**BIA6315 Time Series & Forecasting**

**Fall 2019**

**Assignment 1**

**Goal:** To become familiar with the extraction and components of time series data. Further become familiar with the different (popular) time series and forecasting packages.

I would do this assignment AFTER you complete the Datacamp tutorial.

**Note:** Turn in a single HTML markdown file. Points are given for content, professionalism and discussion. The output should look and read EXTREMELY professional.

I prefer you to use ggplots when making a plot (when possible given your object).

Assignment’s Point Distribution

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| --- | --- |
| Problem | Possible Points |
| Prob. 1 | 50 |
| Prob. 2 | 25 |
| Prob. 3 | 25 |

**Problem 1:** Consider the weekly spot prices for crude oil (dollars per gallon) from January 2004 to January 2016. The data file is crudeoil\_w0416.csv and contains dates (date) and prices (price). Note that the data are separated by commas. **Use the zoo package as well as fbasics package** (see week 1 zoo code example).

a) Create a time plot for the time series of spot prices. Make sure the plot is correctly labeled and titled. Analyze the time trend displayed by the plot, and discuss if data show any striking pattern, such as upward/downward trends or seasonality?

b) Compute the percentage change rate of spot prices using the formula rate = (pt - pt-1) /pt-1, where pt is the oil price . Plot the percent change. Describe what you see.

c) Analyze the distribution of rate using a histogram and a normal quantile plot. Is the distribution of rate symmetric? Is it close to a normal distribution?

d) Create and plot the log value of the spot price. Reflect on your findings.

**Problem 2:**

Hyndman, Chapter 2, Exercise 3 (uses the ts object)

<https://otexts.com/fpp2/graphics-exercises.html>

**Problem 3:** Using the Lubridate package, complete the tutorial questions at this link.

<https://www.r-bloggers.com/dates-and-times-simple-and-easy-with-lubridate-exercises-part-1/>