Evaluation of Two Popular Models of Volatility on Financial Time Series

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Abstract: In this paper, we evaluate and compare two classes of varying volatility model, GARCH and stochastic volatility (SV) models on financial time series. In this case, a closed form estimator for a stochastic volatility model and also its asymptotic properties are considered. Akaike information criterion (AIC) was used to test the adequacy of the models.

Keywords: **GARCH, Stochastic Volatility, Financial Time Series.**

١. Introduction

The volatility models have been widely used in various contexts of a time series analysis. Two common models of volatility, the generalized autoregressive conditional heteroscedasticity (GARCH) and the stochastic volatility (SV) models are well established in both financial time series and econometrics. GARCH models define the time-varying variance as a deterministic function of past squared innovations and lagged conditional variances (see, e.g., Bollerslev et al.(١٩٩٤) and Diebold and Lopez (١٩٩٥)), whereas the variance in the SV model is modeled as an unobserved component that follows some stochastic process (see, e.g., Taylor (١٩٩٤), Ghysels et al. (١٩٩٦) and Shephard (١٩٩٦)). The GARCH specification is proposed by Bollerslev (١٩٨٦).

The most popular version of the SV model defines volatility as a logarithmic first order autoregressive process, which is a discrete-time approximation of the continuous-time Ornstein-Uhlenbeck diffusion process used in the option pricing literature (see, e.g., Hull and White (١٩٨٧), Scott (١٩٨٧) and Chesney and Scott (١٩٨٩)).

The SV models, based on the continuous-time probability process, have also been well studied in financial econometrics (see, e.g., Ghysels et al. (٢٠٠٢), Shephard (٢٠٠٥)).