



QUANTITATIVE RESEARCH

Research Report Title

Author Names

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Abstract

This abstract should summarize the key aspects of the report. It should concisely outline the research background, methodology, main findings, and conclusions. Aim for approximately 250 words, avoiding citations and minimizing abbreviations.

Background: Introduce the topic and the problem your research addresses. **Methodology:** Describe the methods and data used in your analysis. **Results:** Highlight the main outcomes and observations. **Conclusions:** Summarize the key insights and implications of your findings.

Key words: Keyword1; Keyword2; Keyword3; Keyword4; Keyword5

1 Introduction

Portfolio optimisation is a process of strategically selecting a diverse range of assets to build an investment portfolio that offers the maximum expected returns for a given level of risk. This can be calculated using mathematical models, of which we have selected four: Equally Weighted, Markowitz mean/variance optimisation, Black-Litterman and Risk Parity. Together, these models provide a strong theoretical foundation. While Mean-Variance optimisation is central to modern portfolio theory, it often performs poorly in practice due to estimation errors. Therefore, an inclusion of Bayesian frameworks and risk-based allocation methods is designed to improve robustness and empirical performance.

This report conducts a rigorous empirical comparison of portfolio optimisation, which is applied to a selected 18-asset portfolio spanning 2015–2025. The asset universe includes: UK equities, government bonds, precious metals and broader commodities. It defines the scope of our analysis so that findings are realistic and diversified in the investment universe.

The objective of this project is to evaluate the risk-return performance by implementing and backtesting multiple portfolio techniques to understand characteristics, trade-offs and practical applicability. While comparing classical optimisation techniques to alternative approaches to optimise empirical robustness in a real-world investment setting.

1.1 Background and Research Objectives

Provide the necessary background information for the reader to understand the context of your research. Clearly state your primary and secondary research objectives.

2 Methodology

This section details the design of your study, the data used, the models applied, and the analytical framework. The goal is to provide enough detail for another researcher to replicate your work.

2.1 Data Acquisition and Processing

Describe the data you used, where you got it from (e.g., Bloomberg, Refinitiv, web scraping), and any steps you took to clean, process, or transform it. Mention the time period and frequency of the data.

2.2 Analytical Models

Describe the quantitative or qualitative models used in your analysis. Include mathematical formulations if applicable. For example, if you are using a regression model, you would specify it here:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon \quad (1)$$

Explain the variables and the assumptions of the model.

2.3 Backtesting or Validation Framework

If you are testing a strategy, describe the backtesting framework. Mention key parameters like rebalancing frequency, transaction cost assumptions, and performance metrics used.

Key Points

- Key finding or takeaway 1.
- Key finding or takeaway 2.
- Key finding or takeaway 3.

Figure 1. Descriptive caption for your figure.

Table 1. Descriptive caption for your table.

Category	Metric 1	Metric 2	Metric 3
Group A	0.00	0.00	0.00
Group B	0.00	0.00	0.00
Group C	0.00	0.00	0.00

Note: Explain any specific details about the data in the table.

3 Results and Discussion

This section presents the key findings from your analyses and interprets their significance [1]. Use figures and tables to present your results clearly.

3.1 Primary Findings

Present your main results. This could be in the form of tables summarizing statistical outputs, or charts showing trends and relationships.

3.2 Interpretation of Findings

Discuss what your results mean. How do they relate to your initial research question? Are they consistent with existing literature? What are the implications of your findings?

4 Conclusion and Future Work

Summarize the main conclusions of your research. Reiterate the key insights and their importance.

Future work could include:

- Exploring alternative methodologies or datasets.
- Addressing limitations of the current study.
- Expanding the research to a different market or asset class.

5 Declarations

5.1 Author Contributions

Briefly describe the contribution of each author to the research and writing of the report. For example: "A.B. designed the research. C.D. collected the data. E.F. performed the analysis. All authors contributed to writing the report."

5.2 Competing Interests

The authors declare that they have no competing interests.

5.3 Funding

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5.4 Acknowledgements

Thank anyone who provided help or support for the project, such as professors, mentors, or other colleagues.

References

1. Smith J, Doe J. Example Article Title. Journal of Finance 2023;78(4):1234–1256.