

## **A Comparative Study of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and Extreme Value Theory (EVT) Model in Modeling Value-at-Risk (VaR)**

**Authors :** Longqing Li

**Abstract :** The paper addresses the inefficiency of the classical model in measuring the Value-at-Risk (VaR) using a normal distribution or a Student's t distribution. Specifically, the paper focuses on the one day ahead Value-at-Risk (VaR) of major stock market's daily returns in US, UK, China and Hong Kong in the most recent ten years under 95% confidence level. To improve the predictable power and search for the best performing model, the paper proposes using two leading alternatives, Extreme Value Theory (EVT) and a family of GARCH models, and compares the relative performance. The main contribution could be summarized in two aspects. First, the paper extends the GARCH family model by incorporating EGARCH and TGARCH to shed light on the difference between each in estimating one day ahead Value-at-Risk (VaR). Second, to account for the non-normality in the distribution of financial markets, the paper applies Generalized Error Distribution (GED), instead of the normal distribution, to govern the innovation term. A dynamic back-testing procedure is employed to assess the performance of each model, a family of GARCH and the conditional EVT. The conclusion is that Exponential GARCH yields the best estimate in out-of-sample one day ahead Value-at-Risk (VaR) forecasting. Moreover, the discrepancy of performance between the GARCH and the conditional EVT is indistinguishable.

**Keywords :** Value-at-Risk, Extreme Value Theory, conditional EVT, backtesting

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