UNIVERSITI TEKNOLOGI MARA

**PORTFOLIO OPTIMIZATION OF
MALAYSIAN ASSETS USING
MEAN-VARIANCE WITH
ADDITIONAL CARDINALITY
CONSTRAINT
P41S23**

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ABSTRACT

Introduction: Investment is the acquisition of assets to develop wealth and save money from hard-earned income or appreciation. The goal of investment is to generate the highest possible profit while minimizing the risk of loss. Portfolio optimization is a qualitative process used in finance to select the best possible combination of investment portfolio assets and their weights, given a set of objectives and constraints. **Problem:** Investment decision-making in Malaysia is complex due to the wide range of available assets. To determine the optimal investment strategy, it is necessary to explore the impact of cardinality constraints on risk diversification in portfolio optimization, especially concerning the Sharpe ratio, when exhaustive information is not available. **Objectives:** This study aims to determine the diversification of risk and the number of assets within the mean-variance model. Additionally, it seeks to determine the diversification of risk of a portfolio based on different numbers of assets in the cardinality-constrained mean-variance model. Lastly, the study aims to compare the portfolio performance in terms of the Sharpe ratio between the mean-variance and cardinality-constrained mean-variance (CCMV) model. **Methodology:** Mean-variance analysis is a technique used in portfolio optimization to determine the optimal asset allocation that maximizes expected return while minimizing risk. The CCMV model imposes a limit on the number of assets in the portfolio and restricts the proportion of assets in the portfolio. The Sharpe ratio is used to evaluate the performance of the portfolio optimization model under varying cardinality constraints. **Finding:** According to the mean-variance model, as expected returns rise, portfolios often streamline assets, increasing risk while prioritizing diversification for better risk management. The cardinality constrained mean-variance model enhances risk diversification by limiting the number of assets, effectively reducing portfolio risk. The CCMV model shows higher Sharpe ratios compared to the mean-variance model at both low and high target returns, implying potentially superior risk-adjusted returns. **Conclusion:** The study concludes that limiting the number of assets in the portfolio significantly affects expected return and investment risk, aiding investors in allocating resources more effectively and offering valuable insights into portfolio management in the Malaysian market.

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