



Robust bootstrap forecast densities for GARCH models: returns, volatilities and Value-at-Risk.

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GARCH models are widely used to forecast the volatility and can be used to construct forecast densities for financial returns. These densities can be useful to obtain forecast intervals and quantiles of interest as, for example, the Value-at-Risk. In this context, bootstrap procedures can be useful as they allow obtaining forecast densities for returns and volatilities that incorporate the parameter uncertainty without assuming any particular error distribution. In this work, we analyze the effect of outliers on the construction of bootstrap forecast densities for returns and volatilities when they are based on both standard Maximum Likelihood and robust procedures. The results have implications on the construction of forecast intervals for returns and volatilities and on VaR forecasts. Finally, we propose a robust modification with good finite sample properties.

Keywords: Outliers; Robust estimator; Smooth bootstrap; Winsorized bootstrap..