

Title: Range-Based Models in Estimating Value-at-Risk

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Abstract:

This paper introduces a new method of estimating Value-at-Risk (VaR) using range-Based models. Two models, based on the Parkinson Range and Garman-Klas Range, are applied to 10 stock market indices of selected countries in the Asia-Pacific region. The results are compared using the traditional methods such as the econometric method based on the ARMA-Garch models and RiskMetricsTM. The performance of the different models is assessed using the out-sample VaR forecasts. Series of likelihood ratio (LR) tests namely: LR of unconditional coverage (LR_{uc}), LR of independence (LR_{ind}), and LR of conditional coverage (LR_{cc}) are performed for comparison. In addition, stress testing based on block maxima utilizing the Generalized Extreme Value (GEV) distribution is also done on different stock market indices. The result shows that the model based on the Parkinson Range (GARCH (1,1) with Student's t distribution) is the best performing model on 10 stock market indices. The model's failure rate, defined as the percentage of actual return that is smaller than the one-step-ahead VaR forecast, is zero in 9 out of 10 stock market indices. Results show that Range-Based models are good alternatives in modeling volatility and in estimating VaR.

Key Words: Value-at-Risk (VaR), Parkinson Range, Garman-Klas range, Extreme Value