



THE UNIVERSITY OF
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DEPARTMENT OF STATISTICS

Master's Thesis Presentation

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“The Application of a Hybrid Garch-type Model with Quantile Regression Neural Network on the Estimation of Value-at-Risk of Corporate Stocks”

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Abstract

This study develops a hybrid model combining Generalized Autoregressive Conditional Heteroskedasticity (GARCH)-type models with Quantile Regression Neural Networks (QRNN) to enhance the precision of Value-at-Risk (VaR) estimates for corporate stock portfolios. By integrating advanced GARCH variants, which effectively capture diverse market volatilities, with the robustness of QRNN, the model addresses limitations in traditional VaR estimation methods that often fail to account for the dynamic and non-linear nature of market data. Through rigorous backtesting against traditional models and evaluations using financial datasets, including smooth, volatility-clustering, and sudden shock patterns, our results confirm that the hybrid model outperforms existing methods in predicting potential financial risks at 0.05 quantile, but it does not show superiority in other quantiles. We also explore the limitations of the hybrid model. This research provides a practical framework for financial practitioners to assess risk with greater confidence.