

**Portfolio Index GARCH:  
A Class of Parsimonious Dynamic Covariance Models\***

**Manabu Asai**

Faculty of Economics, Soka University, Japan

**Michael McAleer**

School of Economics and Commerce, University of Western Australia

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**Abstract**

The paper develops the structure of a parsimonious Portfolio Index (PI) GARCH model. Unlike the standard multivariate GARCH model, the PI-GARCH approach specifies the volatility of a portfolio directly. When the number of assets is very large, conditional volatility estimates based on the PI-GARCH model can be used to obtain more efficient parameter estimates, lead to a better understanding of portfolio risk management, and achieve greater accuracy in forecasting Value-at-Risk (VaR) thresholds in determining optimal Basel Accord capital charges. For various asymmetric GARCH models, a Portfolio Index Composite News Impact Surface (PI-CNIS) is developed to measure the effects of news on the conditional variances. In addition to evaluating the finite sample properties of the dynamic conditional correlation (DCC) model of Engle (2002), the Monte Carlo experiments show that there is a downward bias in estimating the weight attached to new information in updating the conditional correlations in the DCC model. Moreover, the estimates based on the PI-GARCH model are able to outperform the DCC model in terms of goodness-of-fit measures and in forecasting VaR thresholds for equally weighted, balanced weighted and hedge portfolios.

**Keywords and phrases:** Risk management, Portfolio index model, Multivariate volatility, Dynamic conditional correlations, Asymmetry, Composite news, Value-at-Risk thresholds, Monte Carlo simulations.