

## Copula Markov Switching Multifractal Models for Forecasting Value-at-Risk

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**Abstract :** In this paper, the effectiveness of Copula Markov Switching Multifractal (MSM) models at forecasting Value-at-Risk of a two-stock portfolio is studied. The innovations are allowed to be drawn from distributions that can capture skewness and leptokurtosis, which are well documented empirical characteristics observed in financial returns. The candidate distributions considered for this purpose are Johnson-SU, Pearson Type-IV and  $\alpha$ -Stable distributions. The two univariate marginal distributions are combined using the Student-t copula. The estimation of all parameters is performed by Maximum Likelihood Estimation. Finally, the models are compared in terms of accurate Value-at-Risk (VaR) forecasts using tests of unconditional coverage and independence. It is found that Copula-MSM-models with leptokurtic innovation distributions perform slightly better than Copula-MSM model with Normal innovations. Copula-MSM models, in general, produce better VaR forecasts as compared to traditional methods like Historical Simulation method, Variance-Covariance approach and Copula-Generalized Autoregressive Conditional Heteroscedasticity (Copula-GARCH) models.

**Keywords :** Copula, Markov Switching, multifractal, value-at-risk

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