

MAT 515: Financial Modeling

Project for Spring Quarter, 2022

Purpose: The purpose of the project is to implement the financial data analysis and modeling methods covered in MAT 515.

1. **Option 1:** Portfolio optimization problem

Problem Description: Choose ten risky assets in the stock market using your expertise that you think would best diversify your portfolio. Construct the “optimal” portfolio that you would decide to invest in.

Answer the following questions in your written report (not point-by-point, incorporate the answers into your report.):

- Preselection of assets: Choose some candidate assets [more than ten] that you would like to include in your portfolio.
- Perform preliminary analysis of the historical returns of your candidate assets, such as tests of mean, skewness, kurtosis, historical volatility [standard deviation], Bollingers band, correlations between returns, VaR, ES, etc..
- Based on your study of candidate assets, choose ten assets that you think would most likely produce a portfolio with high return and low risk.
- Plot the efficient frontier of these ten stocks. What is the global minimum variance portfolio?
- If you were the investor, what portfolio would you choose?

2. **Option 2:** Time series analysis of the asset return

- (a) Choose a stock.
- (b) Perform a preliminary analysis of the stock return. [Mean, skewness, kurtosis, distribution, etc.]
- (c) Model the return series using appropriate mean and volatility models.
- (d) Make forecast of future return and volatility using the time series model.

3. **Option 3:** Choose a research paper or a topic that you believe is relevant to the course. You can implement an algorithm and/or model in the paper, write **YOUR** understanding and comments of a new approach in the paper, etc.

Requirement:

This is an individual project. Assume this is a project given by your client, and you should explain to the audience the motivation of the project, the method, the tool you use, and the conclusion you would like to show. Prepare a double-spaced written report not to exceed three pages. The written report is due on **6/8/2022, 9:30 PM** through the submission box on D2L.