

Math 420, Spring 2017

Third Team Homework

due Tuesday, 9 March, 2017

Exercise 1. For each of the years ending December 31 of 2012-2016 use one-year histories with uniform weights to compute \mathbf{m} and \mathbf{V} for the risky assets in group (A), in groups (A) and (B) combined, and in groups (A), (B), and (C) combined. (This is the same exercise as the last two times!)

Exercise 2. For each year graph in the $\sigma\mu$ -plane:

- the three long frontiers for the assets in group (A), for the assets in groups (A) and (B) combined, and for the assets in groups (A), (B), and (C) combined;
- the volatility and return mean for that year of each asset, including the safe investment.

There should be 5 graphs — one for each year — each with three long frontiers and nine assets plotted. Use different symbols or colors to distinguish points associated with the different groups (A), (B), and (C). Comment on any relationships that you see between the objects plotted on each graph. (This will be easier to do if you use the same scales for each of the graphs. Each σ -axis should begin at $\sigma = 0$.)

Remark. The MatLab command “quadprog” can be used to solve the constrained minimization problem that arises for any given $\mu \in [\mu_{\min}, \mu_{\max}]$ in first part of Exercise 2. Documentation for this command is easily found on the web.

Exercise 3. Assume that the safe investment for each year is the U.S. T-Bill rate available at the beginning of that year. For each year graph in the $\sigma\mu$ -plane:

- the three efficient long frontiers associated with the safe investment and the assets in group (A), the assets in groups (A) and (B) combined, and the assets in groups (A), (B), and (C) combined;
- the volatility and return mean for that year of each asset, including the safe investment.
- the volatility and return mean of the nodal portfolio where the capital allocation line for the safe investment touches each long frontier found in Exercise 2.

There should be 5 graphs — one for each year — each with three efficient long frontiers, nine assets, and three nodal portfolios plotted. Use different symbols or colors to distinguish points associated with the different groups (A), (B), and (C). Comment on any relationships that you see between the objects plotted on each graph. (This will be easier to do if you use the same scales for each of the graphs. Each σ -axis should begin at $\sigma = 0$.)