Recent Projects

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This document provides a concise overview of the projects I undertook during my Master's in Finance program at HEC Lausanne. The list has been curated to highlight only those projects in which I was deeply involved and that best align with my current interests in the field of finance.

Project 1: Impact of Strikes on Stock Returns

Fall 2023 – Datascience for Finance

This group project explored the effect of strikes on daily stock returns by investigating how labor disruptions impact market behavior. Our findings uncovered a positive correlation between strike events and excess returns.

I was responsible for the entire data cleaning pipeline, including fuzzy matching to merge strike data with financial datasets. I also implemented all of the statistical models that our team developed. All analysis was performed in Python.

Project 2: Statistical Pair Trading

Spring 2024 – Empirical Methods in Finance

This group project focused on identifying and implementing statistical arbitrage opportunities. The main concepts explored included manually implementing various statistical tests, such as the Dickey-Fuller test, and using these tests to inform an investment strategy.

I handled the entire coding component of the project, including implementing the statistical tests, designing the trading strategy, and creating data visualizations. My teammate and I jointly contributed to the final report. All analyses were performed in Python.

Project 3: Conditional Volatility Modeling for Investment

Spring 2024 – Empirical Methods in Finance

This group project combined a conditional volatility model (GARCH) to substantiate a Markowitz type investment strategy. The risk of the portfolio was then evaluated with conventional metrics, before being reanalyzed with extreme value theory (EVT) methods.

The code included in the repository is written by my teammate but is nevertheless included for completeness. My role was to verify the findings, create the graphs, and contribute to the report. I did so by reimplementing the GARCH model in Python, MATLAB, and Excel, and reproducing the rest of the analysis in Python.

Project 4: Portfolio Optimization with Carbon Constraints

Spring 2024 – Sustainability Aware Asset Management

This group project examined the impact of decarbonization strategies on the returns of equity portfolios in emerging markets. The analysis demonstrated that carbon constraints had a negligible effect on return characteristics and could even enhance performance.

My role in this project was to implement all the investment strategies, from the value-weighted benchmark, to the minimum variance portfolio with an increasingly tight carbon footprint constraint. The process involved processing large amounts of financial and ESG data, and making sure that the optimization ran quickly for a big number of assets. Furthermore, it was my also responsibility to create the visualizations, animations, and to write sections of the report.

Project 5: Investment Strategy Webapp

Fall 2024 – Quantitative Asset and Risk Management

In this group project, my team created an investment strategy that combined a diverse set of asset classes – from equities to commodities – into a single portfolio with equal risk contribution. An interactive webapp was then created to allow users to see how the performance of the strategy would change over time as a function of their risk tolerance. The webapp is available at: https://portfolio-optimisation-webapp.streamlit.app

I was responsible for implementing the portfolio optimization routine. The aspiration was to have the user be able to dynamically construct their investment strategy by choosing different investment approaches, and thus a flexible framework was programmed with a strong emphasis on optimizing code efficiency for real-time performance.

Project 6: Conditional Volatility Modeling Library

Fall 2024 (ongoing) – Personal Project

This personal project addresses the limitations I encountered when using existing Python libraries for volatility modeling and reflects my interest in improving accessibility to these models. It involves developing a Python library for GARCH-type models with a focus on usability, flexibility, and extensibility.

The library currently supports the estimation and fitting of GARCH extensions such as GJR, MLE and QMLE fitting procedures, support for non-normal and non-symmetric distributions and even a multivariate volatility model (DCC). Designed with user-friendliness in mind, it features clean, intuitive interfaces and presents estimates in professionally formatted tables. My long-term goal is to refine and publish this library as a Python package.