

Effectiveness of Copula-EVT in Estimation of VaR under Financial Crisis - Empirical Evidence from ASEAN Market

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Abstract

Monte Carlo simulation is the one of data generating process (DGP) that requires accurate knowledge of the assets comovements in order to simulate series of assets return precisely. Using linear and normality-based correlations estimator leads to estimation bias in measuring portfolio value-at-risk (VaR) due to the prevailing evidences of fat-tailed, skewed, truncated, and non-linear relations of return distributions. Extreme Value Theory (EVT) based copula model, which can capture the non-normality of return distributions, is suggested as an alternative approach to tackle with aforesaid problems. In this paper, we evaluated the effectiveness using our proposed approach in assessing portfolio risks in six ASEAN markets which have different return distribution shapes and compared with Pearson's correlation and pure copula approaches. We incorporated semi-parametric EVT approach to model the tails of the return distributions and copulas to build the joint distribution of returns and find the correlation between changes in foreign exchange rate and stock index returns. The backtesting analysis of the Monte Carlo VaR simulations suggested that, in general, the copulas with the EVT performed better estimation of VaRs than the traditional Pearson's and pure copula's. The results prove the benefits in coping with the downside shocks for portfolio risk management.

Keywords: Copulas; Dependence; Emerging Markets; EVT; VaR; Backtesting