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Abstract:

The Problem:

Because asset price movements are determined in a financial system, estimates have to be solved simultaneously in a system of equations. The problem of identification when parameters are estimated by simultaneous equations with endogenous variables is well researched. When a model includes endogenous variables the structural form cannot be directly estimated, only the reduced form model can be estimated. The structural form parameters has to be obtained from the reduced from parameters. This type of system of equations is under-identified. In order to solve for the structural parameters additional information is necessary. The literature has solved this problem by placing some constraints based on economic knowledge on the system. However, when working with high frequency data these restrictions cannot always be justified.

Methodology:

In order to estimate the structural parameters in this system, Rigobon (2003) developed a methodology to solve the identification problem that is based on heteroscedasticity. This paper applies a structural GARCH model (Rigobon and Sack (2003)) to solve the identification problem, based on the heteroscedasticity that exists so often in financial market data. The contemporaneous effects between the 90-Tbill rate, the ALSI and the R/$ exchange rate are estimated, as well as the conditional variances of the returns on the various series. Lastly, an application to portfolio risk management (Value-at-Risk) is made to highlight the possible dangers in ignoring contemporaneous propagation (or the structural parameters) between assets when calculating the variance of a portfolio.

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Results:

The results obtained are important for investors to minimise their risk with respect to high frequency capital flows between different asset classes. The results indicate significant contemporaneous effects between variables in the mean, as well as significant spillovers across the second moments of the variables. When applying the results to portfolio risk management, large mismeasurement of the portfolio variance is revealed when compared to traditional multivariate GARCH models.

Keywords: GARCH, Heteroscedasticity, Identification, Simultaneous equations, Value-at-Risk, Risk management.