Global Stock Markets Development and Integration: with Special Reference to BRIC Countries

Chittedi, Krishna Reddy
Centre for Development Studies –JNU, Trivandrum, Kerala

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Krishna Reddy Chittedi
Doctoral Scholar,
Centre for Development Studies –JNU
Prashanth Nagar, Ullor
Trivandrum, Kerala, India
Email: krishnareddy5111@gmail.com, krishna08d@cds.ac.in
Web page: http://people.cds.ac.in/krishna08d

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Abstract

In a country like India where the stock market is undergoing significant transformation with liberalization measures, and the analysis of the nature of integration with other developed and emerging markets would not only give an idea of the possible gains to be reaped out of portfolio diversification from Indian market, but may also provide some indication of the vulnerability of the country's stock market in case of a regional financial crisis and consequent reversal of capital flows from the region. In the context the study examined the integration of the stock market among the BRIC (Brazil, Russia, India and China) economies in general and their integration with the developed countries stock markets such as US, UK and Japan, which can be analyzed by using the Granger causality, Johansen co integration and Error correction Mechanism methodology, based on daily data for the period January1998- Aug 2009. The results of co integration shows co integration relationship found between BRIC countries and Developed countries namely USA, UK and Japan. The results of Error correction model reveal that Sensex, Nikki225, moscowtimes, FTSE 100, and Bovespa are significant. It implies that these markets share the forces of short run adjustment to long run equilibrium.

Keywords: Stock Market integration, Johansen Julius co integration test, ECM, Engel Granger Casualty test, emerging countries, developed countries

JEL Classification: F30, G15

Introduction

The global growth of stock markets and the emerging market boom have attracted the attention of academics, practitioners, and policy makers. A number of countries, including India and China, are reforming regulations and laws to foster stock market development and attract foreign portfolio flows. The speed and extent of stock market development in developing countries have been unprecedented and have led to fundamental shift both in the financial structures of less developed countries and in the capital flows from developed nations. India has the distinction of having the second largest number of listed companies after the USA. As per Standard and Poor's Fact Book 2007, India ranked 8th in terms of market capitalization and 15th in terms of turnover ratio as of December 2007. India posted a turnover ratio of 84% at end 2007. Recent research on stock market development shows that modern communications technology and increased financial integration have resulted in more cross-border capital flows, a stronger presence of financial firms around the world, and the migration of stock exchange activities to international exchanges. Many firms in emerging markets now cross-list on international exchanges, which provides them with lower cost capital and more liquidity-traded shares. However, this also means that exchanges in emerging markets may not have enough financial activity to sustain them, putting pressure on them to rethink their operations. One of the most enduring debates in finance during the last decade is whether stock market integration causes economic growth or whether increased economic growth is a consequence of financial development. This issue had been extensively studied nearly three decades ago by Shaw (1973) and McKinnon (1973), who resulted in significant evidence that financial development promotes economic growth, mainly through a raise in the level of saving and investment.

In a country like India where the stock market is undergoing significant transformation with liberalization measures, and the analysis of the nature of integration with other developed and emerging markets would not only give an idea of the possible gains to be reaped out of portfolio diversification from Indian market, but may also provide some indication of the vulnerability of the country's stock market in case of a regional financial crisis and consequent reversal of capital flows from the region. The globalization of financial systems and the acceleration of information transmission have increased the risk of financial crises, as a crisis in one country can spread to other countries and bring about worldwide crises. However, in recent times, with the growing activities of foreign portfolio investors who track international indices and continuously move funds between

markets, as well as further linkages with foreign markets through the route of ADR/GDR issues and other channels, correlation between Indian and global stock markets has increased significantly warranting a detailed in depth study.

The contribution of stock markets to economic growth

There is a lot of discussion about the relation of the stock markets and the economic growth of a country. The main reasons for this phenomenon are that stock exchanges:

