Forecasting Value-At-Risk with a Parsimonious Portfolio Spillover GARCH (PS-GARCH) Model

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Abstract: Accurate modelling of volatility (or risk) is important in finance, particularly as it relates to the modelling and forecasting of Value-at-Risk (VaR) thresholds. As financial applications typically deal with a portfolio of assets and risk, there are several multivariate GARCH models which specify the risk of one asset as depending on its own past as well as the past behaviour of other assets. Multivariate effects, whereby the risk of a given asset depends on the previous risk of any other asset, are termed spillover effects. In this paper we analyse the importance of considering spillover effects when forecasting financial volatility. The forecasting performance of the VARMA-GARCH model of Ling and McAleer (2003), which includes spillover effects from all assets, the CCC model of Bollerslev (1990), which includes no spillovers, and a new Portfolio Spillover GARCH (PS-GARCH) model, which accommodates aggregate spillovers parsimoniously and hence avoids the so-called curse of dimensionality, are compared using a VaR example for a portfolio containing four international stock market indices. The empirical results suggest that spillover effects are statistically significant. However, the VaR threshold forecasts are generally found to be insensitive to the inclusion of spillover effects in any of the multivariate models considered.