**Portfolio Optimization Project Proposal**

**Introduction**

In the financial world, the concept of portfolio optimization stands as a cornerstone of investment strategy, enabling investors to maximize returns while managing risk. This project delves into the dynamic landscape of portfolio management using historical stock price data to optimize the allocation of funds across a diverse stock selection, enhancing the potential for maximized returns.

**Objective**

Our project endeavors to address this complexity head-on by creating a refined model for portfolio optimization. The ultimate goal is to maximize the expected portfolio return with a primary investment of $200,000, subject to various constraints including budgetary limits, investment bounds for individual stocks, and a specified risk threshold. Additionally, we aim to meet a target return, ensuring that our portfolio's performance aligns with investor expectations.

**Method**

The project will commence with the implementation of the mean-variance optimization (MVO) model, a technique renowned for its application in numerous asset allocation endeavors. As the project progresses, there might be an opportunity to incorporate alternative strategies like equal-weights allocation (EQ), contingent upon their efficacy and alignment with prevailing market conditions. [1,2] The adopted model will be inherently dynamic, recalibrating daily in response to fresh market data. This proactive approach will guide decisions on asset acquisition, retention, or disposal, ensuring the portfolio is consistently aligned with market fluctuations.

- Data Analysis: We will analyze historical price data, and calculate expected returns, variances, and covariance for selected stocks in the dataset.

- Model Constraints: Our linear programming model will include:

- A budget constraint to ensure total investment does not exceed the capital we have.

- Individual stock investment constraints to diversify risk.

- A risk constraint to limit portfolio volatility.

- A target return constraint to aim for a minimum expected return.

- Trading Protocol: With access to daily trading data, our trading activity will adhere to US stock market regulations, executing trades once per day based on the model's recommendations.

**Significance**

This project is not merely an academic exercise but a practical application with significant implications for investment management. By optimizing the allocation of funds in a portfolio, we strive to provide a systematic approach to investment that balances the dual mandate of maximizing returns while controlling risk.

**Conclusion**

Through rigorous data analysis and model application, we aim to navigate the complexities of the stock market and deliver a sophisticated tool for portfolio optimization. Our model will serve as a testament to the power of linear programming in financial decision-making, offering a structured path to achieving investment goals in a fluctuating economic landscape.

References

[1] Markowitz, H.M. (1952). Portfolio Selection. The Journal of Finance, 7(1):77–91.

[2] Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. The Journal of Finance, 19(3):425–442.

This proposal is a conceptual draft and may be subject to further revisions based on ongoing research and data analysis.