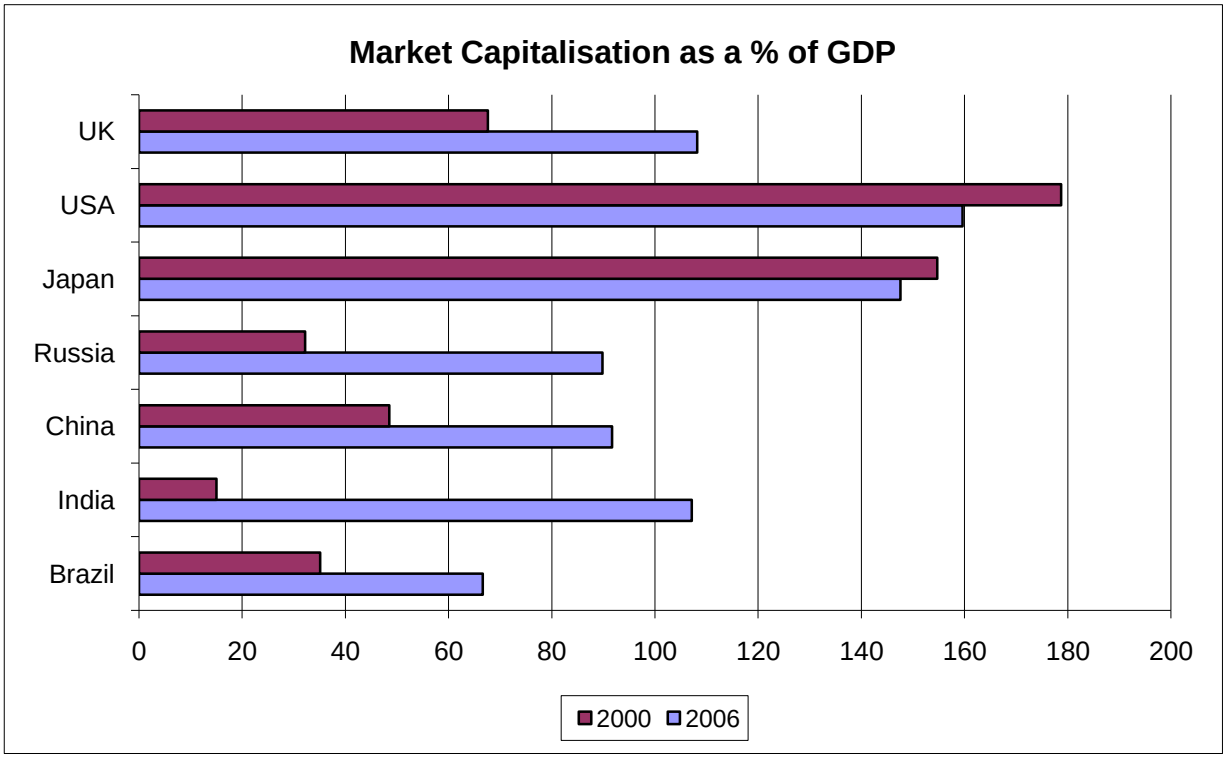
- Increase liquidity and constitutes a mechanism for diversification of risk (risk management device), therefore making market participants more prone to invest.
- Improve the flow of information about activities of companies, which results to the improvement of corporate control and eventually to better corporate governance. In other words, the organizational and managerial structure of the corporations becomes more effective.

Give the possibility to society's savings to direct to alternative investment ways that are more productive. Existence of an exchange increases the stock of funding available for riskier investment projects prerequisite to economic growth. In general, it can be said that stock markets contribute to both capital accumulation and technological innovation. It is very interesting to see stock market development in emerging countries.

Stock Market Development in Emerging Markets

As economies grow and stock markets develop more, further development of stock markets leads to a relative increase of equity financing in the economy. In other words, given that stock market development depends on growth, the bank debt/equity ratio in the economy tends to increase at low levels of capital accumulation and to decrease only when stock markets have reached a reasonable size. The market capitalization of all listed companies taken together on all markets stood at US $ 64.56 trillion in 2007 up from US $ 53.38 trillion in 2006. The share of US in worldwide market capitalization decreased from 36.39 % as at end-2006 to 30.90 % at end 2007, while Indian listed companies accounted for 2.82% of total market capitalization as at end 2007 (an increase from 1.53% at end of 2006). In 2007, United States reported the highest market capitalisation of US $ 19,947,284 million followed by China at US$ 6,226,305 million and Japan at US $4,453,475 million. Among the top 20 countries by Market Capitalisation, 22 were from the developed markets while the other 18 were from the emerging market economies. India ranked 8th in the world with the market capitalization of US $ 1,819,101 million.

Figure 1



Source: Indian Securities Market Review, 2008

The securities market facilitates the internationalization of an economy by linking it with the rest of the world. This linkage assists through the inflow of capital in the form of portfolio investment. Moreover, a strong domestic stock market performance forms the basis for well performing domestic corporate to raise capital in the international market. This implies that the domestic economy is opened up to international competitive pressures, which help to raise efficiency. It is also very likely that existence of a domestic securities market will deter capital outflow by providing attractive investment opportunities within domestic economy.

