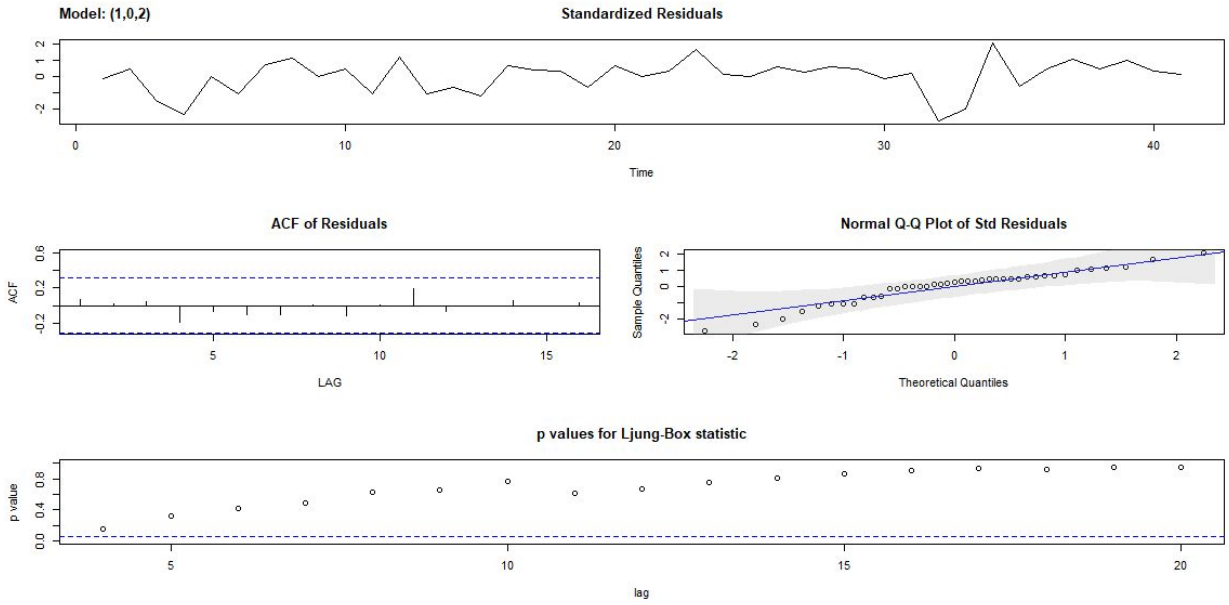


Looking at the ACF and PACF it is clear that there is both an autoregressive process (AR(p)) and a moving average process (MA(q)) due to the tailing of both the ACF and PACF. Secondly by looking at the Differenced data, the ACF and PACF approximate an ARMA model therefore a third integrated term might be necessary as well. The two models most likely to have a solid fit in this case are an ARMA(1,2) or an ARIMA(1,1,2).

With the two models I have chosen to represent my time-series data I must run residual diagnostics and compare information criterion.

