

Modelling Time-Varying Volatility Interactions with an Application to Volatility Contagion

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Abstract

In this paper, we propose an additive time-varying (or partially time-varying) structure where a time-dependent component is added to the extended vector GARCH process for modelling the dynamics of volatility interactions. In this framework, co-dependence in volatility is allowed to change smoothly between two extreme states and contagion is identified from these crisis-contingent structural changes. The estimation of the new time-varying vector GARCH process is simplified using an equation by equation estimator for the volatility equations in the first step, and estimating the correlation matrix in the second step. A Lagrange multiplier test is presented for testing the null hypothesis of constancy co-dependence volatility against a smoothly time-varying interdependence between financial markets. The proposed statistical test allows us to investigate volatility contagion by testing a significant increase in cross-market volatility transmissions. Finite sample properties of the proposed test statistic are investigated by Monte Carlo experiments. An empirical application of the modelling and testing procedure to sovereign bond yields shows evidence for the presence of volatility-based contagion.

JEL classification codes: C12, C13, C32, C51, G15.

Keywords: Multivariate time-varying GARCH; Volatility spillovers; Structural change; Lagrange multiplier test; Volatility-based contagion.

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