

Assignment 3

DUE DATE: Thursday 30th, January 2020.

I pledge to the Honor Code and to obey all rules for taking and performing homework assignments as specified by the course instructor.

name: _____

Full name _____ **Student ID.** _____

All data are downloadable from BE moodle

1.(30 points) Consider the growth rates of the U.S. real gross domestic product (GDP) from 1947.I to 2012.IV. The original data, from Federal Reserve Bank of St Louis, are in the file q-gdpmc1.txt (year, month, day, gnp), and the GDP are in millions of 2005 chained dollars. The growth rate is the first differenced series of the log(GDP).

(a) Plot the GDP growth rates. The reduction in volatility, starting in the 1980s, is referred to as the great moderation in the economic literature.

(b) Test $H_0 : \rho_1 = \dots = \rho_{12} = 0$ versus $H_a : \rho_i \neq 0 \exists 1 \leq i \leq 12$. Draw the conclusion.

(c) Let μ be the mean of U.S. GDP growth rates. Test $H_0 : \mu = 0$ versus $H_a : \mu \neq 0$. Draw your conclusion.

2.(40 points) Consider the daily simple returns of Amazon (AMZN) stock, CRSP value-weighted index (VW), CRSP equal-weighted index (EW), and the S&P composite index (SP) from January 2, 2008 to December 31, 2012. Returns of indices include dividends. The data are in the file d-amzn3dx.txt (date, amzn, vw, ew, sp).

(a) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each simple return series.

(b) Transform the simple returns to log returns. Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each log return series.

(c) Test the null hypothesis that the mean of the log returns of AMZN is zero.

(d) Obtain the histogram (with nclass=40) and sample density plot of the daily log returns of Amazon stock.

3. (30 points) Answer the same questions as Problem 2 but using monthly returns for for Abbott Laboratories (ABT), CRSP value-weighted index (VW), CRSP equal-weighted index (EW), and S&P composite index from January 1972 to December 2012. The returns include dividend distributions. Data file is m-abt3dx.txt (date, abt, vw, ew, sp).

4. (30 points) Consider the monthly stock returns of value-weighted index from January 1972 to December 2012 in Problem 3. Perform the tests and draw conclusions using the 5 % significance level.

(a) Test $H_0 : \mu = 0$ versus $H_a : \mu \neq 0$, where μ denotes the mean of the return.

(b) Test $H_0 : m_3 = 0$ versus $H_a : m_3 \neq 0$, where m_3 denotes the skewness of the return.

(c) Test $H_0 : K = 3$ versus $H_a : K \neq 3$, where K denotes the kurtosis. (Excess kurtosis = 0.)

5. (40 points) Consider the daily log returns of Amazon stock from January 2, 2008 to December 31, 2012 as in Problem 2.

(a) Perform the following tests: (i) Test the null hypothesis that the log return is symmetric with respect to its mean; (ii) Test the null hypothesis that the excess kurtosis of the returns is zero; (iii) Construct a 95 % confidence interval for the expected daily log return of Amazon stock

(b) Compute ACF and PACF of the daily log returns of Amazon stock and Test $H_0 : \rho_1 = \dots = \rho_{12} = 0$ versus $H_a : \rho_i \neq 0 \exists 1 \leq i \leq 12$. Draw the conclusion.

6. (40 points) Daily foreign exchange rates (spot rates) can be obtained from the Federal Reserve Bank in St Louis (FRED). The data are the noon buying rates in New York City certified by the Federal Reserve Bank of New York. Consider the exchange rates between the U.S. dollar and the Euro from January 4, 1999 to March 8, 2013. See the file d-exuseu.txt.

(a) Compute the daily log return of the exchange rate.

(b) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of the log returns of the exchange rate.

(c) Obtain a density plot of the daily log returns of Dollar-Euro exchange rate.

(d) Test $H_0 : \mu = 0$ versus $H_a : \mu \neq 0$, where μ denotes the mean of the daily log return of Dollar-Euro exchange rate.