Table 1
Market Capitalization, Market liquidity, Turnover and Listed Domestic companies for Major Markets

Country	Market Capitalisation				Market liquidity		Turn over ratio		Listed Domestic companies Numbers	
	Millions		% of GDP		Value of shares traded as a % of GDP		Value of shares traded as a % of market capitalisation			
	2000	2007	2000	2006	2000	2006	2000	2007	2000	2007
Brazil	226,152	1,370,377	35.1	66.6	15.7	23.8	43.5	56.2	459	442
Russia	38,922	1,503,011	15.0	107.1	7.8	52.1	36.9	63.9	249	328
China	580,991	6,226,305	48.5	91.7	60.2	61.8	158.3	197.5	1,806	1,530
India	148,064	1,819,101	32.2	89.8	110.8	70.0	133.6	95.9	5,937	4,887
USA	15, 104,307	19,425, 855	154.7	147.6	326.3	252.7	200.8	182.8	7, 524	5,133
UK	2,576,9992	3,794,310	178.7	159.6	127.2	178.5	66.6	123.8	1,904	2,913
Japan	3,157,222	4,726,269	67.6	108.2	57.7	143.1	69.9	132.1	2,561	3,362

Source: World development Indicators 2008

A simple measure of a stock market's size is the total value of all the shares in the market at each point in time (market capitalization) or the average of this value over a period. Market size is important because the level of savings mobilization and risk diversification depend strongly on this indicator. Of course, a measure of a stock market's size needs to take into account the dimension of the economic system overall. For this reason, the typical measurement employed in empirical analyses is the ratio of market capitalization to gross domestic product (GDP) (market capitalization/GDP). The number of listed companies in the stock exchange can also measure stock market size in each period. Although market size is an important indicator of stock market development, this measurement by itself does not capture all the relevant features of a financial markets' development.

Stock exchanges should be harmonised with the international rules and regulations. The current trend is the globalisation of stock exchanges either in terms of alliances or of electronic links between them. The liberation of capital movement is also an important factor for future development of the financial markets. They should focus in a specific client target group either institutional or retail investors. Thus, it is very important to adopt the right strategy and formulate the appropriate rules in order to attract the targets investors' group. Also, stock exchanges should establish sound supervisory structures, like, for example, clearness and transparency.

Benefits and Costs of market integration

Theoretically, the integration of capital markets is ideal and preferable to segmentation, although there are reservations concerning the feasibility of full-scale integration (Dornbusch, 1988). Several arguments are presented for the desirability of international stock market integration. Based on competitive auction-model, Akdogan (1995) pointed out that in case of no barriers to capital movement, stock market integration leads to a more efficient allocation of the world's resources, and capital will seek higher returns to investment, moving from capital market where capital is relatively abundant to another where capital is relatively scarce. These characteristics of capital markets enable the competitive auction-model to function more effectively to economically equilibrate the markets.

1. In case of integration among all stock markets, the systematic risk (market risk) becomes an unsystematic risk (firm-specific risk), and this kind of risk can be diversified or eliminated away by including the security as part of diversifiable portfolio.
2. It has been argued that corporate financial strategies depend on whether international stock markets are integrated or not. In case of integrated market, all firms can raise their capital with lower costs than firms do in a segmented market. Also capital budgeting decisions for firms normally depends on their exposure to international capital that is the marginal cost of capital of a firm that uses international sources is lower than the marginal cost of capital of firm that uses only domestic sources.

Generally, any potential gain from the international diversification of a portfolio is inversely related to the extent of stock market integration. A low correlation between returns of national and overseas indices allows investors to minimize portfolio risk through international diversification. Thus, an analysis of the long-run co-movement of national stock prices with that of overseas stock prices and the short-run temporal relationship between the two is important for managing an international portfolio. Additionally, interdependent international stock prices reflect economic integration in the form of trade linkages and foreign direct investment. Co movement of underlying macroeconomic variables across nations may lead to co-movement of stock prices.

However, integration, regional or global, is not without its costs. In a world with imperfect capital markets, financial integration can heighten a country's vulnerability to macroeconomic and financial crisis. In particular, contagion and reversals in capital flows can result in higher output volatility and

even lower average growth for a certain periods. Regional integration might be even more costly if sudden stops are more frequent within a region than globally.

