Name: Ameer Hamza ; RUID: 221007975

1. Calculate the average monthly return, standard deviation, skewness, and kurtosis for the stock market, the risk free asset, the CPI, the housing market, the gold market and the crude oil market. (Please note that you have to convert the housing, gold and oil prices to their respective returns.)

%% FINMOD1-Assignment1-Ameer Hamza-221007975

%% File Import Process

clc

format compact

%vwret\_data = xlsread("data\_VWRET\_DATA\_MonthlyReturn\_20yr\_Levels.xlsx")

%hog\_data = xlsread("data\_Housing\_Oil\_Gold\_Data.xlsx")

%tbillcpi\_data = xlsread("data\_FINMOD1\_DATA\_90DTBILL&CPI.xlsx")

%% Answers

clc, clearvars -except hog\_data tbillcpi\_data vwret\_data

%% data alignment

vwret\_data;

tbillcpi\_data;

hog\_data;

%% calculations

avg\_stk = mean(vwret\_data(1:end,2),1)

avg\_rfr = nanmean(tbillcpi\_data(1:end,2),1)

avg\_cpi = nanmean(tbillcpi\_data(1:end,4),1)

avg\_hou = nanmean(hog\_data(1:end,4),1)

avg\_oil = nanmean(hog\_data(1:end,5),1)

avg\_gol = nanmean(hog\_data(1:end,6),1)

avg\_crossasset = table

avg\_crossasset = table(avg\_stk,avg\_rfr,avg\_cpi,avg\_hou,avg\_oil,avg\_gol)

Text

Description automatically generated

%skewness

skew\_stk = skewness(vwret\_data(1:end,2),1), ...

skew\_rfr = skewness(tbillcpi\_data(1:end,2),1), ...

skew\_cpi = skewness(tbillcpi\_data(1:end,4),1), ...

skew\_hou = skewness(hog\_data(1:end,4),1), ...

skew\_oil = skewness(hog\_data(1:end,5),1), ...

skew\_gol = skewness(hog\_data(1:end,6),1) ...

skew\_crossasset = table( ...

sdev\_stk, ...

skew\_rfr, ...

skew\_cpi, ...

skew\_hou, ...

skew\_oil, ...

skew\_gol ...

)

%kurtosis

kurt\_stk = kurtosis(vwret\_data(1:end,2),1), ...

kurt\_rfr = kurtosis(tbillcpi\_data(1:end,2),1), ...

kurt\_cpi = kurtosis(tbillcpi\_data(1:end,4),1), ...

kurt\_hou = kurtosis(hog\_data(1:end,4),1), ...

kurt\_oil = kurtosis(hog\_data(1:end,5),1), ...

kurt\_gol = kurtosis(hog\_data(1:end,6),1) ...

kurt\_crossasset = table( ...

kurt\_stk, ...

kurt\_rfr, ...

kurt\_cpi, ...

kurt\_hou, ...

kurt\_oil, ...

kurt\_gol ...

)

Text, letter

Description automatically generated

%kurtosis

kurt\_stk = kurtosis(vwret\_data(1:end,2),1), ...

kurt\_rfr = kurtosis(tbillcpi\_data(1:end,2),1), ...

kurt\_cpi = kurtosis(tbillcpi\_data(1:end,4),1), ...

kurt\_hou = kurtosis(hog\_data(1:end,4),1), ...

kurt\_oil = kurtosis(hog\_data(1:end,5),1), ...

kurt\_gol = kurtosis(hog\_data(1:end,6),1) ...

kurt\_crossasset = table( ...

kurt\_stk, ...

kurt\_rfr, ...

kurt\_cpi, ...

kurt\_hou, ...

kurt\_oil, ...

kurt\_gol ...

)

Text, letter

Description automatically generated

2. Note that the returns provided by CRSP are discrete returns. Now convert market return from discrete to continuously compounded return (we also call the continuously compounded return log return) and calculate the sample average. Do you see a big difference between the discrete returns and continuously compounded returns?

