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The Uncertainty in Extreme Risk Forecasts from Covariate-Augmented Volatility Models

Abstract: For a GARCH-type volatility model with covariates, we derive asymptotically valid forecast intervals for risk measures, such as the Value-at-Risk and Expected Shortfall. To forecast these, we use estimators from extreme value theory. In the volatility model, we allow for the inclusion of exogenous variables, e.g., volatility indices or high-frequency volatility measures. Our framework for the volatility model captures leverage effects, thus allowing for sufficient flexibility in applications. In simulations, we find coverage of the forecast intervals to be adequate. Finally, we investigate if using covariate information from volatility indices or high-frequency data improves risk measure forecasts for real data. While, in our framework, volatility indices appear to be helpful in this regard, intra-day data are not.

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