Evidence about the link between financial integration and volatility is inconclusive (Rogoff et al 2006). What seems clear is that countries with well-developed financial systems are less vulnerable to crisis, but it is also true that financially developed countries are usually financially integrated with rest of the world (Lane and Mislesi- ferretti 2006). More specifically, vulnerability is especially high if certain institutions and polices are not in place before a country liberalizes its financial system (Demirguc-kunt and Detragiache 1999). The string of international financial crises in the 1990's demonstrated that eliminating barriers to the international movement of certain types of financial capital might induce volatility if countries do not have strong institutions and sound macroeconomic polices. Some have also suggested that minimizing the risks of nitration requires the existence of well functioning domestic financial markets (Alfaro et al 2005).

The rest of the paper is arranged as follows: section 2 gives a brief review of existing literature relevant with this study. Section 3 the results of the empirical exercise. Section 4 concludes with a summary of the results.

Review of Literature

In this chapter an attempt is made to present a review of select and recent studies relating to India and outside, that are relevant to studies, the present topic.

Amanulla and Kamaiah (1995) conducted a study to examine the Indian stock market efficiency by using Ravallion co integration and error correction market integration approaches. The data used are the RBI monthly aggregate share indices relating to five regional stock exchanges in India, viz Bombay, Calcutta, Madras, Delhi, Ahmedabad during 1980-1983. The study revealed a long-run equilibrium relation between the price indices of five stock exchanges and error correction models indicated short run deviation between the five regional stock exchanges. The study found that there is no evidence in favour of market efficiency of Bombay, Madras, and Calcutta stock exchanges while contrary evidence is found in case of Delhi and Ahmedabad.

Karajazyk (1995) found that the measure of market segmentation tends to be much larger for emerging markets than for developed markets, which flows into or out of the emerging markets. The measure tends to decrease over time, which is consistent with growing levels of integration. Large values of adjusted mis-pricing occur around periods in which capital controls change significantly. Finally, he found asymmetric integration relationship; stock markets of developed nations are more integrated than those of emerging nations.

Janakiramanan and Lamba (1998) analyze the dynamic relationship between daily returns of eight Pacific-Basin countries (Australia, Hong Kong, Japan, New Zealand, Singapore, Indonesia, Malaysia, and Thailand) and the US over the period 1988-1996. The study uses vector autoregression (VAR), The results exhibit a US influence on all other markets except for Indonesia, and when the study excluded the US market from the VAR system it finds linkages between these markets, which in turn and according to the study, are traced to the indirect influence of the US market. Also the study finds a significant mutual influence between the markets that are geographically and economically close to each other.

Ayuso and Blanco (1999) shown that during the 1990's the linkages between national stock exchanges seem to have increased. Not only as the weight of foreign assets in agents' portfolio increased but also have the correlation between stock indices and the ability of each market return to explain the behavior of returns on other markets.

Scheicher (2001) studies the regional and global integration of stock markets in Hungary, Poland and the Czech Republic and finds evidence of limited interaction: in returns, both regional and global shocks are identified, but innovations to volatility exhibit a chiefly regional character. The markets exhibit low correlations with international markets as well.

Chittedi (2007) Granger causality test results show that The US, Japan and France markets influences Indian stock market. The UK and Australian markets have not influence the India. Similarly, in case of UK, Japan and France, short run changes in the stock markets have a positive impact on short-run changes in Indian stock market. In the case of the US, stock market has shown negative impact on short run changes in Indian stock market. Though the results of the study are some what mixed, the

weight of evidence indicates that the stock market in India moves closely with the markets of the developed countries.

Based on these theoretical postulates, financial integration at the empirical level is studied using several de jure and de facto measures, although the latter, reflecting the actual degree of market linkages, have been more popular (Prasad et al (2006), Yu et al (2007)). 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) and, subsequently, Masih and Masih (2001), Chowdhry (1997) and Chowdhry et al (2007), among several others in the applied finance literature, have used the co integration 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)). 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 co integration 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 co integration 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)). Some of the studies investigated the relationship between international integration and economic growth (Edison, klien et al. 2002, Edison, Levine et al. 2002; vo 2005a) Obstfeld and Taylor (2001) provide a historical review of financial integration and capital markets. Adam et al. (2002) investigated the capital market integration in the European Union. Prasad et al. (2003) offer evidence on the effects of financial international integration on developing countries

The review reveals that the stock markets of different countries are both within and across the country. Most of the studies confirm that when a security listed in both developed and emerging stock markets, the price of such a 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 very few of them revealed the genesis or 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 the emerging countries like India and so far no study especially on BRIC markets.

