**15.433 Assignment 2**

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Date: 09/22/2020

Exercise #1:

\*\*\*Note for Exercise #1: I downloaded all the files before September 15th, so the data were only updated to 202006. Therefore, all the results do not include the data for 202007.

# Output for the mean excess returns for value-weight returns:

Lo10:

A screenshot of a cell phone

Description automatically generated

Dec2:

A screenshot of a cell phone

Description automatically generated

Dec3:

A screenshot of a cell phone

Description automatically generated

Dec4:

A screenshot of a cell phone

Description automatically generated

Dec5:

A screenshot of a cell phone

Description automatically generated

Dec6:

A close up of a piece of paper

Description automatically generated

Dec7:

A screenshot of a cell phone

Description automatically generated

Dec8:

A screenshot of a cell phone

Description automatically generated

Dec9:

A screenshot of a cell phone

Description automatically generated

Hi10:

A screenshot of a cell phone

Description automatically generated

output for the difference between the mean returns of the largest decile portfolio and the smallest decile portfolio:

A screenshot of a cell phone

Description automatically generated

(b)

Lo10:

A screenshot of a cell phone

Description automatically generated

Dec2:

A screenshot of a cell phone

Description automatically generated

Dec3:

A screenshot of a cell phone

Description automatically generated

Dec4:

A picture containing knife

Description automatically generated

Dec5:

A screenshot of a cell phone

Description automatically generated

Dec6:

A screenshot of a cell phone

Description automatically generated

Dec7:

A screenshot of a cell phone

Description automatically generated

Dec8:

A screenshot of a cell phone

Description automatically generated

Dec9:

A screenshot of a cell phone

Description automatically generated

Hi10:

A screenshot of a cell phone

Description automatically generated

# output for the difference between the mean returns of the highest book-to-market decile portfolio and lowest book-to-market decile portfolio:

A close up of a piece of paper

Description automatically generated

# 1C  Intercept is the alpha.

Lo10:

A close up of a device

Description automatically generated

Dec2:

A screenshot of a cell phone

Description automatically generated

Dec3:

A picture containing knife

Description automatically generated

Dec4:

A screenshot of a cell phone

Description automatically generated

Dec5:

A close up of a device

Description automatically generated

Dec6:

A screenshot of a cell phone

Description automatically generated

Dec7:

A close up of a device

Description automatically generated

Dec8:

A screenshot of a cell phone

Description automatically generated

Dec9:

A screenshot of a cell phone

Description automatically generated

Hi10:

A picture containing knife

Description automatically generated

# 1C difference

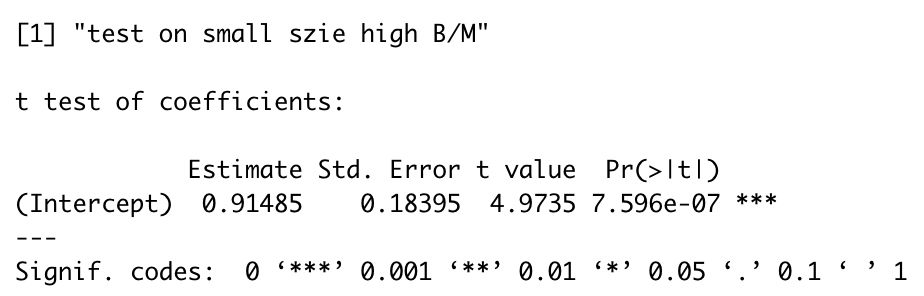
A close up of a piece of paper

Description automatically generated

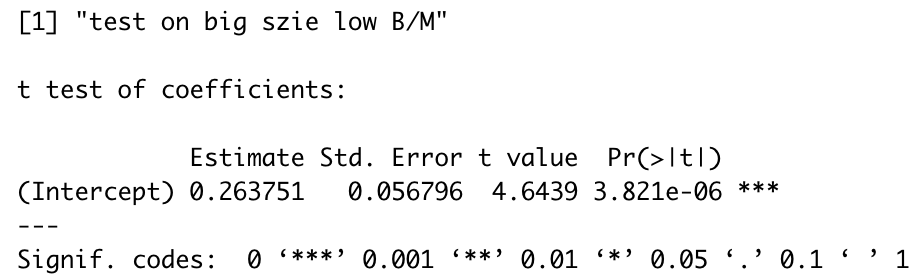
#Exercise 2

(A)

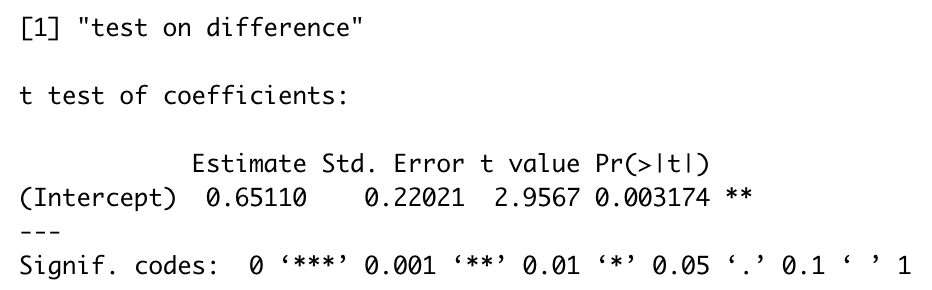
Smallest size/highest book-to-market:



