Integration of Global Stock Markets : A Review of Literature

Aman Srivastava[1], Furqan Qamar[2], Khan Masood[3]

ABSTRACT

The perception is that under the existing global economic structure and developments the global stock markets of most countries are becoming gradually more integrated. Indian markets are no more exception to these developments and in India the issue is also gaining attention in the post liberalization era. With this background, the research aims to examine the common perception of global integration from an Indian stock market perspective. The investigation was carried out, in the first instance, in a straightforward way. With a view to know the interdependence of stock markets located all over the world and to realize the potential risk and rewards of global diversification, the present study presents a brief review of past literature on stock market integration in the international scenario. All the studies are categorized into three parts, namely, studies examining only the presence of interdependence, studies investigating the possible changes in such relationship over time and studies explaining the possible causes of such interdependence. The foregoing review reveals that the stock markets of different countries are interdependent both within and across the country. The present study confirms that though there are a number of studies explaining stock market interdependence, the literature stating why stock markets are interdependent is quite sparse. Again, so much emphasis has been given to the event of "October 1987 crises" in the existing studies possibly to check the extent of such interdependence over time. This study covers the previous works which have applied different methodologies to test the stock market integration.

1. INTRODUCTION

Globalization and technological developments have made the entire world a single market. The cointgration among the global stock markets has gone up significantly due to quick flow of data and information from one market to another. The flow of investment is now without restrictions from one market to another. Thus, it is expected that the stock market movement of one country is exceedingly influenced by that of other countries. This phenomenon of global integration is not true only for efficient and developed markets but also for emerging markets. The factors causing

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the rising market integration is a rapid increase in the cross-border mobility of capital flows due to investors looking for portfolio diversification and better returns, an increasing dependence of economies on the savings of other economies, and a shift in the tendency of companies from debt to equity finance. It is generally perceived that financial integration can be associated with several benefits, including development of markets and institutions and effective price discovery, leading to higher savings, investment and economic progress. At the same time, linkages among financial markets can pose various risks, such as the contagion and associated disruption of economic activities that were evident during the crisis in Asia in the late 1990s and more recently, in march 2008, national stock markets declined sharply in the wake of credit market developments in the United States. Thus after the global met down now the policy makers and analysts across the global have recognized that they should continuously monitor the mutual dependency and integration of their market on continuous basis.

Recognizing the significance of global integration and dependency of global markets several studies in the applied finance literature have concentrated on measuring the international integration of national stock markets across several developed and emerging markets. The review of literature depict that the studies focused on India's stock market are rather scarce, despite various important facts suggesting, prima facie, the increasing linkage of the Indian market with global and emerging Asian markets.

This paper is a moderate attempt to address certain issues. The paper is based on the review of literature in the area of global integration of markets. In this paper, the study investigated the global stock market integration keeping in view the aspect of international portfolio diversification. The paper proceeds along the following lines. Section II presents the conceptual framework of stock market integration, section III discusses the review of literature in various categories, section IV critically analyzed the exiting literature and section V offers conclusions.

2. CONCEPTUAL FRAMEWORK OF STOCK MARKET INTEGRATION

Before the study makes any investigation on stock market integration, it is essential to define that what is the meaning of market integration? Stock Market Integration or Stock Market Interdependence means, that investors can buy and sell shares in those markets without restriction and that identical securities can be issued and traded at the same price across the markets after foreign exchange adjustment.

There are broadly three categories of literature on stock market interdependence. The first category is studies that simply examine stock market interrelationships to determine how interdependent a specific group of stock markets are. Along with determining the stock market interrelationships, the second category also examines the possible changes in such relationships. In other words, these studies simply compare pre-and post-crises relationships as well as examine the evolution of stock market relationships over time. The third and last category is studies that try to explain why stock markets are interdependent, by either decomposing or modeling stock market correlations.

