Afro Asian Journal of Social Sciences
Volume 3, **No.** 3.1 **Quarter** I 2012
ISSN: 2229 - 5313

FINANCIAL MARKET INTEGRATION: EMPIRICAL EVIDENCE FROM INDIA AND SELECT SOUTH ASIAN COUNTRIES

AMALENDU BHUNIA
Reader in Commerce, Fakir Chand College, Kolkata, West Bengal, India

Abstract

This study examines the relation of the stock markets in India with some leading South Asian countries and also endeavours to communicate the impression whether Indian equity market is more proficient than the other south Asian markets as is popularly believed. Integrated financial market is assumed to be of immense significance as it constitutes an important vehicle for promoting domestic savings, investment and economic growth and fostering the necessary condition for a country's financial sector to emerge as an international financial center. Globalization, technological advancements and financial market integration have aggravated the challenges to emerging economies to grow at an extraordinary pace for promoting domestic savings, foreign capital inflows and economic growth. The study is based exclusively on secondary data obtained from various websites of Asian stock markets including yahoo finance and Bloomberg database. To explore these relationships we have used the daily stock indices from August, 2002 to August, 2011 by applying bivariate and multivariate co-integration tests and the Granger causality tests. The result shows both long-run and short-run association among the selected markets. The investors can reap benefit during short-run rather than in the long-run. It indicates that there are ample opportunities for the investors to broaden the horizons of their investments not only in Indian equity markets and also to the selected South Asian markets to reap the benefits of such diversification with risk reduction.

Keywords: Stock Markets, Stock Prices, South Asian Countries, Multivariate Co-integration, Granger Causality

1. Introduction

The developing countries have been transforming themselves into emerging economies by growing at an extraordinary pace while integrating rapidly to their regional and global markets due to globalization, new technological innovation and financial integration (Stiglitz, 2006). The existence of strong economic and trading links, major initiatives in liberalization activities by the governments, advancement in international trade and finance, rapid developments in telecommunication and trading systems and formation of common trading blocs such as NAFTA, European Union and ASEAN have added some more momentum to such integration. Integrated financial market is assumed to be of immense significance as it constitutes an important vehicle for promoting domestic savings, investment and economic growth (Mohan, 2004, 2005) and fostering the necessary condition for a country's financial sector to emerge as an international financial center (Reddy, 2003, 2006). The liberalization of financial markets also resulted in regional economic integration, greater co-movement in the stock prices and foreign investments. The recent global financial crisis has focused more attention on the linkages among the stock markets of Asian countries. India has made tremendous strides in the global economy since opening up of the economy and subsequent economic and political reforms. The outcome being integration of various segments of capital market, strengthening competition, financial deepening with innovative instruments, easing of restrictions of foreign capital flows, lowering transaction costs and enhancing liquidity.

This paper aims to examine the relationship of Indian market with the neighboring Asian markets. For this research event study methodology is applied and hence, the daily closing prices of both crude oil and equity indexes of each country's stock market (which act as a proxy for stock market performance) are considered. Section two briefly glances at the previous studies on stock market integration among the various equity markets in the world, the causes behind increasing stock market integration are discussed in section three. In section four, the data source and the methodology adopted are presented. The empirical results and inferences are discussed in section five and section six concludes the paper.

2. Previous Studies

Most of the literatures on integration of Asian stock markets have concentrated on the relationships using co-integration and vector regression models (Nath and Verma, 2003; Lamba, 2005; Raj and Dhal, 2008; Auzairy and Ahmed, 2009; Korajazyk, 1995; Chittedi, 2009; Wong, Agarwal and Du, 2005; Abas, 2009; Aktan, Mandaci, Kopurla and Ersener, 2009 and Chattopadhyay and Behera, 2008). Kumar (2002a, 2002b), in his study, confirmed that stock index of Indian stock market was not co-integrated with the developed markets. Mishra (2006) investigated the international integration of Indian stock market and found no long-run relationship between BSE and NASDAQ indices. Kroner and Ng (1998) also found no evidence of relationship among the Asian stock markets. However, correlation analyses signaled integrations among the markets in near future. Nath and Verma (2003) 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. They suggested that international investors could achieve long term gains by investing in the stock markets because of the independencies of these stock markets. Working in line with above researches, Narayan *et al* (2004) examined the dynamic linkages between the stock markets of Bangladesh, India, Pakistan and Sri Lanka using Granger causality approach. They observed unidirectional Granger causality running from stock prices in Pakistan to India, Sri Lanka to India and from Pakistan to Sri Lanka in the short run. Bangladesh was the most exogenous of the four markets. Gupta and Agarwal (2011) in their paper observed the correlation of Indian Stock market with five other major Asian economies: Japan, Hong Kong, Indonesia, Malaysia and Korea. A weak correlation concluded that the Indian stock markets had offer diversification benefits to institutional and international investors. According to Raj and Dhal (2003), India's stock markets were rather scarce despite various stylised facts suggesting, prima facie, the growing linkage of the Indian market with global and major regional markets in Asia during the reform period beginning in the early 1990s. The study applied correlation and the vector error correction and co-integration model (VECM) to gauge such integration of India's stock market with the United States, the United Kingdom and Japan, and with major regional markets such as Singapore and Hong Kong, the key financial centers in Asia. Ismail and Rahman (2009) investigated the relationship

