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Modelling Stock Volatilities During Financial Crises: a Time Varying Coefficient Approach

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Abstract

We examine how the most prevalent stochastic properties of key financial time series have been affected during the recent financial crises. In particular we focus on changes associated with the remarkable economic events of the last two decades in the volatility dynamics, including the underlying volatility persistence and volatility spillovers structure. Using daily data from several key stock market indices, the results of our bivariate GARCH models show the existence of time varying correlations as well as time varying shock and volatility spillovers between the returns of FTSE and DAX, and those of NIKKEI and Hang Seng, which became more prominent during the recent financial crisis. Our theoretical considerations on the time varying model which provides the platform upon which we integrate our multifaceted empirical approaches are also of independent interest. In particular, we provide the general solution for time varying asymmetric GARCH specifications, which is a long standing research topic. This enables us to characterize these models by deriving, first, their multistep ahead predictors, second, the first two time varying unconditional moments, and third, their covariance structure.

Keywords: financial crisis, time varying GARCH models, structural breaks, volatility spillovers.
JEL Classifications: C53; C58; G15.

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[*]The order of the authors' names reflect their contribution. M. Karanasos is the first author, having defined the theoretical and empirical models, and having derived (together with the second author, A. Paraskevopoulos) the theoretical results (Section 3). F. Menla Ali is third author, having estimated the various univariate