3. REVIEW OF LITERATURE

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In the theoretical literature, integration of markets derives from different postulates such as the law of one price (Cournot (1927), Marshall (1930)), portfolio diversification with risky assets (Markowitz (1952)), capital asset price models (Sharpe (1964), Lintner (1965)) and arbitrage price theory (Ross (1976)). Even after having different views these postulates share a common perspective: if risks governs the price, then the correlation of financial

asset prices and the integration among markets comes from the mechanism of pricing risk due to investors' risk aversion. By investigation the price behavior of Indian market with US and London markets *Sharma* and *Kennedy* (1977) attempted to test the random-walk hypothesis by applying the technique of runs analysis and spectral densities. By observing monthly indices over a period of 11 years starting from 1963 to 1973, they found that the behavior of Bombay Variable Dividend Industrial Share Index (BVDIS) was statistically indistinguishable from that of London Financial Time-Actuaries 500 Stock Index and S & P's 425 Common Stock Index. Their spectral densities, estimated for the first difference series of each index, confirmed the randomness of the series. Based on the tests applied in the study, they concluded that stocks listed on the Bombay Stock Exchange obey a random walk and likely are considered to be equivalent with the behavior of stock prices in the markets of advanced industrialized countries, like UK and US. Most of the studies, except King et al. (1990), Roll (1992), Chen & Zhang (1997), Bracker et al. (1999), Serra (2000), Pretorius (2002), Brooks and Negro (2002 & 2003), Johnson and Soenen (2002) etc., are confined in examining the presence of such interrelationship either in a short period or over a long time. Again, most of the studies (e.g. Eun and Resnick, 1984; Roll, 1992; Serra, 2000; Brooks and Negro, 2002 & 2003.) that do address issue of explaining the causes of such interrelationships, concentrate on decomposing the stock returns into country and industry factors, setting aside the other economic variables that may drive stock market co-movements. Only the study made by *Serra* (2000) Pretorius (2001) discloses the presence of those variables in explaining stock market comovement. All the studies [made by Becker at el. (1990), Cheung & Ng. (1992), Arshanapalli and Doukas (1993 & 1995), Masih and Masih (1997) and Sharma (2002)] examining the effect of a crisis (either October 1987 crisis or 1997 Asian crisis) on stock market relationships used different approaches with respect to the division of sample period. Following the seminal works of Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990), numerous studies beginning with Taylor and Tonks (1989), Kasa (1992) depicted that average daily turnover in the stock market is available for one-leg transactions, while turnover by the FIIs includes two-way transactions (purchase and sales).

Rao & Naik (1990) attempted to examine the inter-relatedness of US, Japanese and Indian Stock Markets. The data relating to stock price indices used in the study were of monthly type and those were collected from New York, Tokyo and Bombay stock exchanges for the period January, 1971 to December, 1988. They tried to cover the episode of the October, 1987 world market crash and the Indian stock market boom of 1985-87 and subsequent fall in 1987-88 in their study period. By applying the cross-spectral analysis they concluded that the interrelationship among the three markets were, in average, very low. Contrary to the suggestion that Japan acts like a follower in international markets, there findings pointed out that Japanese market probably acts more like an independent factor in relation to the US and Indian stock markets. By using daily data for the period January, 1986 to December, 1990, *Choudhury* (1994) attempted to examine the relationship among the Asian Newly Industrialized Economies NIEs, Japan and the US. By applying variance decomposition and impulse response functions, they found that the US led the NIEs and that there were significant linkages between the markets.

Amanulla and Kamaiah (1995) attempted to examine the stock market efficiency by measuring the integration among different exchanges in Indian Stock Market. The data used were the RBI monthly aggregate share indices relating to the all India, and five selected regional stock exchanges, viz., Bombay, Calcutta, Madras, Delhi and Ahmadabad during the period 1980-1993. By using two market integration approaches, such as, Ravallion approach and Cointegration and error correction approach, they concluded that Bombay, Madras and Calcutta stock exchanges were integrated and thus not efficient. But Ahmadabad and Delhi stock exchange confirmed the existence of market efficiency at the sense that these stock markets were not integrated during the study period.

Chowdhry (1997) and Chowdhry et al (2007), among several others in the applied finance literature, have used the cointegration hypothesis to assess the international integration of financial markets. Until Taylor and Tonks (1989) and Kasa (1992), studies relied on correlation and regression analyses to gauge the nature of price convergence and international portfolio diversification across markets (Levy and

Sarnat (1970), Agmon (1972), Solnik (1974) and Panton et al (1976)). Taylor and Tonks (1989) showed that the cointegration technique is useful from the perspective of the international capital asset price model. Kasa (1992) suggested that the short-term return correlation between stock markets is not appropriate from the perspective of long-horizon investors driven by common stochastic trends. A cointegration model is useful since it not only distinguishes between the nature of long-run and of short-run linkages among financial markets, but captures the interaction between them as well. Given the wide popularity of the cointegration hypothesis, we refrain from rehashing the algebra of this methodology. What is striking about the empirical literature is that studies on the subject have brought to the fore various useful perspectives relating to price equalization, market equilibrium, market efficiency and portfolio diversification (Chowdhry et al (2007)). In order to facilitate our empirical analysis, a brief discussion on these perspectives follows.

