

A Multivariate Threshold GARCH Model with Time-varying Correlations

C.K. Kwan * W.K. Li[†] K. Ng[‡]

Revised January 17, 2005

First version June 21, 2003

Abstract

In this article, a Multivariate Threshold Generalized Autoregressive Conditional Heteroscedasticity model with time-varying correlation (VC-MTGARCH) is proposed. The model extends the idea of Engle (2002) and Tse & Tsui (2002) to a threshold framework. This model retains the interpretation of the univariate threshold GARCH model and allows for dynamic conditional correlations. Techniques of model identification, estimation and model checking are developed. Some simulation results are reported on the finite sample distribution of the maximum likelihood estimate of the VC-MTGARCH model. A time-varying covariance multivariate GARCH model with a threshold structure is also proposed as a by-product. Real examples demonstrate the asymmetric behaviour of the mean and the variance in financial time series and the ability of the VC-MTGARCH model to capture these phenomena.

Keywords: Multivariate GARCH model; Threshold nonlinearity; Varying correlation; Volatility

*Email: mawilson@polyu.edu.hk. Department of Applied Mathematics, The Hong Kong Polytechnic University and Department of Statistics and Actuarial Science, The University of Hong Kong.

[†]Email: hrntlwk@hku.hk. Department of Statistics and Actuarial Science, The University of Hong Kong

[‡]Email: kaing@hku.hk Department of Statistics and Actuarial Science, The University of Hong Kong