

**UNIVERSITI TEKNOLOGI MARA**

**TECHNICAL REPORT**

**RISK MINIMISING PORTFOLIOS FOR  
CRYPTOCURRENCY AND SHARIAH ASSETS USING  
MEAN VARIANCE OPTIMISATION MODEL**

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**P07/S22**

**Report submitted in partial fulfillment of the requirement  
for the degree of**

**Bachelor of Science (Hons.) Mathematics  
College of Computing, Informatics and Media**

**February 2023**

## Acknowledgement

First and foremost, praises and thanks to Allah, the Almighty, for the given abundance of blessings throughout the process of us completing the final year project paper entitled Risk Minimising Portfolios of Cryptocurrency and Shariah-compliant Assets using Mean-Variance Optimisation Model. This project would not have been possible without the support from many parties. We would like to express our deepest gratitude towards our supervisor, Mr Mohd Azdi Maasar for his continuous patience and guidance. Thank you for always providing us invaluable feedback on every report's draft as well as analysis. At times, he even responded to our late-night messages. It was a privilege to work under his supervision throughout these two semesters. Likewise, much obliged to our lecturer of Final Year Project Writing subject, Dr Rossidah Wan Abdul Aziz for giving us helpful advice as we completed the report. We also acknowledged the generous help from the UiTM librarians, especially Mr Syaiful Hisyam Saleh. With his assistance, we managed to get access to the Refinitiv Eikon website and collected all required data for us to conduct this study. Next, we are grateful for our parents, siblings and close friends who endured this long process with us, offering full love and support. We were indebted to our fellow classmates of N4CS2486B1 as well. It was pleasant to have a group of people who were all working towards the same goal as we do. We comforted each other with words of encouragement whenever any of us had a hard row to hoe. Last but not least, we would like to give credit towards ourselves, the members of P07S22. Thank you, Nur Athirah Hani Senin, for the excellent leadership. Thank you, Nurul Aisah Ahmadi, for dealing with most of the technical tasks. Thank you, 'Afina Syahmah Abdul Gaafar, for keeping eyes on the sentence structure and grammar. Thank you to every member's determination and wonderful spirit, which led us to finally be able to complete this final year project. Sincerely, we pray that all the hard work will pay off.

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## **Abstract**

Portfolio selection is well identified as a crucial problem in finance because the future returns of assets are unknown at the time of the investment decision was made. This research focuses on minimising the risk of portfolios of cryptocurrency and shariah-compliant assets. The objective of this research is to simulate the scenario returns (weekly) for cryptocurrency and shariah-compliant assets. Consequently, we are motivated to construct variance minimising portfolios for both assets and make comparison. Finally, we validate the performance of these portfolios using out-of-sample analysis. We apply variance as the risk measure and obtain risk minimising portfolios using mean variance model. A set of close prices of 51 companies involving the cryptocurrency and shariah assets are obtained through the Refinitiv website. Simulation is conducted on the collected data using the Microsoft Excel to determine the expected return range. A total of six in sample portfolios are constructed and evaluated across three different target returns representing low, medium and high return. In sample analysis shows that when a low target return is set, shariah portfolios yield lower standard deviation than cryptocurrency portfolios. This means, a shariah asset is less risky than cryptocurrency. The result is similar for portfolios under medium level of target return. However, under a high level of target return, the result shows a contrary pattern because the standard deviation of shariah portfolios start to surpass cryptocurrency portfolios. This may be caused by the classical theory of Markowitz' portfolio. According to Boiko, Ye, Kononenko , and Goncharov (2021), heavy-tailed profitability in cryptocurrency causes the asset to not be subject to normal distribution. All developed portfolios are validated well because out-of-sample analysis results demonstrate that the realised return and expected target return of

the portfolios exhibit similar behaviour. The realised standard deviation of the portfolios for every target return are also congruent to the standard deviation from the in samples analysis.