Maximum Likelihood Estimation of Continuous Time Stochastic Volatility Models with Partially Observed GARCH

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Abstract

This paper proposes a method for the maximum likelihood estimation of continuous time stochastic volatility models. The key step is to introduce approximating GARCH processes that have higher frequencies of construction but are observed at lower frequencies. The latency of the volatility process is retained by augmenting data points between price observations. The convergence of the likelihood function can be obtained with mild regularity conditions. Such an approach reconciles discrete and continuous time models, and it can be implemented easily under the context of the simulated maximum likelihood. As an extension to the commonly used modified Brownian bridge sampler, we propose generating paths with skewed density to match the dynamics of the volatilities.

Keywords: Latent variable; Simulated maximum likelihood; Importance sampling; Skewed normal distribution.