A Comparison on GARCH Option Pricing Models

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Abstract

This study investigates the option pricing performance of Heston and Nandi (2000)'s GARCH model, Christoffersen et al. (2008)'s Component GARCH model and Cheng et al. (2016)'s Kernel GARCH model. The Component GARCH model extends Heston and Nandi (2000)'s GARCH model by including the short-run and long-run volatility components. The Kernel GARCH model generalizes the Component GARCH model by further considering the effect of volatility premium. We derive a proper set of constraints for the parameters in the Component GARCH model and the Kernel GARCH model to ensure the positivity of the conditional variances. The model parameters are estimated by a Markov chain Monte Carlo (MCMC) algorithm. Simulation results indicate that the proposed MCMC method has satisfactory estimation performance. We also conduct several simulation scenarios to investigate the sensitivity of the model parameters for the three GARCH models. The data of the S&P500 index from 2013/1/1 to 2015/10/15 are employed to compare the pricing performance for European call options with different maturities and different strike prices of the three GARCH models.

Key words：GARCH model, Markov chain Monte Carlo, option pricing