between the US and four Asian emerging stock markets namely Hong Kong, India, South Korea and Malaysia using monthly data between 1996 and 2008. In order to identify the relationships, linear Vector Autoregressive (VAR) model and nonlinear Markov Switching Vector Autoregressive (MS-VAR) model were used. It was found that the two models had managed to explore the possibility of relationship between all the stock markets. Mallick (2006) used the dynamic conditional correlation (DCC) and multivariate GARCH model of Engle (1982) to measure the degree of co-movement of BSE and NASDAQ. Empirical findings confirmed that there had been a significant increase in the mean of correlation coefficient between the markets in the crisis periods compared to the pre-crisis period. This proved the existence of contagion between the US and Indian markets and urged to find the channels of the contagion effect. Bose (2005) identified that the Indian stock market did not function in relative isolation from the rest of Asia and the US as stock returns in India were highly correlated with returns in major Asian markets and was led by returns in the US, Japan, as well as other Asian markets during the post-Asian crisis and up to mid-2004. The degree of integration found between the Indian and other markets in the Asian region was, however, not of a very high order, consequently leaving sufficient room for portfolio diversification and not posing any immediate threat for capital outflows in case of regional crisis. The paper by Wong, Agarwal and Du (2005) empirically investigated the long-run equilibrium relationship and short-run dynamic linkage between the Indian stock market and the stock markets in major developed countries (United States, United Kingdom and Japan) after 1990 by examining the Granger causality relationship and the pair-wise, multiple and fractional co-integrations between the Indian stock market and the stock markets from these three developed markets. It was concluded that Indian stock market was integrated with mature markets and was susceptible to the dynamics in these markets in the long run. In a short run, however, both US and Japan, Granger had caused the Indian stock market but not vice versa. In addition, it was also observed that the Indian stock index and the mature stock indices had structured fractionally co-integrated relationship in the long run with a common fractional, non-stationary component and found that the Johansen method was the best to divulge their co-integration relationship. Chen, Lobo and Wong (2006) examined the relation between India-US, US-China and India-China based on Fractionally Integrated VECM to examine co-integration between them. By supplementing the model with a multivariate GARCH model, the study also observed the first and second spillover effects. The result

showed that all these pairs are fractionally co-integrated. The US market played a dominant role while there remained an interactive relationship between US and Chinese stock markets. Iqbal, Khalid and Rafiq (2011) attempted to find out dynamic relationship using Johansen (1988) and Juselius and Jones (1990) co-integration procedure for long run relationship and Granger Causality test based on Toda and Yamamoto (1995). No integration was found among US, Pakistan and India. However, the Granger Causality test showed the evidence of unidirectional causality running from NYSE to Bombay and Karachi stock exchange.

A significant number of studies on financial market integration related to the developed markets and its spillover effects to the developing economies have been undertaken. Only a few studies have examined the co-movement of Indian stock market with international markets in general and other Asian markets in particular. Based on some studies, it is found that the price behavior of Indian market is statistically indistinguishable from that of the US and UK markets and there is no evidence of systematic cyclical component or periodicity for these markets. Some conclude that the relationship of Indian market with international markets was poor throughout the entire seventies, but turned around significantly since early 1990s with liberalization measures initiated by the government. Given the newfound interest in the Indian stock markets, an intriguing question is how far India has gone down the road towards financial integration with its neighbouring countries. To answer this issue, we would examine the interrelationship between Indian stock markets (both Bombay stock exchange and National stock exchange) and the leading Asian markets. While China, Japan, Hong Kong and Singapore represent well-developed economies, Malaysia and Taiwan stand for developing economies and South Korea and Indonesia belong to less-developed economy.

