Math 420, Spring 2014
First Project
Modeling Portfolios: Histories and Weights

Presentation due Monday, 10 March 2014
Report due Friday, 14 March 2014

This project explores the sensitivity of frontiers to the choice of history and weights. Consider the following groups of assets.

(A) VFINX, VBTIX, DJP (beginners portfolio)
(B) DFSTX, DFEMX, VFIDX, VGSIX.

Identify these funds and describe their holdings.

Show how the frontier for the risky assets in group (A), group (B), and groups (A) and (B) combined depend upon how the model is calibrated. Use:

(1) half-year histories with uniform weights;
(2) one-year histories with uniform weights;
(3) two-year histories with uniform weights.

For each of the years that end on December 31 of 2008-2013 use the above histories of daily return rates and uniform weights to calabrate $\mathbf{m}$ and $\mathbf{V}$. For each year observe how the efficient frontiers vary with the different calibrations. Do you see reasons to prefer some calibrations over others? In which of these years would you have the most confidence in the calibation? How do the different calibrations effect $\mathbf{f}_{\text{mv}}$? Comment on the implications of what you see.

Assuming that the safe investment is U.S. T-Bills, how do the different calibrations effect the values of σ_{st}, μ_{st}, and $\mathbf{f}_{\text{st}}$ when a safe tangent portfolio exists? Assuming that the credit-line is three points higher than the U.S. T-Bill rate how do the different calibrations effect σ_{ct}, μ_{ct}, and $\mathbf{f}_{\text{ct}}$ when a credit tangent portfolio exists? Show how the associated efficient frontiers are effected. Comment on the implications of what you see.

In a similar manner, compute and graph the long frontier for the risky assets in group (A), group (B), and groups (A) and (B) combined using one-year histories with uniform weights for each of the years ending December 31 of 2008-2013. Graph the associated efficient long frontiers with a safe investment of U.S. T-Bills. Comment on the implications of what you find.