

# Math 420, Spring 2017

## Second Project: Leverage Limits and Risk

presentation due Thursday, 4 May, 2017

report due Thursday, 11 May, 2017

This project explores how to use a statistical test to guide the choice of the risk coefficient  $\chi$ . Consider the following groups of assets.

- (A) This will be the Group A from the first project.
- (B) This will be the Group B from the first project of one of the team members. It will be filled in once the team is assigned.
- (C) This will be the Group C from the first project of one of the team members. It will be filled in once the team is assigned.

For each of the years ending December 31 of the years 2002-2016 use one-year histories of daily returns and uniform weights to calibrate  $\mathbf{m}$  and  $\mathbf{V}$ .

Consider at least two measures of how much leverage pressure there is in the market. These should involve the data  $\rho_{\min}(d)$  and  $\rho_{\max}(d)$ .

Consider at least two measures of the weak efficient market hypothesis holds — i.e. of how far the index funds are from the efficient frontier for the risky assets.

Explore correlations between the four measures that you devised.

Repeat the last homework assignment with  $\chi = 0, .25, .5, .75, 1, 1.25, 1.5, 1.75$  and  $2$ . Determine which value of  $\chi$  yields the best performing portfolios in the subsequent year. Use scatter plots to seek correlations between these best  $\chi$  and the measures that you devised above. Identify the two measures with the strongest correlation and find a linear function of those measures that best fits these  $\chi$ .