

Math 420, Spring 2017

Fourth Team Homework

due Tuesday, 11 April, 2017

In the following exercises consider the risky assets in groups (A), (B), and (C) of your final project.

Exercise 1. For each asset consider its daily return history $\{(d, r(d))\}_{d=1}^D$ over the five year period 2012-2016. Use plots of these histories to explain when each of these assets is a good candidate to be mimiced by an IID model.

Exercise 2. Consider one-year histories of daily share price data for each asset over the years ending December 31 of 2012-2016. Use the unbiased estimators $\hat{\mu}$, $\hat{\xi}$, $\hat{\gamma}$, and $\hat{\theta}$ given by

$$\hat{\mu} = \frac{1}{D} \sum_{d=1}^D r(d), \quad \hat{\xi} = \frac{1}{D-1} \sum_{d=1}^D (r(d) - \hat{\mu})^2,$$
$$\hat{\gamma} = \frac{1}{D} \sum_{d=1}^D x(d), \quad \hat{\theta} = \frac{1}{D-1} \sum_{d=1}^D (x(d) - \hat{\gamma})^2,$$

to estimate μ , ξ , γ , and θ given the share price history $\{s(d)\}_{d=0}^D$ with

$$r(d) = \left(\frac{s(d)}{s(d-1)} - 1 \right), \quad x(d) = \log \left(\frac{s(d)}{s(d-1)} \right).$$

How do $\hat{\mu}$ and $\hat{\gamma}$ compare as measures of reward over the years considered? How do $\hat{\xi}$ and $\hat{\theta}$ compare as measures of risk?