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Volatility and information flows in emerging equity market A case of the Korean Stock Exchange

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Abstract

Applying the generalized autoregressive conditional heteroskedasticity (GARCH) model to the Korean Stock Exchange, this study examines: (1) the statistical property of time-varying volatility in returns and trading volume data found in an emerging capital market, and (2) the property of the conditional variances of returns in predicting the flow patterns of information across the firms of different sizes. The results find that current trading volume as a proxy of information arrival dramatically reduces the persistence of the conditional variance, meaning that the arrival of information is a source of the ARCH effect in the emerging market just as it is in the U.S. The results also show that just as the volatility of larger firms can be predicted by shocks to smaller firms, the volatility of smaller firms can be predicted by shocks to larger firms. However, the volatility spillover effect from larger to smaller firms is more significant than that from smaller to larger firms. © 2000 Elsevier Science Inc. All rights reserved.

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1. Orientation to the problem

One distinct feature of auto-regressive conditional heteroskedasticity (ARCH) models is that the models allow a conditional second moment (the conditional variance) of the innovations in the time series that bring about the predictive power residing in the volatility

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that may go otherwise undetected. More specifically, an ARCH parameter allows the identification of not only volatility clustering in an autoregressive structure that may persist over time but also a mixture of distributions, such as daily stock returns, being generated by the rate of daily information arrival, which may be the dominant stochastic mixing variable.

Isolating the effects of an estimated disturbance variance in one period on the disturbance variances in subsequent time periods, Clark (1973), Epps and Epps (1976), Tauchen and Pitts (1983), Harris (1987), and Lamoureux and Lastrapes (1990) have shown that the stochastic information arrivals in the form of volume or price can be identified by the mixture of distributions, and that the volume series indeed manifests time-varying ARCH effects. Ross (1989) and Conrad et al. (1991) expand the ARCH effects under the mixture of distribution hypothesis to intercompany transaction data and show the detectable “spill over effects” in the flows of information from large to small firms or vice versa. It should be noted that the focus of the studies mentioned herein have dealt with transaction data for the U.S. and other developed stock markets.

There is relative paucity in the literature investigating the ARCH effect dealing with stock returns in fast-growing stock markets in emerging economies such as Korea and China. Reasons for the paucity are largely attributable to the lack of reliable time series data that cover a time period sufficient for a meaningful analysis and the presence of country-specific idiosyncrasies, such as onerous stock exchange rules and peculiar industrial structure found in these developing countries.¹

This study investigates the relationship between trading volume and the time-varying conditional heteroskedasticity of stock returns by testing the validity of the mixture of distribution hypothesis and the volatility spillover effect in the Korean stock market. More specifically, it seeks to ascertain two key issues: (a) whether or not trading volume can be identified as an explanatory mixing variable for the rate of daily information arrival, and (b) whether or not stock returns of firms in Korea can be linked to the differences in the conditional flow of information from large to small firms or vice versa, as they are the case in the U.S.

The remainder of this paper is organized as follows. Section 2 presents a brief literature survey, while section 3 describes the data and its sources and section 4 the methodology. Empirical findings relating to the trading volume and return volatility, and the asymmetry in information flows, respectively, are discussed in sections 5 and 6. Concluding remarks are found in section 7.

2. A brief survey of literature

2.1. The mixture of distribution hypothesis and the ARCH effect

The generalized autoregressive conditional heteroskedasticity (hereinafter GARCH) model allows the variance of disturbance terms to conditionally evolve over time in such a way that

¹ See Roll (1992) for the sources of structural distortion inherent in statistical data of many countries overseas.

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