Testing volatility interactions in a constant conditional correlation GARCH model

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Abstract

In this paper, we propose an Lagrange multiplier (LM) test for the presence of volatility interactions among markets/assets. The null hypothesis is the constant conditional correlation (CCC) GARCH model of Bollerslev (1990) in which volatility of an asset is described only through lagged squared residuals and volatility of its own. The alternative hypothesis is an extension of that model in the way of Jeantheau (1998), where volatility is modelled, while keeping the conditional correlation structure constant, as a linear combination not only of its own lagged squared residuals and volatility but also of those in the other equations. As an example, we derive expressions for the LM test in the bivariate case along with the necessary derivatives of the likelihood function, and conduct simulation experiments to investigate finite sample properties of the test. Empirical applications are carried out for pairs of foreign exchange rates and of stock indices. Results indicate that there indeed exist volatility interactions in some pairs that are detected by the proposed test.

Keywords: Multivariate GARCH; Lagrange multiplier test; Monte Carlo simulation; Constant conditional correlation.
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