Kumar (2002), in his study, attempted to find out whether Indian Stock Market was integrated with the major stock markets of the world, such as, US, Japan, Singapore and Hong-Kong. In other words, he tried to find out the attractiveness of the Indian stock market from the investors in the developed markets stated above.

With a view to examine the short run dynamic linkages between NSE Nifty in India and NASDAQ composite in the US, *Kiran Kumar* & *Mukhopadyay* (2002) attempted to make an empirical investigation during the period 1999 to 2001. By using intra-daily data to determine the daytime and overnight returns, their study carried out a comprehensive analysis to examine the comovement and volatility transmission between the US and Indian stock markets. *Mishra* (2002) in his paper tried to investigate, broadly, international integration of India's domestic financial markets and hence studied the international integration of Indian stock market. Stock indices from Bombay Stock Exchange as well as from NASDAQ Stock Exchange were taken into account from the period 1993-94 to 1999-2000. By applying Ordinary Least Square and Co-integration technique, they found a positive correlation between NASDAQ and BSE and thus concluded that BSE was being influenced by the movements of NASDAQ. But no co integrating vector was found between BSE and NASDAQ indices that signifies there was no long-run relationship between these two stock exchanges.

Nath and Verma (2003) have analyzed the level of capital market integration by examining the transmission of market movements among three major stock markets in Asian region, viz., India, Singapore and Taiwan, during the period 1994 to 2002. They used daily data relating to stock market indices of India (NSE NIFTY), Singapore (STI) and Taiwan (TAIEX). By employing bi-variate and multivariate cointegration analysis (Granger 1969,1988 and Johensen 1988), their empirical findings had shown that there was no long-term interrelationships and thus an equilibrium among those stock markets, though they confirmed the possibilities, in few cases, of some casual influences of one stock market' return on the return in other stock markets. Lastly, they suggested that international investors could achieve long term gains by investing in the stock markets because of the independencies of the stock markets considered in the study. Khan Masood Ahmad, Shahid Ashraf and Shahid Ahmed (2005) in their scholastic paper attempted to understand the interlinkages and causal relationship between the NASDAQ composite index in the US, the Nikkei in Japan with that of NSE Nifty and BSE Sensex in India during the period January 1999 to August 2004, using daily closing data. The Johansen co-integration test is applied to measure the long-term relationship between the two indices and the Granger-causality test is used to check the short-term causal relationship. The analysis reveals that there is no long-term relationship of the Indian equity market with that of the US and Japanese equity markets. While the simplicity of the systematic structure of Vector Auto Regressive (VAR) method [as applied by Janakiramanan and Lamba (1998), Masih and Masih (1999)] is an advantage, its unrestricted construction posses a drawback for econometric analysis because of omitting of some important variables. Moreover, the presence of only lagged variables as regressors requires that all the contemporaneous shocks feed through the error term. This may be problematical in variance decomposition and impulse response analysis because when residuals are highly correlated, ordering of variables may vastly affect the impulse responses.

4. A CRITICAL ASSESSMENT OF LITERATURE

Even though stock market interdependence seems to be a widely accepted fact, it is apparent from the foregoing review presented in the earlier sections as well as from the comprehensive table given in the Appendix, that the literature explaining why stock markets are interdependent is quite sparse. Most of the studies, except King et al. (1990), Roll (1992), Chen & Zhang (1997), Bracker et al. (1999), Serra (2000), Pretorius (2002), Brooks and Negro (2002 & 2003), Johnson and Soenen (2002) etc., are confined in examining the presence of such interrelationship either in a short period or over a long time. Again, most of the studies (e.g. Eun and Resnick, 1984; Roll, 1992; Serra, 2000; Brooks and Negro, 2002 & 2003.) that do address issue of explaining the causes of such interrelationships, concentrate on decomposing the stock returns into country and industry factors, setting aside the other economic variables that may drive stock market co-movements. Only the study made by *Serra* (2000) Pretorius (2001) discloses the presence of those variables in explaining stock market comovement.

