

Assignment 3

DUE DATE: Tuesday 2nd, March 2021.

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

Full name Goatchasorn Atcharanukul **Student ID.** 6004640477

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.

Plotted at the end of this paper

(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.

Ho: $\rho_1 = \rho_2 = \dots = \rho_{12} = 0$ According to the P value, we can reject the null hypothesis at the 95% confidence interval, such that there is no correlation in the past growth rates.
Ha: $\rho_i \neq 0$

(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.

Ho: mean of the log gdp = 0 According to the t-statistics, we can reject the null hypothesis at 95% confidence interval.
Ha: mean of the log gdp is not 0 Which means that the mean of the log GDP is not equal to 0.

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.

```
#samplemean: 0.001207, sd: 0.029087, skewness: 1.031884, excess kurtosis: 9.360219
#Minimum      -0.127820
#Maximum      0.267951
```

(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.

Ho: mean of the logreturn_amzn = 0
Ha: mean of the logreturn_amzn is not equal to 0

Page 1

The p-value falls into the rejection region, therefore we can conclude that we can reject the null hypothesis at 95% confidence interval. which means the the mean of log returns of AMZN is not 0.

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

Plotted at the end of this paper

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, RET, vwret, ewret, sprtrn).

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.

Ho: mean of the vw = 0
Ha: mean of the vw not equal to 0
The p-value falls into the rejection region, therefore we can reject the null hypothesis at 95% confidence interval. Hence, the mean of the monthly return is not =0.

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

Ho: skewness of the log vw = 0
Ha: skewness of the log vw not equal to 0
pv= 1.073558e-07, hence we can reject the null hypothesis, which means m3 is not equal to 0

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

Ho: excess kurtosis of the log vw = 0
Ha: excess kurtosis of the log vw not equal to 0
pv = 0, hence we can reject the null hypothesis, which means k3 is not equal to 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

i) Ho: the log return is symmetric respect to its mean
Ha: the log return is not symmetric respect to its mean
P VALUE: Asymptotic p Value: < 2.2e-16
we can reject the null hypothesis, the log return is not symmetric to its mean
ii) Ho: excess kurtosis of the logreturn amzn = 0
Ha: excess kurtosis of the logreturn amzn is not equal to 0
pv = 0, hence we can reject the null hypothesis.
iii) 95% CI = -0.0007975567 0.0023801007

(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.

Ho: p1=p2=...p12=0
Ha: Pi != p
#X-squared = 12.488, df = 12, p-value = 0.4073
#we can not reject the null hypothesis that p1=p2=...pm=0 with 95% confidence interval
#the variation of the past can not explain the variation of rt.

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.

#Minimum	-0.18995	Maximum	0.470628
#Mean	0.179553	Stdev	0.164010
#Skewness	-0.594377	Kurtosis	-0.726508

(c) Obtain a density plot of the daily long 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.

$H_0: \mu = 0$ we reject the null hypothesis, which means the mean of the log return is not =0.
 $H_a: \mu \neq 0$