Objective:

Given the background of the study, the main objective of this study is to examine stock market integration among the emerging and developed countries. To attain this purpose, the study has set the following specific objective:

i) To examine the integration of the stock market among the BRIC (Brazil, Russia, India and China) nations in general and their integration with the developed countries stock markets such as US, UK and Japan.

Nature and Source of Data

The study comprises daily stock market indices at closing times as collected from the **www.econstats.com** and the validity of the data was checked from respective stock exchange websites. Accordingly, our data series consist of the daily index values of the, NASDAQ, FTSE-100, NIKKEI-225, Bovespa, Moscowtimes, Sensex and Shanghai for US, UK, Japan, Brazil, Russia, India and China respectively. The period of study is based on the collected data series 1998 -2008.

Section III

Empirical results and Analysis:

To examine the stationary property of all the variables used in our study, we have carried out the ADF, PP and KPSS unit roots. All the tests have been conducted both with intercept and with intercept and trend, without intercept. Stock market integration between India and other BRIC countries and developed countries (US, UK, and Japan,) is explained here with the help of co-integration techniques. Hence, it is a necessary condition that the variables that appear in the stock market integration should not be integrated of order zero i.e. (I (0). At the same time, it should be of the same order as variables of same order only can co-integrate each other.

Unit Root Tests: Discussion of results

Table 1 to 2 carry the required statistics of ADF, PP and KPSS tests for the variables on both levels and first differences. Log values of the variables are used in this study. Stock market indices, when measured in levels are not stationary as the value of the test statistics i.e. ADF, PP and KPSS are not significant. But when these variables are measured in first differences, it is evident that both DF and ADF statistics are negative and statistically significant at 1 % level.

Table 1.1: Unit Root Statistics: Level

Variables	Augmented Dickey-Fuller Test			Phillips-Perron Test		
	With Intercept	With Intercept and Trend	Without Intercept and Trend	With Intercept	Without Intercept and Trend	Without Intercept and Trend
SENSEX	-1.957551	-0.882978	-2.373166	-1.567228	-1.193552	-1.894555
NASDQ	-1.480155	-1.339090	-0.781137	-1.493196	-1.361923	-0.792112
FTSX-100	-1.559601	-1.474716	0.427311	-1.868904	-1.767027	-0.062276
NIKKI 225	-1.923640	-2.014884	0.648305	-1.900115	-1.991241	0.680935
BOVESPA	-1.689217	-2.219161	-1.698465	-1.671382	-2.099424	-2.081473
MOSCOW TIMES	-0.143772	-2.682207	-0.385248	-0.308662	-2.752380	-0.466202
SHANGHAI	-1.063071	-0.901734	-1.280268	-1.069657	-0.911336	-1.279051

Unit Root Statistics: Level

Variables	KPSS Test	
	With Intercept	With Intercept and Trend
SENSEX	5.365852	0.977598
NASDAQ	0.973227	0.421166
FTSX-100	1.010597	0.778789
NIKKI 225	1.075158	0.768666
BOVESPA	5.863130	0.959626
MOSCOW TIMES	5.729430	0.508490
SHANGHAI	2.342467	0.536999

Table 1.1: Unit Root Statistics: First differences

Variables	Augmented Dickey-Fuller Test			Phillips-Perron Test		
	With Intercept	Without Intercept and Trend	Without Intercept and Trend	With Intercept	Without Intercept and Trend	Without Intercept and Trend
SENSEX	-20.55076	-20.62885	-20.48041	-46.90938	-46.90239	-46.91182
NASDAQ	-13.71263	-13.72943	-13.71241	-58.27982	-58.29436	-58.28694

FTSX-100	-27.06781	-27.06729	-27.06187	-54.93689	-54.93644	-54.93877
NIKKI 225	-52.71244	-52.69810	-52.69469	-52.72058	-52.70637	-52.69390
BOVESPA	-37.23787	-37.23555	-37.22466	-52.03025	-52.02355	-51.99244
MOSCOW TIMES	-50.04980	-50.10086	-50.06111	-50.77003	-50.79445	-50.77986
SHANGHAI	-27.18901	-27.18483	-10.43987	-50.84125	-50.83621	-50.84538

Unit Root Statistics: First differences

Variables	KPSS Test	
	With Intercept	With Intercept and Trend
SENSEX	0.166562	0.044598
NASDAQ	0.148532	0.123589
FTSX-100	0.100972	0.079589
NIKKI 225	0.103377	0.101638
BOVESPA	0.106362	0.047275
MOSCOW TIMES	0.371495	0.262439
SHANGHAI	0.133465	0.098562

Results of Granger tests

Granger causality test explain any pair of variables there is a possibility of unidirectional causality or bidirectional causality or none. This can also be the case between two pairs of variables used in our empirical analysis. The pre-condition for applying Granger Causality test is to ascertain the stationarity of the variables in the pair.

