

MScFE 652 PORTFOLIO MANAGEMENT

Group Work Project # 2

[See grading rubric here](#)

Scenario

Manny Wayz is a hedge fund specializing in using different methodologies. The students all pick the same data over the same period and agree to perform a portfolio optimization. The time period must be at least 2 years ago. Collectively, they perform Markowitz Optimization together. But then they work in 2 additional areas.

Tasks

Groups of 3 members complete all the following steps:

Step 1: Gathering Data

1. Select a portfolio with a minimum of 5 securities. (**Note that you should choose stocks for which you can find recent news, headlines, analyst reports, etc.**)
2. Download daily or weekly returns for a period that allows you to have at least 100 data points (about 6 months daily returns, or 2 years of weekly returns). Assume you cannot short any securities.
3. Compute the covariance matrix from the observations.

Step 2: Markowitz Optimization

1. Run a classical Markowitz portfolio optimization.
2. Be sure to print / display / graph the weights of each security in the portfolio optimization results.

Step 3: Random Strategy Optimization

1. Individually, each student addresses 1/N portfolio strategy
 - a. Use Monte Carlo simulation to allocate equally across randomly selected portfolios. Note: the data will be actual historical data, but the weights are randomly selected.
 - b. Perform a series of historical back-tests to see how the combined portfolio performs. The students will compare their results with each

other; Please include all 3 sets of code in the final submission, as each student should code their own version of this step.

2. Collectively, the students summarize the findings by comparing to 1/N strategy with the Markowitz strategy. For example, how did the allocations hold for the following 3-month period?

Step 4: Black-Litterman

1. Find recent news, headlines, analyst reports, etc. that can be quantitatively translated into new values of returns and volatilities within the Black-Litterman framework.
2. Apply the BL portfolio optimization. Compare the original portfolio allocation with the BL results. The comparison should include differences in weights and performance.
3. Write 1-2 pages of background information. The background information provides equations, explains the terms in the equation, distinguishes inputs and outputs, explains how the parameters are estimated and calibrated, gives any interpretation to what the parameters mean, etc. The background is a technical summary of how the model works using equations, graphs, figures, tables, charts, and other illustrations, along with written explanations and interpretations.

Step 5: Kelly Criterion

1. Perform back-testing using the Kelly criterion for each security in the portfolio to size the allocation to that security.
2. Perform a series of historical backtests to see how the combined portfolio performs.
3. Write 1-2 pages of background information. The background information provides equations, explains the terms in the equation, distinguishes inputs and outputs, explains how the parameters are estimated and calibrated, gives any interpretation to what the parameters mean, etc. The background is a technical summary of how the model works using equations, graphs, figures, tables, charts, and other illustrations, along with written explanations and interpretations.

Groups of 2 members:

1. Complete Steps 1, 2, and 3
2. Complete Step 4 OR Step 5

Submission requirements and format

One team member submits on behalf of the entire group the following:

1. **1 PDF document*** (4-6 pages) with written notes of background information.
 - a. Use the available Report Template and fill out the required information on the first page, then make sure to include the reports in the PDF along with the template.
2. **1 zipped folder** including:
 - a. One (1) Jupyter notebook with:
 - Code
 - Graphs
 - Explanation of procedures and choices
 - Results
 - Interpretation
3. **1 PDF of a 3 to 5-page summary report*** that compares all 3 portfolios (3 for groups of 2 students):
 - Original
 - Naïve (1/N)
 - Black-Litterman
 - Kelly

The comparison should include both quantitative metrics and tabular or graphical visualizations. It should have a column for each of the portfolios.

** **Use Google Docs to collaborate.** Start by uploading the Report Template provided in the Course Overview. Once your report is completed, click File → Download → PDF Document (.pdf) to obtain the copy for your submission.*

*** **Use Google Colab or GitHub to collaborate** in completing the executable Python program.*

*The PDF file must be uploaded **separately** from the zipped folder that includes any other types of files. This allows Turnitin to generate a similarity report.*

Rubric

Your instructor will evaluate your group submission for GWP1 using the following rubric:

Quantitative Analysis (open-ended questions)	Technical and Non-technical Reports	Writing and Formatting
40 Points	30 Points	20 Points
<p>The group is able to apply results, formulas, and their knowledge of theory to real-life finance scenarios by doing the following:</p> <ul style="list-style-type: none"> • Providing all the necessary information to support their arguments. • Presenting arguments that reflect group discussion and research. • Using authoritative references to support a position and provide updated information • Concluding with practical takeaways for more insightful financial decision-making 	<p>Technical Reports contain 3 parts:</p> <ol style="list-style-type: none"> 1) summary of key results; 2) interpretation of results; and 3) the recommended course of action that can reasonably follow from those results and interpretations. <p>Note: Technical reports will include the technicalities of models, such as names, methods of estimation, parameter values, etc. and exclude generalities about the work done. It should NOT include names of Python code that were used.</p>	<p>A submission that looks professional should include:</p> <ul style="list-style-type: none"> • The axes, labels, and scales in graphs. • No significant grammar errors or typos. • Organized, well-structured, and easy-to-read document. • Proper citations and bibliography using MLA format.
	<p>Non-technical Reports contain 3 parts:</p> <ol style="list-style-type: none"> 1) clear explanation of results; 2) the recommended course of action that follows; and 3) the identification of factors that impact each portfolio. <p>Note: AVOID all references to model names, algorithms, and unnecessary details. Instead, focus on the investment decision.</p>	