3. Materials and Methods

3.1 Data Source

The study is based exclusively on secondary data obtained from various websites of Asian stock markets including yahoo finance and Bloomberg database.

3.2 Research Design

We have considered daily data (five days in a week) comprising the closing indexes of both SENSEX and NIFTY (India), SSE (China), KOSPI (South Korea), TSEC (Taiwan), HSI (Hong Kong), JSX (Indonesia), NIKKEI (Japan), FTSE (Malaysia) and STI (Singapore). The

sample period spans from August 12, 2002 to August 19, 2011. After matching daily closing indexes of all the selected equity exchanges, there are 2252 observations.

3.3 Tools Used

To study the long-term relationship among stock indices a common practice in the literature is to employ Johansen's co-integration method and the maximum Eigen value test. We have considered three specifications of the co-integrating equation to observe the long-term relationship. They are (a) the co-integrating equation that assumes no deterministic trend in the data: with intercept only, (b) the co-integrating equation that allows linear deterministic trend in the data: with intercept only and (c) the co-integrating equation that allows linear deterministic trend in the data: with both intercept and trend. The short-term relationship between is explored by using the Granger causality tests or the Error Correction Model (ECM) approach. Furthermore, to observe whether any diversification benefits are offered by the stock markets, the return correlations among the indices are taken into consideration.

3.4 Econometric Formula

Assessment of the dynamic relations between Indian stock market indices and the various stock indices of other selected Asian countries may be undertaken through the model suggested either by Engle (1982) or Granger (1986, 1988) or Johansen and Juselius (1990) protocols. While Engle and Granger's (1987) two-step ECM may be used in a multivariate context, the Johansen's (1988, 1991) Vector Error Correction Model (VECM) yields more efficient estimators of co-integrating vector as the model is regarded as full information maximum likelihood estimation model, which allows to test co-integration in a whole system of equation in one step without requiring a specific variable to be normalized. This allows researchers to avoid carrying over the errors from the first to the second step, unlike the case of Engle and Granger methodology. It also allows the avoidance of a priori of assumptions of endogenity or exogeniety of variables. Now the VECM is in the form of:

$$\Delta zt = \Gamma 1\Sigma\ \Delta zt\text{-}1 + \ldots + \Gamma k\text{-}1\ \Delta zt\text{-}k+1 + \Pi zt\text{-}k + \mu t \qquad (1)$$

Where, Δ denotes first difference, $\Gamma i = -(I - A1 - \ldots - Ai)$, $(I = 1, \ldots, k-1)$, and $\Pi = -(I - A1 - \ldots - Ak)$. The short and long-run adjustments to z is specified by the estimates of Γi and Π. $\Pi = \alpha\ \beta\square$, where α is the speed of adjustment to disequilibrium and β is the matrix of long-run coefficients that represents up to n-1 co-integration relationship and ensures that z_ts converge

to their long-run steady state. This is to ensure that the variables are stationary and that shocks are only temporary and will dissipate and revert to their long-run mean. The tests for stationarity or unit roots employ the augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) (1988) test performed on the variables in levels and first differences. Co-integration requires to prove that all the variables be integrated of the same order. To test the presence of unit roots, we have used the ADF test which considers the null hypothesis of H_0: □= 0.

This represents,

$$p\Delta yt = a0 + \square yt\text{-}1 + \square\square i\ \Delta yt\text{-}i\text{+}1 + \square t \qquad (2)$$

The ADF test assumes the asymptotic normality of the idiosyncratic error term, □**t**, in (2).

The choice of lag-lengths may be decided using likelihood ratio test. Determining the appropriate lag length is important as too many lags reduce the power of the test due to estimation of additional parameters and a loss of degrees of freedom. In contrast, too few lags may not capture the dynamics of the actual error correction process, resulting in poor estimate of g and its standard errors. In this paper the multivariate forms of the Akaike information criterion (AIC) and the Schwartz Bayesian criterion (SBC) are employed to determine lag lengths. The model selection criteria are developed considering maximum likelihood estimation techniques, where:

AIC = T ln (residual sum of squares) + 2n and

SBC = T ln (residual sum of squares) + n ln (T)

To minimize the AIC and SBC, we have minimized the natural logarithm of the residual sum of squares adjusted for sample size, n, and the number of parameters included, T. It is observed by testing the null hypothesis that there are at most r co-integration vectors and thus (n-r) unit roots, i.e.