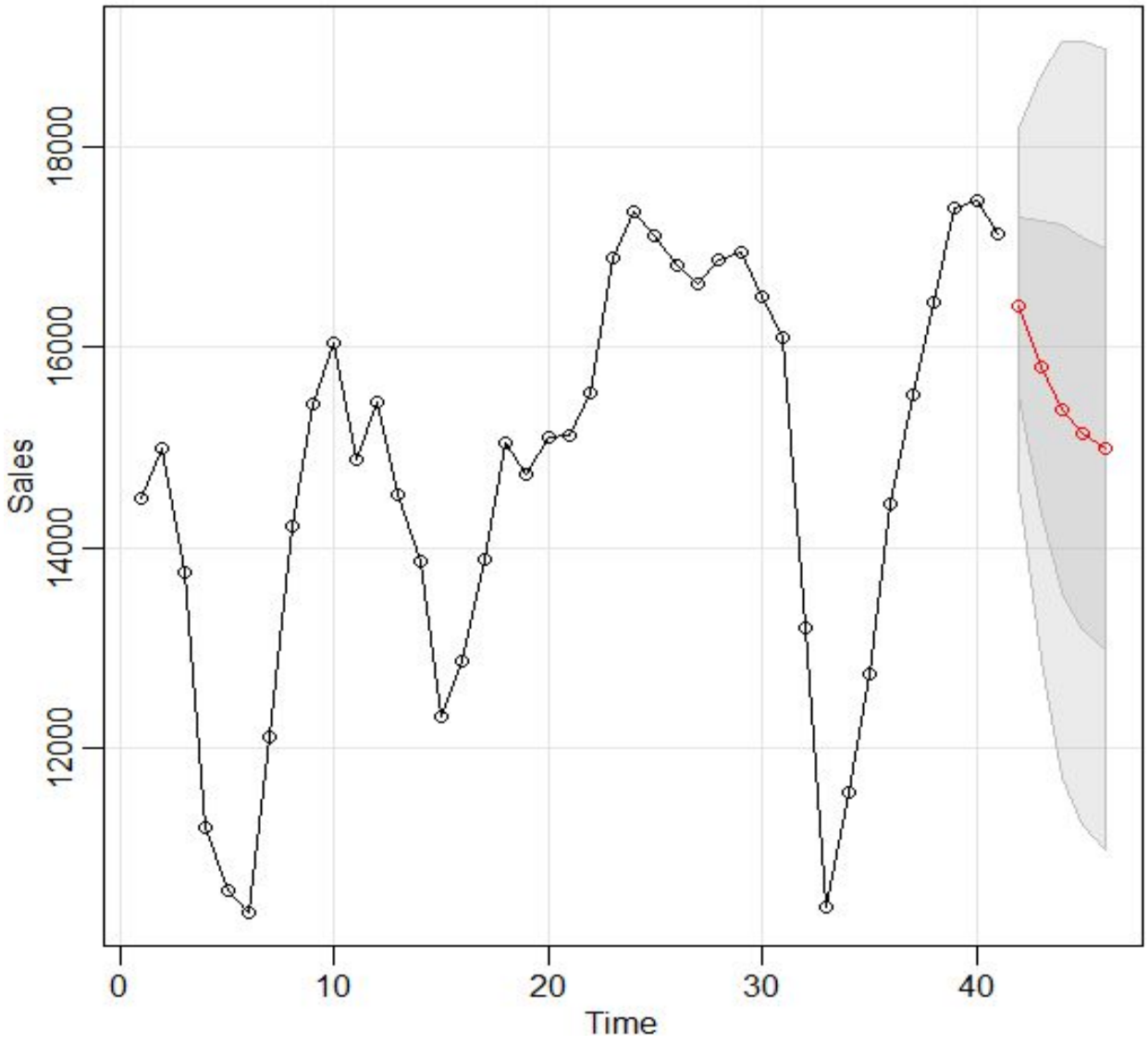


Looking at the Residual diagnostics for my ARIMA(1,1,2) fit of the Time-Series data it is clear that the results are significant as the residuals approximate a white noise process and the data passes the Ljung-Box Test. The Akaike Information Criterion for this Data is a 14.982 while the Schwarz-Bayesian Information Criterion for this data set is a 14.1493.



Looking at the ARMA(1,2) data set the results seem to also be a solid match for the data set while the Ljung-Box values are a little more significant when compared to our previous model. The AIC for this model is 14.78 and the SBIC for this model is a 13.95.

With the Information Criterion significantly lower on the ARMA(1,2) Model I decided to go with it for the forecast.



Time period	Forecasted Sales (Thousands of Cars)
2018	16407
2019	15802
2020	15384
2021	15131
2022	14980

According to my forecasts it is clear that there will be a steady down-trend in the amount of cars sold as time goes on. With this information , car manufacturers will be able to judge how well they fair in these coming times and must dig deeper to understand the potential causal underlying issue in the decline of car sales.

Source for Time-Series Data
https://www.statista.com/statistics/199983/us-vehicle-sales-since-1951/