The second requirement for the Granger Causality test is to find out the appropriate lag length for each pair of variables. For this purpose, we used the vector auto regression (VAR) lag order selection method available in Eviews 6.0 package. This technique uses six criteria namely log likelihood value (log L), sequential modified likelihood ratio (LR) test statistic, final prediction error (F & E), AKaike information criterion (AIC), Schwarz information criterion (SC) and Hannan –Quin information criterion (HQ) for choosing the optimal lag length. Among these three criteria, except the LR and FPE statistics are monotonically minimizing functions of lag length and the choice of optimum lag length is at the minimum of the respective function. In our case, the optimum lag length has been found out to be 02 for all the variables, based on AIC, SC and HQ.

Finally, the result of Granger causality test is reported in table 2. There is a unidirectional casual influence between Indian stock market and United States and Japan. The present study found that direction of causality is from United States, Japan to India, since estimated F-value is significant at 5% level. On the other hand, there is no reverse causation from India to United States and Japan. There fore, Indian stock market has been influenced by United States and Japan. Since both the computed value and F value are found significant. This suggest that there is no casual relation between UK and India, China and India implying that there is no influence between these two stock markets. Where as Indian stock market influencing Brazil stock market and Russia stock market. On the other hand, there is no reverse causation from Brazil, Russia to India.

Table: 2 Granger Causality Tests: Lag 02

Null Hypothesis	Obs	F-Statistic	Probability	Inference
UNITIED STATES does not Granger Cause INDIA	2520	2.53659	0.0648	Reject
INDIA does not Granger Cause UNITIED STATES		0.15053	0.8603	Accept
UK does not Granger Cause INDIA	2391	0.06171	0.9402	Accept
INDIA does not Granger Cause UK		1.01624	0.3621	Accept
JAPAN does not Granger Cause INDIA	2244	1.44761	0.0639	Reject
INIDA does not Granger Cause JAPAN		0.23235	0.7927	Accept
BRAZIL does not Granger Cause INDIA	2221	1.64694	0.1929	Accept
INDIA does not Granger Cause BRAZIL		17.1820	4.E-08	Reject
RUSSIA does not Granger Cause INDIA	2090	1.54713	0.2131	Accept
INDIA does not Granger Cause RUSSIA		23.0920	1.E-10	Reject
CHINA does not Granger Cause INDIA	2310	1.43564	0.2382	Accept
INDIA does not Granger Cause CHINA		0.21992	0.8026	Accept

Results of co integration test

Co-integration tests are helpful while dealing with non-stationary in the data and also examine the long run relationship. As the unit root tests try to examine the presence of stochastic trend of time series,

co integration tests search for the presence of a common stochastic trend among the variables from the unit root test results, the required condition for co integration test that given series are not I (O) is satisfied .At levels all the variables are non-stationary, where as first differenced stationary.

The concept of co integration, introduced by Granger (1986) and further developed by Engle and Granger (1987), incorporates the presence of non stationary, long-term relationship and short-run dynamics in the modeling process. The study proposed to test the presence of non-stationary and long term relationship between India and BRIC countries and developed stock markets namely Brazil, Russia, China,USA ,UK, and Japan. A financial time series is said to be integrated of one order i.e., I (1), if it becomes stationary after differencing once. If two series are integrated of order one, there may have a linear combination that is stationary without requiring differencing and, if they do, they are said to be co integrated. To analyze long run relationship between Indian stock Market and other BRIC countries and developed stock markets, Johansen co-integration model has adopted. For testing co-integration, there are two test statistics to use. First, one is trace statistics and other one is Maximum Eigen value statistics. The results are shown in table 3 and table 3.1. An empirical result of trace statistic indicates that the rejection of null hypothesis at 0.05 critical values i.e. there are no co-integration vector. In other words, Indian stock market has long relationship with other developed markets i.e. USA, UK, and Japan and Other BRIC markets. Trace test also indicates that 1 co integration equation at 5 % level of significance, tells about long run equilibrium between Indian stock market and other BRIC markets and developed markets.