H0: λi= 0 where i= r+1,...…

The λ test statistics may be represented as,

$$n\ \lambda trace = -T \sum \log (1\text{-}li) \quad r=0, 1, 2, \ldots, n\text{-}2, n\text{-}1 \qquad (3)$$

The choice of the number of maximum co-integrating relationships is based on the λtrace test to examine the specific hypotheses. We have rejected models where π has full rank, as in such a situation, z_t is stationary and has no unit root and so there is no error correction.

4. Empirical Results

To perceive diversification benefits as are offered by the South Asian stock markets including India we have first computed the correlation coefficients of the stock market indices. The following table shows the correlation matrix.

Table-1: Correlation Matrix

	NIFTY	SENSEX	SSE	KOSPI	TSEC	HSI	JSX	NIKKEI	FTSE	STI
NIFTY	1.00									
SENSEX	0.78**	1.00								
SSE	0.55**	0.97**	1.00							
KOSPI	0.70**	0.86**	0.70**	1.00						
TSEC	0.54**	0.95**	0.67**	0.90**	1.00					
HIS	0.69**	0.95**	0.82**	0.94**	0.90**	1.00				
JSX	0.77**	0.95**	0.65**	0.94**	0.83**	0.87**	1.00			
NIKKEI	-0.13**	0.22**	0.13**	0.30**	0.46**	0.36**	0.07**	1.00		
FTSE	0.70**	0.95**	0.71**	0.97**	0.91**	0.93**	0.96**	0.22**	1.00	
STI	0.57**	0.89**	0.72**	0.91**	0.92**	0.95**	0.81**	0.53**	0.91**	1.00

** Correlation is significant at 1% level

Table 1 identifies that the correlation coefficients between the Indian stock markets and the selected South Asian markets are low and in some cases negative. This means, investment in these selected markets may reap diversification benefits (with low portfolio risks) to the investors.

Prior to testing co-integration relationship, unit root tests are performed for each of the selected indices in determining the order of integration among them by applying the Augmented Dickey-Fuller test (1979,1981) and the Phillips-Perron test, with or without deterministic trend. The Dickey–Fuller test, fitting the regression model by ordinary least squares (OLS), is represented by:

$$\Delta yt = \rho yt-1 + (\text{constant, time trend}) + ut \quad (4)$$

It is, however, apprehended that serial correlation may lead to some problems. To defend against such, the augmented Dickey-Fuller test's regression includes lags of the first differences of yt. The Phillips-Perron (PP) test, after acknowledging the augmented Dickey-Fuller test, has evolved the following equation:

$$yt = \pi yt-1 + (\text{constant, time trend}) + ut \quad (5)$$

In (4) ut is I(0) and may be heteroskedastic. The PP tests take into account robust to serial correlation and heteroskedasticity in the errors ut non-parametrically by modifying the Dickey-Fuller test statistics with Newey-West (1987) heteroskedasticity- and autocorrelation-consistent covariance matrix estimator.

Under the null hypothesis that $\rho = 0$, the PP Zt and $Z\pi$ statistics have the same asymptotic distributions as the ADF t-statistic and normalized bias statistics. One advantage of the PP tests over the ADF tests is that the former consider robust to general forms of heteroskedasticity in the error term ut. The other advantage is that the user does not have to specify a lag length for the test regression.

The study has not dealt with it, but the Dickey Fuller test produces two test statistics: a) the normalized bias T ($\pi - 1$) has a well defined limiting distribution that does not depend on nuisance parameters and b) it can also be used as a test statistic for the null hypothesis H_0: $\pi = 1$. This is the second test from DF and relates to $Z\pi$ in PP test. Both these tests are performed at both the levels and on the first differences of the stock indices. Table 2 shows the results of these tests. The results of the unit root tests indicate that all the series are integrated of order one (i.e., they are I (1).

