

Portfolio Optimisation with Liquidity Adjusted Value at Risk using Garch-EVT-Vine Copula Approach

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Abstract

In this study, we propose to use the Liquidity adjusted value at risk (L-VaR) measure for portfolio optimization. Vine copulas are used for the joint modelling of the interdependence between the return series and the spread series of different stocks in the portfolio while calculating the L-VaR. Historical data of the return and spread series are used for fitting the model after adjusting for non-normality, autocorrelation, and fat tails with ARMA-EGARCH, and Extreme value theory (EVT). The estimated parameters from the fitted model will then be used for simulating the return and spread series after incorporating the interdependence using Vine copulas. Finally, the L-VaR is calculated as per three different models using the simulated data. We then optimise the Portfolio following the approach of maximising the modified Sharpe ratio, where, in place of standard deviation, we use L-VaR as the measure of risk. We compare the optimisation results of the modified Sharpe ratio with the original Sharpe ratio. We expect the portfolio optimised based on the modified Sharpe ratio to perform better than the portfolio optimised based on the original Sharpe ratio.

Keywords: Portfolio optimisation, Liquidity, value at risk, copula.