Similarly, the empirical results of Maximum Eigen value are shown in the table 5. The empirical result indicates that the rejection of null hypothesis at 0.05 critical value i.e. no-co integration vector. It also tells that Indian stock market has long run equilibrium with other developing markets. Maximum Eigen value indicates that 2 co integration equation at 5 % level of significance.

Table-3.0 Stock market returns for Multivariate co integration India, Untied States, UK, Japan, Brazil, Russia and China: Trace Statistics.

Lags interval (in first differences): 1 to 4				
Hypothesized				
No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.058086	125.6005	111.7805	0.0049
At most 1	0.051823	77.36820	83.93712	0.1362
At most 2	0.016767	34.47731	60.06141	0.9039
At most 3	0.014274	20.84892	40.17493	0.8641
At most 4	0.007878	9.261043	24.27596	0.8964
At most 5	0.003193	2.886383	12.32090	0.8616
At most 6	0.000383	0.308927	4.129906	0.6401
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table -3.1 Stock market returns for Multivariate co integration India, Untied States, UK, Japan, Brazil, Russia and China: Max- Eigen Statistics

Lags interval (in first differences): 1 to 4				
Hypothesized				
No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.058086	48.23227	42.77219	0.0113
At most 1 *	0.051823	42.89089	36.63019	0.0082
At most 2	0.016767	13.62839	30.43961	0.9502
At most 3	0.014274	11.58788	24.15921	0.8130
At most 4	0.007878	6.374659	17.79730	0.8675
At most 5	0.003193	2.577456	11.22480	0.8503
At most 6	0.000383	0.308927	4.129906	0.6401
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Empirical analysis Error Correction Mechanism

From the above analysis, it has explained that, BRIC emerging stock markets has long run relationship with other developing markets. But that does not mean they have short run equilibrium. There may exists short run dynamics among stock markets. For taking care of short run equilibrium Error Correction Mechanism (ECM) has been adopted. ECM empirical results have shown in the table (4.0**).**The co efficient of error correction term for Sensex, Nikki225, moscowtimes, FTSE 100,

and Bovespa are significant. . It implies that these markets share the forces of short tun adjustment to long run equilibrium. In other words, whenever stock indices deviate from long run equilibrium, these five markets tend to correct backwards a long run equilibrium level. This results show that stock markets such as US and China leads other markets.