Table-2: Unit Root Test

Series	ADF test		P-P test	
	Constant	Constant + Trend	Constant	Constant + Trend
Level				
Nifty	-1.45 (0)	-0.97 (0)	-1.51	-1.34
Sensex	-1.37 (1)	-1.22 (1)	-1.39	-1.27
SSE	-1.09 (0)	-1.43 (0)	-1.14	-1.88
KOSPI	-0.89 (1)	-1.73 (1)	-0.94	-1.98
TSEC	0.81 (3)	-1.45 (3)	0.99	-1.15
HIS	-1.62 (2)	-1.62 (2)	-1.84	-1.47
JSX	-1.14 (1)	-4.03 (0)	-1.35	-3.96
Nikkei	-1.02 (0)	-3.85 (0)	-1.21	-3.32
FTSE	-1.61 (0)	-3.64 (0)**	-0.83	-3.72 **
STI	-1.07 (0)	-1.92 (0)	-2.07	-2.19
Difference				
Nifty	-18.37 (0)*	-19.04 (0)*	-18.51*	-19.34 *
Sensex	-11.93 (0)*	-11.29 (1)*	-12.39 *	-12.27*
SSE	-14.51 (0)*	-14.53 (0)*	-14.52*	-15.67 (0)*
KOSPI	-12.84 (0)*	-12.86 (0)*	-13.94*	-13.84 *
TSEC	-7.24 (2)*	-7.45 (3)*	-7.84*	-8.11 *
HIS	-6.12 (1)*	-8.62 (0)*	-13.47*	-13.27 *
JSX	-19.14 (0)*	-19.83 (0)*	-18.34*	-17.60 *
Nikkei	-17.47 (0)*	-17.85 (0)*	-18.54*	-18.97 *
FTSE	-15.76 (0)*	-15.64 (0)*	-16.14 *	-17.12 *
STI	-15.54 (0)*	-15.29 (0)*	-15.34 *	-15.57 *

Figures in parenthesis are the lag order in the ADF equation that was selected based on the Schwartz Criterion.

* Significant at 1% level of significance.

**Significant at 1% level of significance.

Next we have looked into whether the Indian stock markets are pair-wise co-integrated with each other and also with the South Asian markets. As mentioned earlier, we have exercised Johansen co-integration approach to test the interdependence among these markets. Table 3

identifies the results of the pair-wise co-integration tests and also reveals that both Sensex and Nifty do not have any long-run association with each other and these markets certainly do not share common stochastic trend with the selected Asian markets. For some markets, the long-run relationship is found dubious as the results of the co-integration tests are dependent on the specifications of the co-integrating equation and/or on the method used (trace vs. maximum Eigen value method) and/or on the number of lags included in the co-integration equation.

Table-3: Pair-wise Co-integration Test

	Nifty	Sensex	SSE	KOSPI	TSEC	HSI	JSX	Nikkei	FTSE	STI
Nifty	-	?	No	No	No	?	No	No	No	No
Sensex		-	No	No	?	Yes	No	?	No	No
SSE	No	No	-	No	No	No	No	No	No	No
KOSPI	No	No	No	-	No	No	No	No	No	No
TSEC	No	?	No	No	-	No	?	?	?	?
HIS	?	Yes	No	No	No	-	No	No	No	No
JSX	No	No	No	No	?	No	-	No	No	No
Nikkei	No	?	No	No	?	No	No	-	?	?
FTSE	No	No	No	No	?	No	No	?	-	?
STI	No	No	No	No	?	No	No	?	?	-

* (?) indicates that the results of the co-integration are not robust. The results depend upon the co-integration equation used and/or on the test method employed and/or on the number of lags included in the co- integration equation

The results of the multivariate co-integration tests are found not robust and are also dependent on the choice of the model or on the method employed or on the number of lags included in the co-integrating equation as well as on the sample period considered.

Table 4 shows the short-term association among the selected Asian equity markets based on the Granger causality tests. The result reveals presence of short-run associations among them. However, it is observed that none of the South Asian markets has any control over each other, i.e, none of the South Asian markets leads the Indian stock market nor they are being influenced by Indian stock market.

