

Applied Economic Forecasting

Your Name here

Homework #6 - Spring 2021

Instructions: In all cases, please ensure that your graphs and visuals have properly titles and axes labels, where necessary. For your convenience, I have posted my R markdown file on our course website so that you can open and alter as you see fit. Refer to the output, whenever appropriate, when discussing the results. **Lastly, remember that creativity (coupled with relevance) will be rewarded.**

Question 1: Financial Market Data

You are interested in forecasting the price of three major companies (Apple, Microsoft, and Intel) on the stock market. You therefore pull the stock price data from Yahoo-Finance, estimate ARIMA models, and use them to generate your best guess of future prices.

Select one of the three (3) companies that most appeals to you and use it for the analyses that follow.

- (a) Edit my code below to use the `quantmod` package to pull the closing stock prices for AAPL (Apple), MSFT (Microsoft), or INTC (Intel) from yahoo finance for the period April 1, 2014 to April 30, 2019.
 - By default, `getSymbols` will pull the daily Prices (Open, High, Low, Close, Adj Close) and Volume. We will need to use the `to.monthly` function to convert to monthly.
 - We are interested in the closing prices so that column will need to be extracted.

```
sDate <- as.Date("2014-04-01", format = c("%Y-%M-%d"))
eDate <- as.Date(XXXX, format = c(XXXX))

tickers <- c("AAPL", "MSFT", "INTC")

# Use the tickers argument to choose your preferred stock
getSymbols(Symbols = xxxq, src = "yahoo", from = sDate, to = eDate)
xxx2 <- to.monthly(xxxq)[, "xxxq.Close"]
```

- (b) Convert your series to a ts object with the appropriate frequency and start date.
- (c) Provide a time-series plot along with ACF plot for your chosen series in (b) and comment on its stationarity.
- (d) Convert your data to a stationary series if necessary and then report the autocorrelation functions for this new series. **Be sure to explain how you rendered the series stationary and how you determined it was stationary.**
- (e) Confirm your conclusion from (d) using the `ur.df` function. **Be sure to explain the test hypothesis and conclusion.**
- (f) Now that we know the order of integration for your series, we can proceed to selecting the best $ARIMA(p, d, q)$ model.
 - Present the `ggetsdisplay` of the *stationary version* of your series in (a).
 - Based on your analysis above, comment on the possible ARIMA model contender(s).
- (g) Estimate the model suggested in part (f) and report the diagnostic checks to justify the adequacy of your model. Be sure to comment on the Ljung-Box test results. [Hint: You can achieve this by passing your ARIMA model fit to the `checkresiduals()` command.]

- (h) Present an autoplot of the forecast for the remaining 8 months of 2019. [*Hint: It would help to store the forecasts before you plot them, you will need this for part (i).*]
- (i) In a table using the kable command, report the forecasted point estimates from part (h). Make sure to round to 2 decimal places.

Question 2: Forecasting CFK's Sales growth

As a part of your job interview, you have been tasked with forecasting the sales growth for a fast food company called CFK. The file `cfk_sales.csv` contains quarterly sales growth figures for 1995Q1 to 2019Q4.

- (a) Using the code below, pull the sales data from the HW6 folder on our Github site. Report the time series plot and discuss it. *You might find it useful to explore potential seasonality in the series.*

```
path <- "https://raw.githubusercontent.com/Shamar-Stewart/ForecastingS21/main/Homework/HW6/"
cfk <- ts(read.csv(pppp)[,2],frequency = yyy, start = xxxx)
```

- (b) Explore the stationarity of the data and apply appropriate transformations, if necessary, to render it stationary. *Be sure to explain your process here.*
- (c) Produce a `ggtsdisplay()` of the transformed series and comment on the ACF and PACF. Based on your analysis, determine the appropriate ARIMA model. *Be sure to explain why you chose one model over the other.*
- (d) Report model diagnostics to justify the adequacy of your model in part (c).
- (e) Use the desired model from part (d) to plot the forecasted growth in sales for 2020.