

STOCHASTIC VOLATILITY MODELING IN ISTANBUL STOCK EXCHANGE: HESTON MODEL VS. COGARCH(1,1)

Selcuk Bayraci

Yeditepe University / Financial Economics
e-mail: selcuk.bayraci@alumni.exeter.ac.uk

Yavuz Yildirim

Yeditepe University / Financial Economics
e-mail: yildirimyz@gmail.com

Yakup Ari

Yeditepe University / Financial Economics
e-mail: yakupari@gmail.com

Abstract

In this paper, we propose an alternative approach to Heston model in modeling the index return volatility in Istanbul Stock Exchange. Heston model which has been widely used in the financial volatility modeling satisfies the equations of the form $dS_t = r_t S_t dt + \sigma_t S_t dW_t^1$ and $d\sigma_t^2 = \kappa(\theta^2 - \sigma_t^2)dt + \gamma\sigma_t dW_t^2$, is driven by two independent Brownian motions. In a simple GARCH(1,1) model, the idea of the large innovations in the price process are almost immediately manifested as large innovations in the volatility process. But this feedback mechanism is lost in Heston model due to two sources of uncertainty. Klüppelberg et.al introduced the idea of continuous time GARCH(1,1) in 2004 where price and volatility process are driven by a single Lévy process, satisfies the price and volatility equations of; $dG_t = \sigma_t dL_t$ and $d\sigma_t^2 = (\beta - \eta\sigma_{t-}^2)dt + \varphi\sigma_{t-}^2 d[L, L]_t^{(d)}$, where $d[L, L]_t^{(d)}$ is the quadratic variation of the Lévy process. We use the intraday returns of the IMKB100 index for the period of 1998-2006, and apply Heston and COGARCH(1,1) models to the data.