Table-4: Short-run association based on Granger causality tests

	Nifty	Sensex	SSE	KOSPI	TSEC	HSI	JSX	Nikkei	FTSE	STI
Nifty	-	Yes	Yes	No	No	Yes	No	No	No	No
Sensex	No	-	Yes	Yes	Yes	No	No	No	No	No
SSE	No	No	-	No	No	No	No	No	No	No
KOSPI	No	No	No	-	No	Yes	No	No	No	No
TSEC	No	No	No	Yes	-	Yes	No	No	No	No
HIS	Yes	Yes	No	No	No	-	No	No	No	No
JSX	No	No	No	No	No	No	-	No	No	No
Nikkei	No	No	No	No	No	No	No	-	No	No
FTSE	No	No	No	No	No	No	No	No	-	No
STI	No	No	No	No	No	No	No	No	No	-

These results are obtained at the 5% level of significance and using 4 lags

Conclusion

The study makes an approach to examine whether there is any inter-linking between the Indian stock markets with the leading stock markets of the South Asian countries. We have employed daily data from 2002 to 2011to explore the long-term association among them. We have applied the Johansen co-integration approach to identify the long-run association and to observe the short-term association the Granger causality tests were taken into consideration. Our findings suggest that:

- There are ample opportunities for the investors to broaden the horizons of their investments not only in Indian equity markets and also to the selected South Asian markets to reap the benefits of such diversification with risk reduction.
- Investors can gain from the short-run association that exists among the Asian stock markets.
- Authorities of South Asian countries may have little worries in respect to the market crash in this region as there remains a modest long-run association among the countries equity markets.

- International investors can also diversify their portfolio by investing in South Asian countries.

In future we will venture to conduct other co-integration tests (other than Johansen tests) to see whether the above results show robustness and employ other approaches, e.g., impulse response, variance decomposition, principal component method etc. to examine both the long-term and short-term associations of the equity markets.

References

Abas, M. (2009). Analysis of Stock Market Linkages: Chinese, Indian and Major Markets. *Unupublished Dissertation*.

Akin, C. and Kose, M. A. (2007). Changing Nature of North-South Linkages: Stylised Facts and Explanations. *IMF Working Papers.* No 07/280.

Aktan, B., Mandaci, P. V., Kopurla. B. S. and Ersener. B. (2009). Behaviour of Emerging Stock Markets in the Global Financial Meltdown: Evidence from BRIC-A. *African Journal of Business Management.* Vol. 3 (9).

Auzairy, N. A. and Ahmed. R. (2009). The Impact of Subsequent Stock Market Liberalization on the Integration of Stock Market in ASEAN-4+South Korea, *World Academy of Science Engineering and Technology*. 58.

Bose, S. (2005). Securities Market Regulations: Lessons from US and Indian Experience. *The ICRA Bulletin. Money & Finance*. Vol. 2. No. 20-21.

Chattopadhyay, S. and Behera. S. K. (2008). Financial Integration for Indian Stock Market. *Working Paper*. 12th Annual Conference on Money and Finance in the Indian Economy.

Chen, H., Lobo, J. B. and Wong, W-K. (2006). Links between the Indian, US and Chinese Stock Markets. *Working Paper No. 0602*.

Chittedi, K.R. (2009). Global Stock Markets Development and Integration: with Special Reference to BRIC Countries. *Unpublished*.

Dickey, D. and Fuller, W. (1979). Distribution of the Estimates for Autoregressive Time Series with a Unit Root. *Journal of American Statistical Association.* 74.

Dickey, D. and Fuller, W. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica*. *49*.

Engle, R. F. (1982). Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation. *Econometrica*. Vol. 50.

Engle, R. F. and Granger, C. W. J. (1987). Co-Integration, Error Correction: Representation, Estimation and Testing. *Econometrica*. Vol. 55(2).

Giannetti, M., Guiso, L. J., Padula. T. and Pagano, M. (2002). Financial Market Integration, Corporate Financing and Economic Growth. *European Economy*. Economic Papers #179.

Granger, C. W. J. (1986). Developments in the Study of Cointegrated Economic Variables. *Oxford Bulletin of Economics and Statistics.* Vol 48.

Granger, C. W. J. (1988). Some Recent Developments in a Concept of Causality. *Journal of Econometrics.V*ol 39 (1/2).

Gupta, N. and Agarwal,V. (2011). Comparative Study of Distribution of Indian Stock Market with Other Asian Markets. *International Journal of Enterprise Computing and Business Systems.* Vol. 1 Issue 2.

Ismail, M. T. and Rahman, R. A. (2009). Modelling the Relationships between US and Selected Asian Stock Markets, *World Applied Sciences Journal.* 7 (11).

