Robust Estimation and Inference for Time-varying Unconditional Volatility

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Room Benvenuti and live Zoom
Department of Statistical Sciences

The unconditional volatility of financial return is often time-varying. To model this, a common approach is to decompose the volatility multiplicatively into a non-stochastic process, and a de-volatilitised stochastic process.

We prove the consistency and asymptotic normality of the single-step Quasi Maximum Likelihood Estimator (QMLE) of the parameters of the non-stochastic component for a large class of specifications. Next, we derive a simple but robust and consistent estimator of the asymptotic coefficient covariance.
The exact specification of the stochastic component need not be estimated or known, and it can even be non-stationary in the distribution.

This is important in empirical applications, since financial returns are frequently characterised by a non-stationary zero-process. Next, we derive a period-by-period estimator of time-varying periodic unconditional volatility. Due to the assumptions we rely upon, our results extend directly to the Multiplicative Error Model (MEM)vinterpretation of volatility models.

So our results can also be applied to the modelling of the time-varying unconditional mean of non-negative processes (e.g. volume, duration, realised volatility, dividends and unemployment). Three applications illustrate our results.

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