A multivariate joint model for market risk and credit risk management for cryptocurrencies

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Abstract

The goal of this paper is to choose the most appropriate model for managing both market and credit risks for a set of cryptocurrencies. For this purpose we exploit multivariate time series models, namely VAR-Copula-GARCH and VAR-DCC models with different specifications. Value-at-Risk and Expected Shortfall for single coins and an equally weighted portfolio are calculated during backtesting and then evaluated with tests. The ZPP approach is used for default probability estimation and compared to classical credit score models – logit and probit and one machine learning algorithms – Random Forest. We implement the proposed study with data of 15 coins in terms of market risk analysis and 45 coins in terms of credit risk estimation. The results reveals the superiority of copula-GARCH with multivariate Student's t-distribution of standardized errors model for market risk and ZPP ARMA-GARCH with skewed Student's t-distribution for credit risk management.