Iqbal, A., Khalid. N. and Rafiq. S. (2011). Dynamic Interrelationship among the Stock Markets of India, Pakistan and United States. *International Journal of Human and Social Sciences.* 6:1 2011.

Johansen, S. (1988). Statistical Analysis of Cointegrating Vectors. *Journal of Economic Dynamic and Control.* Vol. 12.

Johansen, S. (1991). Estimation and Hypothesis Testing of Cointegrating Vectors in Gaussian Vector Autoregressive Models. *Econometrica*. Vol. 59.

Korajczyk, A. R. (1995). Stock Market Integration for Developed and Emerging Markets. *The World Bank Policy Research Department. Policy Research World Paper* No. 1482

Kose, M. A., Prasad, E., Rogoff, K. and Shang-Jin Wei. (2006). Financial Globalisation: A Reappraisal. *IMF Working Papers.* No. 06/189.

Kose, M. A, Otrok, C. and Prasad, E. S.(2006). Regionalization vs. Globalization: Explaining North-South Business Cycles. IMF Working Paper.

Kose, M. A., Otrok, C. and Prasad, E. S. 2006a. How Do Trade and Financial Integration Affect the Relationship Between Growth and Volatility? *Journal of International Economics.* Vol. 69.

Kroner, K. and Ng, V. (1998). Modeling Asymmetric Comovements of Asset Returns. *Review of Financial Studies. 11*.

Kumar, N. (2002a). Towards an Asian Economic Community- Vision of Closer Economic Cooperation in Asia: An Overview. *Research and Information System for Non-Aligned and other Developing countries (RIS).* Discussion Paper 32. New Delhi.

Kumar, N. (2002b). Towards an Asian Economic Community: The Relevance of India. *Research and Information System for Non-Aligned and other Developing countries (RIS)*. Discussion Paper 34. New Delhi.

Lamba, A.S. (2005). An Analysis of the Short- and Long-Run Relationships between South Asian and Developed Equity Markets, *International Journal of Business*, Vol. 10(4).

Mallik, G. (2006). Has the Stock Market Integration between the Asian and OECD Countries Improved after the Asian Crisis? Frontiers in Finance and Economics. Vol. 3(2).

Markowitz, H. and Tobin, J. (1952) Portfolio Selection. *Journal of Finance.* 7.

Mishra, D. (2006). Financing India's Rapid Growth and its Implications for the Global Economy. Mimeo, World Bank.

Mohan, R. (2004). Financial Sector Reforms in India: Policies and Performance Analysis. *RBI Bulletin.* October.

Mohan, R. (2005). Globalisation, Financial Markets and the Operation of Monetary Policy in India. *BIS Papers. N*o 23. Basel. May.

Narayan, P., Smyth, R. and Nandha, M. (2004). Interdependence and Dynamic Linkages between the Emerging Stock Markets of South Asia. *Accounting and Finance. V*ol. 44(3).

Nath, G. C and Verma, S. (2003). Study of Common Stochastic Trend and Co-integration in the Emerging Markets: A Case Study of India, Singapore and Taiwan. *Research paper. NSE-India.*

Phillips, P. C. B. and Perron, P. (1988). Testing for a Unit Root in Time Series Regression. *Biometrika*. Vol. 75. No. 2.

Raj, J. and Dhal, S. (2008). Integration of India's Stock Market with Global and Major Regional Markets. *BIS Papers.* No. 42.

Reddy, Y. V. (2003). The Global Economy and Financial Markets: Outlook, Risks and Policy Responses. *RBI Bulletin.* October.

Reddy, Y. V. (2006). Reforming India's Financial Sector: Changing Dimensions and Emerging Issues. *RBI Bulletin*. June.

Stiglitz, J. (2006). Making Globalization Work, *W W Norton.*

Toda, H.Y. and Yamamoto. (1995). Statistical Inference in Vector Autoregressions with Possibly Integrated Processes. *Journal of Econometrics*, 66.

Trichet. J-C. 2005. The Process of European Financial Integration: Where Do We Stand? Speech delivered at WHU Otto Beisheim School of Management. Vallendar. 13 January.

Wong, W-K., Agarwal, A. and Du, J. (2005). Financial Integration for Indian Stock Market: A Fractional Cointegration Approach. *Working Paper No. 0501*. Department of Economics, National University of Singapore.