

MEASURING MARKET RISK USING EXTREME VALUE THEORY

by

JOSE OLIVER Q. SUAISSO

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Diliman, Quezon City

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ABSTRACT

The adoption of Basel II standards by the Bangko Sentral ng Pilipinas initiates financial institutions to develop Value-at-Risk (VaR) models to measure market risk. In this study, two VaR models are considered using the Peaks-Over-Threshold (POT) approach of the Extreme Value Theory: (1) Static EVT model which is the straightforward application of POT to the bond benchmark rates; and (2) Dynamic EVT model which applies POT to the residuals of the fitted AR-GARCH model. The results are compared with traditional VaR methods such as RiskMetrics and AR-GARCH-type models. The relative size, accuracy and efficiency of the models are assessed using Mean Relative Bias, Backtesting, Likelihood Ratio tests, Loss Function, Mean Relative Scaled Bias and computation of Market Risk Charge. Findings show that the Dynamic EVT model can capture market risk conservatively, accurately and efficiently. It is also practical to use because it has the potential to lower a bank's capital requirements. Comparing the two EVT models, the Dynamic model is better than Static as the former can address some issues in risk measurement and can effectively capture market risks.

Key Words: Extreme Value Theory (EVT), Peaks-Over-Threshold (POT), Value-at-Risk (VaR), Market Risk, Risk Management