%% log returns and calculations

%Compute log returns

%Fetch Stck Prices & transform to log returns

stk\_levels = vwret\_data(1:end,2)

stk\_levels = log(stk\_levels(1:end,2))

stk\_levels = stk\_levels + 1

%mean

lnavg\_stk = nanmean(vwretlevels(1:end,3),1)

lnavg\_rfr = nanmean(tbillcpi\_ln(1:end,6),1)

lnavg\_cpi = nanmean(tbillcpi\_ln(1:end,7),1)

lnavg\_hou = nanmean(hog\_ln(1:end,8),1)

lnavg\_oil = nanmean(hog\_ln(1:end,9),1)

lnavg\_gol = nanmean(hog\_ln(1:end,10),1)

lnavg\_crossasset = table

lnavg\_crossasset = table(lnavg\_stk,lnavg\_rfr,lnavg\_cpi,lnavg\_hou,lnavg\_oil,lnavg\_gol)

Text

Description automatically generated

%standard deviation

lnsdev\_stk = nanstd(vwretlevels(1:end,3),1), ...

lnsdev\_rfr = nanstd(tbillcpi\_ln(1:end,6),1), ...

lnsdev\_cpi = nanstd(tbillcpi\_ln(1:end,7),1), ...

lnsdev\_hou = nanstd(hog\_ln(1:end,8),1), ...

lnsdev\_oil = nanstd(hog\_ln(1:end,9),1), ...

lnsdev\_gol = nanstd(hog\_ln(1:end,10),1) ...

lnstddev\_crossasset = table( ...

lnsdev\_stk, ...

lnsdev\_rfr, ...

lnsdev\_cpi, ...

lnsdev\_cpi, ...

lnsdev\_oil, ...

lnsdev\_gol ...

)

A picture containing diagram

Description automatically generated

%skewness

lnskew\_stk = skewness(vwretlevels(1:end,2),1), ...

lnskew\_rfr = skewness(tbillcpi\_ln(1:end,2),1), ...

lnskew\_cpi = skewness(tbillcpi\_ln(1:end,4),1), ...

lnskew\_hou = skewness(hog\_ln(1:end,4),1), ...

lnskew\_oil = skewness(hog\_ln(1:end,5),1), ...

lnskew\_gol = skewness(hog\_ln(1:end,6),1) ...

lnskew\_crossasset = table( ...

lnskew\_stk, ...

lnskew\_rfr, ...

lnskew\_cpi, ...

lnskew\_hou, ...

lnskew\_oil, ...

lnskew\_gol ...

)

Text

Description automatically generated with medium confidence

%kurtosis

lnkurt\_stk = kurtosis(vwretlevels(1:end,2),1), ...

lnkurt\_rfr = kurtosis(tbillcpi\_ln(1:end,2),1), ...

lnkurt\_cpi = kurtosis(tbillcpi\_ln(1:end,4),1), ...

lnkurt\_hou = kurtosis(hog\_ln(1:end,4),1), ...

lnkurt\_oil = kurtosis(hog\_ln(1:end,5),1), ...

lnkurt\_gol = kurtosis(hog\_ln(1:end,6),1) ...

lnkurt\_crossasset = table( ...

lnkurt\_stk, ...

lnkurt\_rfr, ...

lnkurt\_cpi, ...

lnkurt\_hou, ...

lnkurt\_oil, ...

lnkurt\_gol ...

)

A picture containing diagram

Description automatically generated

3. We know that in general investors may be better off by investing in stocks than in T-bills if the investment horizon is relatively long. The difference between the market return and the T-bill rate is called the equity risk premium. Using the 20-year data, test whether the equity risk premium is significantly positive using the standard t-test. Also calculate the average real return rate for the T-bill using the CPI index.

Text

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P(T<=t) one-tail and two-tail values are less than 0.05 we reject the null hypothesis that the difference between means of stocks and 90-day tbill are same. This means that we have sufficient evidence to say that two population means are different over a longer period.

Average real rate of return for 90d-TBILL is -0.08324625% (after adjusting for inflation rate).

4. Many people believe that real estate is always a good investment at least in the long run. Do you agree? People also argue that gold is a safe asset with a good return. Do you agree? Would you make a fortune by investing in the oil market compared to the stock market in the past 20 years (think about return vs. risk)?

Real-estate is a good investment based on the data available for the period of last 20years. Mean return for real-estate is 0.37%.

Average return from gold is 0.93% how ever the standard deviation is 4.901%, given the risk-reward, the average return of gold is not adequate for the given level of risk.

Investing in Oil has given the highest monthly return of 1.17%, however with standard deviation is 10.592% which make it the third best investment considering risk-return ratio.

Table

Description automatically generated with medium confidence

5. We often assume that stock returns are normally distributed. Calculate the skewness and kurtosis of market returns. Is the distribution skewed? Does the distribution have excess kurtosis? Use the Jarque-Bera test to see whether the market return follows a normal distribution. Also do the same analysis using daily and annual market returns data.

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Text, letter

Description automatically generatedGraphical user interface, text, application, email

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