MKT691

Kilger

Exercise 2

Reading in data to GRETL and Unit Root tests

**Name:** Rudy Martinez

This exercise will give you the opportunity to find an appropriate time series data set and read it in to GRETL. Once read into GRETL, you can then plot and proceed to apply some unit root tests to the data to see whether or not there is a constant mean across time. There is also an extra credit challenge portion that is worth 7 points if you want to attempt it.

1. Find yourself a nice happy time series data set online. The good news is that unlike market research data sets, free time series data sets are easy to find and download. Here is a starting place for you:

<https://archive.ics.uci.edu/ml/datasets.php?format=&task=&att=&area=&numAtt=10to100&numIns=&type=ts&sort=nameUp&view=table>

**Selected Dataset:** Tesla 5 Year Stock Price History (source: Yahoo Finance)

1. Once you have found your time series data set then plot the data set (be sure to include the plot in your exercise). Use your Mark I eyeball and tell me if you think the mean is constant across time or not.

**Time Series Plot**



**Is the mean constant across time?**

The line trends up across time, indicating a non-constant mean.

1. Run an ACF plot for the data set (be sure to include that plot in your exercise). First, tell me what prominent feature is usually there in an ACF plot if there is a trend or non-constant mean across time? Does your plot look like there is a non-constant mean?

**What prominent feature is usually there in an ACF plot if there is a trend or non-constant mean across time?**

There is a ski slope if there is a trend or non-constant mean across time



**Does your plot look like there is a non-constant mean?**

Because there is a ski slope, there is a non-constant mean

1. Next apply the two unit root tests that test for constant mean across time.

**Results**

KPSS test for AdjClose

T = 60

Lag truncation parameter = 3

Test statistic = 0.833017

10% 5% 1%

Critical values: 0.351 0.462 0.728

P-value < .01

* 1. **What is the null and alternative hypothesis for the KPSS test?**
     + **Null:** No evidence of non-constant mean
     + **Alternative:** Evidence of non-constant mean
  2. **What do you conclude from the KPSS test on your data? Be sure to include the test in your exercise.**
     + Because the p-value is below 0.05 (<0.01), we reject the null hypothesis and conclude that there is evidence of non-constant mean

Augmented Dickey-Fuller test for AdjClose

testing down from 10 lags, criterion AIC

sample size 51

unit-root null hypothesis: a = 1

test with constant

including 8 lags of (1-L)AdjClose

model: (1-L)y = b0 + (a-1)\*y(-1) + ... + e

estimated value of (a - 1): -0.582984

test statistic: tau\_c(1) = -1.60608

asymptotic p-value 0.4794

1st-order autocorrelation coeff. for e: -0.008

lagged differences: F(8, 41) = 6.591 [0.0000]

* 1. **What is the null and alternative hypothesis for the Augmented Dickey Fuller test?**
     + **Null:** Evidence of non-constant mean
     + **Alternative:** No evidence of non-constant mean
  2. **What do you conclude from the Augmented Dickey Fuller test on your data?**
     + The p-value is above 0.05 (0.4794), therefore, we can’t reject the null hypothesis. This means that there is evidence of non-constant mean.

1. **Select another raw time series data set and repeat steps 2 through 4d.**

**Dataset:** Population Time Series Data ([link](https://www.kaggle.com/census/population-time-series-data))

**Time Series Plot**



**Is the mean constant across time?**

The line trends up across time, indicating a non-constant mean.



**Does your plot look like there is a non-constant mean?**

There doesn’t appear to be a ski slope; therefore, I cannot conclude that there is a non-constant mean over time with this visual.

**Results**

KPSS test for value

T = 816

Lag truncation parameter = 6

Test statistic = 11.7238

10% 5% 1%

Critical values: 0.348 0.462 0.743

P-value < .01

* 1. **What is the null and alternative hypothesis for the KPSS test?**
     + **Null:** No evidence of non-constant mean
     + **Alternative:** Evidence of non-constant mean
  2. **What do you conclude from the KPSS test on your data? Be sure to include the test in your exercise.**
     + Because the p-value is below 0.05 (<0.01), we reject the null hypothesis and conclude that there is evidence of non-constant mean

Augmented Dickey-Fuller test for value

testing down from 20 lags, criterion AIC

sample size 798

unit-root null hypothesis: a = 1

test with constant

including 17 lags of (1-L)value

model: (1-L)y = b0 + (a-1)\*y(-1) + ... + e

estimated value of (a - 1): -7.28486e-06

test statistic: tau\_c(1) = -0.665317

asymptotic p-value 0.8534

1st-order autocorrelation coeff. for e: -0.004

lagged differences: F(17, 779) = 346.889 [0.0000]

* 1. **What is the null and alternative hypothesis for the Augmented Dickey Fuller test?**
     + **Null:** Evidence of non-constant mean
     + **Alternative:** No evidence of non-constant mean
  2. **What do you conclude from the Augmented Dickey Fuller test on your data?**
     + The p-value is above 0.05 (0.8534), therefore, we can’t reject the null hypothesis. This means that there is evidence of non-constant mean.