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"Use the Market's Heartbeat to Predict Extreme Financial Risks"

Abstract

This paper proposes a simple approach to estimate quantiles of daily financial returns directly from high-frequency data. We denote the resulting estimator as realized quantile (RQ) and use it to forecast tail risk measures, such as Value at Risk (VaR) and Expected Shortfall (ES). The RQ estimator is built on the assumption that financial logarithm prices are subordinated self-similar processes in intrinsic time. The intrinsic time dimension stochastically transforms the clock time in order to capture the real "heartbeat" of financial markets in accordance with their trading activity and/or riskiness. The self-similarity assumption allows to compute daily quantiles by simply scaling up their intraday counterparts, while the subordination technique can easily accommodate numerous empirical features of financial returns, such as volatility persistence and fat-tailedness.

Our method, which is built on a flexible assumption, is simple to implement and exploits the rich information content of high-frequency data from another time perspective than the classical clock time. In a comprehensive empirical exercise, we show that our forecasts of VaR and ES are more accurate than the ones from a large set of up-to-date comparative models, for both stocks and foreign exchange rates.