Table 4.0 Error correction Mechanism results

Error Correction	D(SHANGAHAI)	D(SENSEX)	D(NIKKI225)	D(NASDAQ)	D(MOSCOWTIMES)	D(FTSE100)	D(BOVESPA)
CointEq1	-0.000220	0.003973	-0.004843	0.000736	-0.011424	-0.001919	-0.023793
	[-0.68649]	[3.13375]	[-3.14254]	[1.85206]	[-6.18229]	[-3.63136]	[-5.56877]
D(SHANGAHAI(-1))	-0.032371	-0.548996	0.156966	0.015574	0.222477	0.004438	-0.811346
	[-1.12294]	[-4.80781]	[1.13072]	[0.43508]	[1.33665]	[0.09326]	[-2.10831]
D(SHANGAHAI(-2))	-0.078509	0.050397	-0.008522	0.024148	0.187058	-0.033408	0.343515
	[-2.81502]	[0.45620]	[-0.06345]	[0.69728]	[1.16165]	[-0.72558]	[0.92266]
D(SENSEX(-1))	0.004825	0.056676	-0.017231	0.007013	-0.031226	-0.045871	-0.355484
	[0.62444]	[1.85189]	[-0.46313]	[0.73091]	[-0.69997]	[-3.59610]	[-3.44655]
D(SENSEX(-2))	0.006884	0.008538	0.160028	0.005298	0.021798	0.006665	-0.014483
	[0.92037]	[0.28817]	[4.44266]	[0.57037]	[0.50471]	[0.53967]	[-0.14504]
D(NIKKI225(-1))	0.034767	-0.017406	-0.081125	0.011268	0.015220	-0.027588	0.075870
	[5.65816]	[-0.71514]	[-2.74171]	[1.47674]	[0.42901]	[-2.71955]	[0.92495]
D(NIKKI225(-2))	-0.000590	0.021299	-0.063999	-0.002534	0.006947	0.017152	0.042425
	[-0.09497]	[0.86514]	[-2.13825]	[-0.32837]	[0.19358]	[1.67149]	[0.51132]
D(NASDAQ(-1))	-0.007536	0.068897	0.232249	-0.110018	0.103421	0.062807	-0.208422
	[-0.32297]	[0.74541]	[2.06690]	[-3.79697]	[0.76764]	[1.63036]	[-0.66910]
D(NASDAQ(-2))	-0.030230	0.077195	0.032339	-0.079865	-0.234298	0.026399	0.423713
	[-1.20613]	[0.77756]	[0.26795]	[-2.56613]	[-1.61909]	[0.63800]	[1.26639]
D(MOSCOWTIMES(-1))	-0.003912	0.039068	0.008349	-0.007037	-0.056377	-1.67E-05	0.465086
	[-0.72353]	[1.82423]	[0.32067]	[-1.04820]	[-1.80597]	[-0.00187]	[6.44378]
D(MOSCOWTIMES(-2))	0.006271	0.071688	-0.016120	0.007354	-0.035115	0.010270	0.105149
	[1.14440]	[3.30290]	[-0.61092]	[1.08075]	[-1.10992]	[1.13530]	[1.43748]
D(FTSE100(-1))	-0.006015	0.093433	0.060013	-0.001438	0.140521	-0.055501	0.569014
	[-0.31332]	[1.22863]	[0.64914]	[-0.06033]	[1.26770]	[-1.75108]	[2.22022]
D(FTSE100(-2))	-0.024708	-0.003088	0.104831	-0.031511	0.141879	-0.047782	0.211149
	[-1.29655]	[-0.04091]	[1.14232]	[-1.33157]	[1.28945]	[-1.51872]	[0.82999]
D(BOVESPA(-1))	-0.003041	-0.008455	0.011535	0.001793	0.004873	0.007477	-0.009103
	[-1.33247]	[-0.93537]	[1.04973]	[0.63264]	[0.36988]	[1.98461]	[-0.29882]
D(BOVESPA(-2))	-0.001689	-0.023425	-0.021749	-0.001316	0.012646	0.002945	-0.097364
	[-0.78824]	[-2.75943]	[-2.10743]	[-0.49445]	[1.02200]	[0.83223]	[-3.40323]
C	-3.458547	-8.269982	10.42068	-0.907354	-11.21393	-1.548728	-27.31080
	[-2.93724]	[-1.77311]	[1.83779]	[-0.62056]	[-1.64946]	[-0.79669]	[-1.73746]
R-squared	0.042417	0.051551	0.046959	0.026220	0.044828	0.041241	0.108882
Adj. R-squared	0.029806	0.039061	0.034408	0.013396	0.032249	0.028615	0.097146
F-statistic	3.363501	4.127205	3.741479	2.044563	3.563695	3.266262	9.277952

Notes: Figures in parentheses are t values. Lag length is chosen based on Akaike Information Criterion (AIC) and Final Prediction Error (FPE).

Section-IV

Summary and Conclusion

This paper empirically investigates the long run equilibrium relationship between the BRIC stock markets and the stock market indices of three major developed countries as a using the multivariate co integration. The multivariate co integration technique is used to investigate the long run relationship. To asses the short run influence of one market on the other and to assess how many days each market takes to factor out the influence Indian stock market, we have used the Granger causality test with 02 days. The present study found that US, and Japan market factors influencing Indian stock market. It might be because of maximum international trade commercial activities between these countries. Indian stock market is not influencing by UK, Brazil, Russia and China markets. But Brazil and Russia markets are influencing by Indian stock market. The study finally conclude that India and developed countries markets USA, UK, Japan, and other Emerging BRIC markets highly co integrating during the period of the study.

Financial integration is key to delivering competitiveness, efficiency and growth. But will integration also bring about financial stability? Not necessarily. Strong framework rules, closer co operation and in particular a readiness to share information and co ordinate action across borders are necessary complements. Countries such as India will, over the next 10 to 15 years, need to move towards far greater integrated global financial world and policy makers in India need to rethink the framework for such integration. India to a great extent is far less integrated with the global markets and is fortunate in its leadership at the policy level. Our policy makers will navigate India through the present crisis. That is the least of our worries. We need to exercise restraint and build a regulatory framework for the economy at a much faster rate. Further, we need to pause to ensure that we do not get carried away with blind faith in the doctrine that there is a direct relationship between growth and economic freedom.

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