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Stock market integration and volatility spillover: India and its major Asian counterparts

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ABSTRACT

Stock market integration and volatility spillover between India and its major Asian counterparties is studied. Apart from different degrees of correlations, contemporaneous intraday return spillovers between India and its Asian counterparts are found to be positively significant and bi-directional. Hong Kong, Korea, Singapore and Thailand are found to be four Asian markets from where there is significant flow of information in India. Though most of the information gets transmitted between the markets without much delay, some amount of information still remains unsent and is found to be successfully transmitted as soon as the domestic market opens in the next day.

1. Introduction

Increasing regionalization of economic activities and liberalization of financial markets since the late 1980s has resulted in *regional economic integrations*[1] around the world. Due to the increasing interdependence of major financial markets all over the world, transmission of stock market information among the major Asian markets has become a much researched topic. Early research focused exclusively on the spillover of the first moment of stock prices, i.e. the return, among the major stock

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[1] Regional economic integration can take place among the markets within the same region because of so many factors, such as economic ties among the countries, lower geographical distance, foreign investments, contagion effect, etc.

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exchanges (Eun and Shim, 1989; Joen and Furstenberg, 1990; Cumby, 1990). But, exploring the stock market co-movements is a combined study of information spillover both in terms of returns as well as the volatility of returns. Volatility linkages, i.e. inter-market linkages in the conditional second moments of stock price is another significant aspect of international financial relations. Several studies, such as (Kyle, 1985) have pointed out that much of the information would be revealed in the volatility of stock prices, rather than the price itself.

There are several reasons to analyze the cross-border volatility spillovers. In addition to various domestic factors, volatility of major foreign trading partners is one of the important determinants of stock return volatility in a domestic market. From the practitioners' point of view, they are interested to analyze 'volatility' with a view to assess the risk associated with various financial assets (Merton, 1980) and to facilitate the valuation of different financial products along with the development of different hedging techniques (Ng, 2000). As far as academics are concerned, they believed that the changes in volatility reveal the arrival of new information (Ross, 1989).

This paper attempts to investigate the first and second moment interactions among the Indian equity market with that of twelve other Asian countries. It is very well known that the volatility of stock return series is time varying, both intraday and across the days. In light of this fact, application of multiple regression analysis, granger causality test, vector auto regression (VAR)[2] technique, etc., assuming time invariant conditional variances; to investigate the transmission of stock price movements may not cover all the aspects of the transmission mechanism. Therefore, this study has examined the transmission of the conditional first and second moments in the stock prices across the markets allowing for changing the variances. The generalized autoregressive conditional hetroscedasticity (GARCH) model introduced by Engle (1982) and Bollerslev (1986) has been used to account for the time-variant conditional variances. Our results, based on daily price observations from November 1997 to April 2008, ensures that apart from different degrees of correlations, both in terms of return and squared return series, among Indian stock market with that of other Asian countries, the contemporaneous intraday return spillover among India and almost all the sample countries are found to be positively significant and bi-directional where as the same in terms of volatility is basically uni-directional, i.e. either from other Asian markets to India or vice versa. As far as the lagged spillover of information is concerned, though most of the information gets transmitted between the markets without much delay, some amount of information, both in terms of return and volatility, still remains and is found to be successfully spilled over as soon as the domestic market opens in the next day.

The rest of this paper is organized as follows: Section 2 presents a brief review of existing literature relevant to this study and pointed out the possible efforts achieved through this study. The details of data used are presented in Section 3. Section 4 gives a comprehensive description of the methods and the tests applied in this study. The analysis of major empirical findings is shown in Section 5, followed by the conclusion in Section 6.

2. Review of literature

There is a diverse amount of literature on stock market integration and information spillover across the markets. Some studies have examined only the return spillover across the markets, while some other studies consider both the first and the second moments of equity prices to examine the cross-border spillover. Apart from examining only the presence of such interdependence among the equity markets, some authors have also focused on the impact of some special events such as market crises, market liberalization, etc. on the spillover of information across the national borders. All the above studies aimed only at examining the spillover of information among the national equity markets. But, there are also some studies that focused on the possible factors or in short, the determinants of such spillover among different markets. Some studies, such as Kearney and Lucey (2004), have surveyed the literature on equity market integration and have noticed the significant contribution of methodological developments in giving a new perspective on the degree of integration among the national markets.

[2] Interdependence among more than one market can be examined through a vector auto regression technique where every endogenous variable in a system is modeled as a function of the lagged values of all of the endogenous variables in the system.