

GR5261/GU4261 Statistical Methods in Finance

Homework 3 (due on Feb 15, 2018; online submission only)

Questions from the textbook (Ruppert/Matteson, 2015)

Pages 512-514: Exercises 1, 2, 3, 7, 10, 11

Other questions:

- (1) The 'hw3.csv' file contains the adjusted closing stock prices of Caterpillar (CAT), IBM and Microsoft (MSFT) over 4963 days. We will work with the daily log-returns of the three stocks computed using these stock prices.
 - (a) Suppose that the three stocks are the only securities trading in the market and that short selling is allowed. Plot the efficient frontier formed by the three stocks. Indicate in your graph the positions of the three stocks by CAT, IBM and MSFT respectively.
 - (b) Now, in addition to the three stocks, we have a risk-free asset with daily risk-free interest rate at $5\%/253$. Again suppose that short selling and borrowing at risk-free rate are allowed, find the tangency portfolio in this case. Plot the line connecting the risk-free asset and the tangency portfolio in the same graph you have in (a). Indicate in your graph the positions of the risk-free asset and the tangency portfolio by crosses (x).
 - (c) Redo (a) with short selling not allowed.

Hint: You may refer to the files "Example.pdf" and "r-codeCAPM.pdf" on Courseworks for a similar example.