

Math 420, Spring 2016

First Project: Histories and Weights

presentation Tuesday, 8 March, 2016

report due Thursday, 10 March, 2016

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

- (A) VFINX, VBTIX, VGSIX.
- (B) PESPX, VFIDV, PCRAX.
- (C) Apple, GE, Ford.

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

Show how the frontiers for the risky assets in group (A), groups (A) and (B) combined, and groups (A), (B), and (C) 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;
- (4) two-year histories with the second year weighted twice as much as the first year.

For each of the years ending December 31 of the years 2010-2015 use the above histories of daily return rates and uniform weights to calibrate \mathbf{m} and \mathbf{V} . For each year observe how the 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 calibration? How do the different calibrations effect \mathbf{f}_{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}_{st} when a safe tangent portfolio exists? When it exists, determine if \mathbf{f}_{st} is solvent for the entire history that you are using.

Assuming that the credit-line is three points higher than the U.S. T-Bill rate how do the different calibrations effect the values of σ_{ct} , μ_{ct} , and \mathbf{f}_{ct} when a credit tangent portfolio exists? When it exists, determine if \mathbf{f}_{ct} is solvent for the entire history that you are using.

Show how the efficient frontiers associated with the risk-free assets are effected. Comment on the implications of what you see.

In a similar manner, show how the long efficient frontier, for the risky assets in group (A), groups (A) and (B) combined, and groups (A), (B), and (C) combined depend upon how the model is calibrated, both with and without a safe investment of U.S. T-Bills. Comment on the implications of what you see.