MScFE 652 PORTFOLIO MANAGEMENT

Group Work Project # 1

See grading rubric here

Scenario

Factors are everywhere. Professor French (of Fama-French fame) now makes available historical factors. Please see:

https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

You want to understand the benefit of using extra factors, say, compared to CAPM.

Fama-French have a 3-factor model – let's call this FF3.

Fama-French also have a 5-factor model – let's call this FF5

Starting with CAPM, if you add 2 factors: Small Minus Big (SMB) and High Minus Low (HML) , you get FF3.

Starting with FF3, if you add 2 factors -- Conservative Minus Aggressive (CMA) and Robust Minus Weak (RMW) – you get FF5.

Your job will be to compare and contrast the performance of FF3 and FF5 over a period of 3 years using daily data. Your group will explain each factor, and how the additional 2 factors in FF5 either improved performance, hindered performance, or made no difference at all. Your group concludes by not only summarizing the results, but also interpreting the results. Note: the time period can be any 3-year period for which there is sufficient data.

Tasks

Scenario with a group of 3 members:

Step 1: Complete the following:

a. Collectively, define each of the 5 factors, one per page.

b. Write a non-technical paragraph (**NO MORE!**) as to why this factor helps to explain returns. Be sure to use professional references (**NOT Wikipedia**) for these sections.

Groups of 2: Only define 3 factors.

Step 2: Select a 3-year time period and use daily data.

a. Import, structure, and graph the daily factor returns.
b. Collect and compute correlations of the changes in the factor returns.
c. Collect economic data of your choice during that 2-year period (for example, inflation rates, 10-year Treasury rates, etc.)

Groups of 2: select a 2-year period.

Step 3: Using the data, find the FF3 betas.

a. Use LS and a robust version to run the regressions. Please specify how you divided data into training and testing. There are many ways to do this, as you learned in ML.
b. Summarize the coefficients and model metrics.

Groups of 2: Use at least 2 regression methods.

Step 4: Using the data, find the FF5 betas.

a. Use the same regression methods, including how you divided the data into training and testing.
b. Summarize the coefficients and model metrics.

Groups of 2: Use at least 2 regression methods.

Step 5: Using the daily factor data:

c. Compute the correlation matrix of the factor returns
d. Compute the covariance matrix of the factor returns.
e. Compare and contrast the 2 matrices, emphasizing any important differences.

Groups of 2: Do the same.

Step 6: Report in tabular form how the extra 2 factors (CMA and RMW) affect the results.

Groups of 2: Do the same.

Step 7: Select ANY 5 stocks (over the same 3-year period) that you combine in a portfolio.

f. Use Markowitz portfolio optimization to find a set of optimal allocations. (Shorts are possible).
g. Show how the portfolio depends on each of the factors in FF3.
h. Show how the portfolio depends on each of the factors in FF5.

Step 8: Provide a 100-200 word interpretation of the results, specifically addressing some or all of the 5 factors by name.

Groups of 2: Write a 100 – 150 word interpretation.

You will find excellent reading at
https://www.cfainstitute.org/-/media/documents/book/rf-publication/2016/rf-v2016-n4-1-pdf.pdf

Submission requirements and format

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

1. **1 PDF document*** with written notes of background information.
    1. 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:
    1. One (1) Jupyter notebook with:
        - Code
        - Graphs
        - Explanation of procedures and choices
        - Results
        - Interpretation
3. 1 **PDF of a 5 to10-page summary report*** that includes all the written responses and tabular results and graphs. This report should NOT contain code. Be sure

that the written work addresses all the question above, and is organized according to the steps number.

** **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 files 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) 40 Points	Technical and Non-technical Reports 30 Points	Writing and Formatting 20 Points
The group is able to apply results, formulas, and their knowledge of theory to real-life finance scenarios by doing the following: ● 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	Technical Reports contain 3 parts: 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. **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.	A submission that looks professional should include: ● 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.
	Non-technical Reports contain 3 parts: 1) clear explanation of results; 2) the recommended course of action that follows; and 3) the identification of factors that impact each portfolio. **Note**: AVOID all references to model names, algorithms, and unnecessary details. Instead, focus on the investment decision.	