All the studies [made by Becker at el. (1990), Cheung & Ng. (1992), Arshanapalli and Doukas (1993 & 1995), Masih and Masih (1997), Liu et al. (1998), Hsiao and Tu. (2000), Ratanapakorn and Sharma (2002), Collins and Biekpe (2003)] examining the effect of a crisis (either October 1987 crisis or 1997 Asian crisis) on stock market relationships used different approaches with respect to the division of sample period. A group of researchers simply split the total sample period into two, while others completely excluded the month or the week of the crisis itself. Since the exact beginning and the end of a crisis is normally undeterminable, there is no clear-cut rule on how to split a sample. Thus, all the results drawn from these studies are not robust with respect to the choice of how to incorporate the break period into the tests. In addition, a stock market crisis is not only the potential factor that can influence stock market interrelationships over time. There may be several other variables having a potential to influence the stock relationships over a long period. Thus by avoiding splitting of the sample period altogether, one can get around this pitfall by studying the evolution of the relationships over time.

When the market of various countries are heavily weighted towards some specific sectors or industry, then there is a possibility of having higher correlations with those markets that have a similar sector composition and therefore a similar cyclical relationship with global and local fundamentals. Thus some adjustment should make in the index composition with a view to achieve a more accurate measure of both integration and contagion. But such a step was not considered in the study of Collins & Bikepe (2003).

All the studies based on simple correlation are also suffered from a limitation. National stock market data may display substantial serial correlation that may cause an understatement of the true correlation between markets and lead to a conclusion that the markets are not integrated. Due to this statistical limitation, the degree of correlation, either high or low, in the rates of return may not imply about the international stock market linkages.

The cointegration approach to measure market integration can considered being a straight forward technique. This approach confirms cointegration among a set of series when there exists a long run equilibrium relationship between them. Stock market integration implies cointegration between prices in two given markets. If two price series are cointegrated, there exists an error-correction mechanism to explain the short run deviations of prices from their respective equilibrium values. That is why co-integration approaches as applied by Ammanulla and Kamaiah. (1995), Choudhury (1997), Hsiao and Tu (2000), Arshanapalli and Doukas (1995), Nath and Verma (2003), Mishra (2002)] clearly explain the long run dependence between prices of different markets without avoiding the possibilities of short run deviations.

Though Engel & Granger (1987) proposed several test statistics [applied by Smith et al. (1992), Arshanapalli and Doukas (1995), Ratnapakorn and Sharma (2002)] to measure the degree of market cointegration, these are suffered from various limitations. In case of more than two variables, their single approach can be misleading, particularly when more than one cointegrating relationship are present. In the context of a multiple cointegrating vectors, the Engel & Granger method may produce a complex

linear combination of all such vectors that can not be easily interpreted. However, the Johansen (1988) measure of co-integration, as applied by Choudhury (1997), Arshanapalli and Doukas (1995), Hsiao and Tu. (2000), Chang (2002), overcome the above limitations and can estimate as well as test the presence of multiple cointegrating vectors.

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5. CONCLUSION

The interdependence of emerging stock markets has serious implications for both investors as well as policy makers. Investors have increasingly turned to the emerging stock markets to achieve the benefits of international diversification, but the interdependence among those markets may have decline the scope of diversification possibilities. Moreover, the policy makers of most of the emerging countries are trying to open-up their economies, mainly their financial markets with the hope of achieving the benefits and prospect of an integrated world financial economy. It is therefore very crucial to test whether there is any comovement in the prices of two stock markets and if it is so, then what are the factors that influence the level of interdependence over time. The foregoing review reveals that the stock market of different countries is interdependent both within and across the country. Most of the studies confirm that when a security is listed in both developed and emerging stock markets, then the price of such security is mainly influenced by the shocks generated in the developed market. Though there are a number of studies to test the stock market integration, only a few of them revealed the genesis or the causes of such a behavior of stock markets. Again, though there is a continuous effort to conduct such a study in the developed countries, it is very rare in emerging, mainly Asian emerging countries like India. As already observed, stock markets of various countries though independent before some of the crisis (e.g. October 1987 crisis, 1997 Asian financial crisis etc., recent US subprime crises 2007) they become interdependent after the crisis.

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