AMSC/Math 420, Spring 2014
Fifth Team Homework
Modeling Protfolios: Estimators for Portfolios and Prediction

Due Monday, 7 April, 2014

In the following exercises consider the risky assets in groups (A) and (B) of your final project. Consider one-year histories of daily share price data for each asset over the years ending December 31 of 2008-2013.

Exercise 1. When the final forms of the estimators $\hat{\gamma}$ and $\hat{\theta}$ in the lecture *Stochastic Models II: Portfolios with Risky Assets* are applied to a single risky asset, they reduce to

$$\hat{\gamma} = \hat{\mu} - \frac{1}{2D}\hat{\xi}, \qquad \hat{\theta} = \hat{\xi}.$$

Use these to estimate γ and θ for each asset and year. How do these $\hat{\gamma}$ and $\hat{\theta}$ compare with the unbiased estimators for γ and θ that you obtained in Exercise 3 of the previous homework?

Exercise 2. For each year compute $\hat{\mu}$ and $\hat{\xi}$ for the Markowitz portfolios with value equally distributed among the assets in group (A), group (B), and groups (A) and (B) combined.

(a) For each year simulate each of these portfolios three times by drawing daily return rates from a normal distribution with mean $\hat{\mu}$ and variance $\hat{\xi}$. How do the simulated portfolio return rates for each year compare with the actual ones? How do the simulated portfolio return rates for each year but the last compare with the actual ones for the next year?

(a) For each year simulate each of these portfolios three times by drawing daily growth rates from a normal distribution with mean $\hat{\gamma}$ and variance $\hat{\theta}$ given in Exercise 1 and converting then to return rates. How do the simulated portfolio return rates for each year compare with the actual ones? How do the simulated portfolio return rates for each year but the last compare with the actual ones for the next year?

Exercise 3. As a team discuss how you plan to address the questions raised in your project with the instructor. Write a paragraph that reflects the outcome of that discussion.