

Math 420, Spring 2018

Sixth Team Homework

due Tuesday, 17 April, 2018

In the following exercises consider the risky assets in groups (A) (B) and (c) of your final project. Consider one-year histories of daily share price data for each asset over the years ending December 31 of 2013-2017. Use the $\hat{\mu}$ and $\hat{\xi}$ you computed in the previous assignment for the Markowitz portfolios with value equally distributed among the assets in group (A), groups (A) and (B) combined, and groups (A), (B), and (C) combined.

Exercise 1. Simulate each of these 15 portfolios 100 times by drawing daily growth rates $\{X(d)\}_{d=1}^D$ from a normal distribution with mean $\hat{\gamma}$ and variance $\hat{\theta}$, where $\hat{\gamma}$ and $\hat{\theta}$ are given in Exercise 1 of the previous assignment. Determine the number of these portfolios that satisfy

$$\frac{1}{D} \sum_{d=1}^D X(d) \geq \hat{\gamma} - \zeta \sqrt{\hat{\theta}},$$

where $\zeta = 0, .5, 1, 1.5,$ and 2 . How do your results compare with what you expect from the central limit theorem?

Exercise 2. Simulate each of these 15 portfolios 100 times by drawing daily return rates $\{R(d)\}_{d=1}^D$ from a normal distribution with mean $\hat{\mu}$ and variance $\hat{\xi}$ and then converting them to daily growth rates $\{X(d)\}_{d=1}^D$. Determine the number of these portfolios that satisfy

$$\frac{1}{D} \sum_{d=1}^D X(d) \geq \hat{\gamma} - \zeta \sqrt{\hat{\theta}},$$

where $\zeta = 0, .5, 1, 1.5,$ and 2 . How do your results compare with what you expect from the central limit theorem?