

**UNIVERSITI TEKNOLOGI MARA**

**TECHNICAL REPORT**

**PORTFOLIO OPTIMIZATION OF RISKY ASSETS  
USING MEAN-VARIANCE AND MEAN-CVAR**

**P21S18**

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## Abstract

The aim of this research is to apply the variance and conditional value-at-risk (CVaR) as risk measures in portfolio selection problem. To obtain an optimum portfolio of the assets, we minimize the risks using mean-variance and mean-CVaR models. Dataset with stocks from FBMKLCI is used to generate our scenario returns. Both models and dataset are coded and implemented in AMPL software. Then, we analyzed the numerical results in Microsoft Excel. We compared the performance of both optimized portfolios constructed from the models in term of risk measure and realized returns. The optimal portfolios are evaluated across three different target returns that represent the low risk-low returns, medium risk-medium returns and high risk-high returns portfolios. Numerical results show that the composition of portfolios for mean-variance are generally more diversified compared to mean-CVaR portfolios. The in-sample results show that the seven optimal mean-CVaR<sub>0.05</sub> portfolios have lower CVaR<sub>0.05</sub> values as compared to their optimal mean-variance counterparts. Consequently, the standard deviation for mean-variance optimal portfolios are lower than the standard deviation of its mean-CVaR<sub>0.05</sub> counterparts. For the out-of sample analysis, we can conclude that mean-variance portfolios only minimize standard deviation at low target return. While, mean-CVaR portfolios are favourable in minimizing risks at high target return.

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