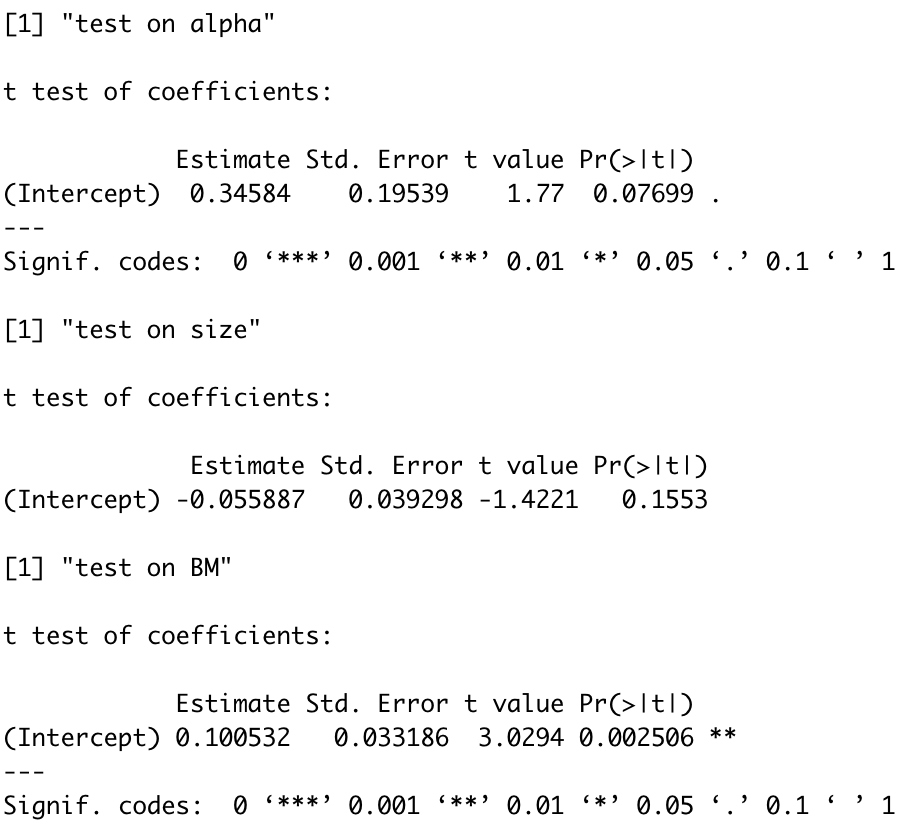
Largest size/lowest book-to-market:



Test on difference:



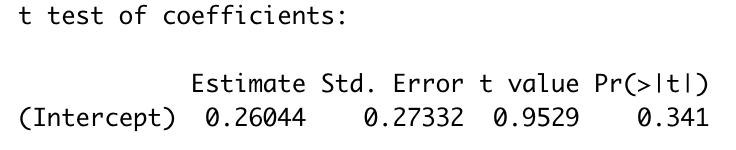
(B)



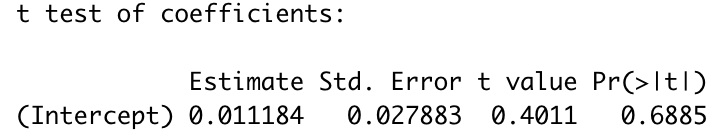
Based on Fama-Macbeth result, although smaller size and higher book-to-market ratio do imply higher return (which is consistent with results in A), the effect from size is not very significant.

(C)

Mean and t-stat on the constant:



Mean and t-stat on the BETA:



Both values are insignificant, which is bad news for CAPM model.

Exercise #3 (A)

CAPM alpha and associated t-stat for firms in the lowest decile of operating profitability:

手机屏幕截图

描述已自动生成

Note: Standard Errors are heteroscedasticity and autocorrelation robust (HAC) using 6 lags. It displays z-stat here because z-stat is the same as t-stat here.

CAPM alpha and associated t-stat for firms in the highest decile of operating profitability:

手机屏幕截图

描述已自动生成

CAPM alpha and associated t-stat for lowest minus highest:

A screenshot of a cell phone

Description automatically generated

The difference in CAPM alpha for these two portfolios is statistically significant, with absolute value of t-stat greater than 2.

3 (B)

FF3 alpha and associated t-stat for firms in the lowest decile of operating profitability:

手机屏幕截图

描述已自动生成

FF3 alpha and associated t-stat for firms in the highest decile of operating profitability:

手机屏幕截图

描述已自动生成

FF3 alpha and associated t-stat for lowest minus highest:

手机屏幕截图

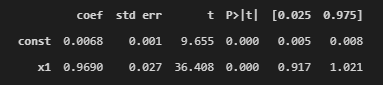
描述已自动生成

The difference in FF3 alpha for these two portfolios is still statistically significant, with absolute value of t-stat greater than 2. Therefore, the FF3 factors does not explain the risk associated with the difference between low operating profitability and high operating profitability.

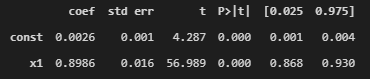
Exercise #4

(A) CAPM

Equally-weighted:

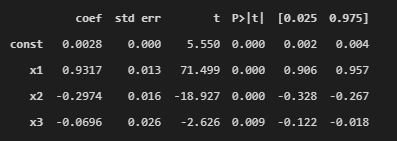


Value-weighted:



(B)

FF3 model for value-weighted:



x1 for mkt, x2 for SMB, x3 for HML.

We suspect these firms are big firms with slight small book-to-market ratio.