

Math 420, Spring 2012

Second Project: Monday Markov Models

presentation due Monday, 30 April, 2012

report due Wednesday, 9 May, 2012

This project explores whether there is benefit in building Markov models that treat the first trading day of the week differently from every other trading day. Consider the following groups of assets.

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

For each of the years ending June 30 of the years 2006-2011 use one-year histories of daily return rates and uniform weights to calibrate a Markov model that uses one probability density for the return rates on the first trading day of each week, and another probability density for the return rates on all other trading days. Because the first trading day of each week is generally a Monday, we will call such models Monday Markov Models.

Find unbiased estimators for the “Monday” return rate means \mathbf{m}_M and covariances \mathbf{V}_M , as well as the return rate means \mathbf{m}_O and covariances \mathbf{V}_O for the other trading days. Do you see a “Monday” effect for all assets or some assets? If so, describe it.

Modify the IID model from the lectures into a Markov model that draws return rates from a density $p_M(\mathbf{R})$ with means \mathbf{m}_M and covariances \mathbf{V}_M on “Mondays”, and from a density $p_O(\mathbf{R})$ with means \mathbf{m}_O and covariances \mathbf{V}_O on other trading days.

There is a version of the central limit theorem that holds for such Markov models. Use that central limit theorem to build an objective function analogous to the one from the lectures. Repeat the last homework assignment using this objective function. Describe and explain differences you find in the performance of the optimal portfolios computed from the IID model and the Monday Markov Model.