Math 420, Spring 2016
First Project: Long Frontiers

presentation Tuesday, 8 March, 2016

report due Thursday, 10 March, 2016

This project explores the relationship between frontiers and long frontiers. Consider the following groups of assets.

(A) VFINX, VBTIX, VGSIX.

(B) DESTX, VFITX, PCRAX.

(C) Google, Ford, UPS.

Identify the funds in (A) and (B) and describe their holdings. (This information should inform some of your subsequent answers.)

Compute the frontiers for the risky assets in group (A), groups (A) and (B) combined, and groups (A), (B), and (C) combined using one-year histories with uniform weights for each of the years ending December 31 of 2010-2015. Do the same for $\mathbf{f}_{\mathrm{mv}}$. Comment on the implications of what you find.

Assuming that the safe investment is U.S. T-Bills, compute $\mathbf{f}_{\mathrm{st}}$. Assuming that the credit-line is three points higher than the U.S. T-Bill rate, compute $\mathbf{f}_{\mathrm{ct}}$. (You should identify when these tangency portfolios either do not exist or are not solvent.) Graph the associated efficient frontiers. Comment on the implications of what you find.

In a similar manner, graph the efficient long frontiers, for the risky assets in group (A), groups (A) and (B) combined, and groups (A), (B), and (C) combined, both with and without a safe investment of U.S. T-Bills. Comment on the implications of what you find.

Compare the efficient frontier with the efficient long frontier for each of the groupings and each of the years considered above. Determine when they intersect and give the intersection when they do. When they do not intersect determine the minimum value of $|\mathbf{f}(\mu) - \mathbf{f}_l(\mu)|$ where $|\cdot|$ denotes the sum of the absolute values of the entries. Devise a couple of other measures of the difference between the efficient frontier with the efficient long frontier. Comment on the implications of what you find.