Robust Estimation and Inference for Smooth Changes in the Unconditional Volatility

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Abstract

The unconditional volatility of financial return is frequently time-varying. To model this, the most common approach is to decompose the conditional volatility σ_t^2 multiplicatively into a smoothly varying non-stochastic process g_t, and a de-scaled stochastic process h_t: $\sigma_t^2 = g_t h_t$. We prove the consistency and asymptotic normality of the single-step QMLE for the parameters of g_t for a broad class of specifications g_t. Next, we derive a simple but robust and consistent estimator of the coefficient covariance. The exact specification of h_t need not be estimated or known, and h_t can be non-stationary in the distribution. This is important in empirical applications, since financial returns are frequently characterised by a non-stationary zero-process. We compare our single-step estimator with the multi-step iterative estimator of Amado and Terasvirta (2013), and illustrate our results in an empirical application.

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