Stock Market Integration of India with Rest of the World: An Empirical Study

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Abstract

The present study conducted an analysis of the stock market integration of India and a few selected countries of the globe. The study used the Engle-Granger bivariate co-integration test for the analytical purpose of ascertaining the long run equilibrium relation among the countries. The long run relationship of India with some of the selected countries across the globe was analyzed over three different phases. It was observed that cointegration of India with other stock markets was increasingly improving over the years with financial liberalization. The study found that the Indian stock market was more responsive to the other Asian stock markets during the recession phase than in any other sub-sample periods.

Key words: **co-integration, Augmented Dicky-fuller test, stationarity, integration, financial reforms, stock market**

JEL Classification : G110, G150, G180

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In order to make financial markets transparent and vibrant to achieve confidence of the market participants, financial markets have undergone reforms over the last few decades. Financial markets should have depth and liquidity for trades to execute smoothly and to have lower bid-ask spread. A transparent market is important for economic growth of a country as it fosters investors' confidence that will induce them to invest their savings, which in turn, will be used for productive purposes. Over the years, the reforms in the financial markets of Asia, Latin America, Europe, and Africa have introduced different policies in order to erect a solid regulatory architecture for financial markets. Furthermore, it is observed that these policy initiatives have eased or liberalized various segments of financial markets so as to attract investors both foreign and domestic. Different countries have established institutional frameworks to ensure that the stock markets are governed by corporate governance, prudential norms, resolution mechanism, and so forth so that the investors are protected. A well-developed financial market is imperative to have a sustained real economic growth.

Karim, Majid, and Karim (2009) pointed out that integrated stock markets at regional levels are more efficient as compared to segmented markets. They opined that the study of stock market integration has an important role to play in portfolio diversification. They further maintained that financial market integration has its impact upon the stability of the overall economic system. The benefit of portfolio diversification can be thwarted if the stock markets are related in the long run. Thus, the study of market integration not only helps the investors, but is also important for policy makers to form suitable policies.

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Raju and Khanapuri (2009) opined that in the recent past, emerging economies have received importance in the global market because of their ability to generate better risk adjusted returns as compared to their developed counterparts. They further argued that the emerging economies are comparatively distant from each other, and also, they are little away from the developed markets. Thus, the emerging economies are not so affected by the shocks to other countries.

Yusof and Majid (2006) pointed out that interest on the study of stock market integration has increasingly grown since the market crash of 1987 and particularly after the Asian Financial Crisis of 1997. They said that largely, there are two ways to measure market integration, that is, asset pricing and statistical standpoint. The law of one price states that if the financial markets of two different countries are integrated, then the price of the same asset listed in two different markets should be same since they have a similar risk profile. In such an integrated market, the arbitrage opportunity for the investors is minimal. From a statistical standpoint, stock market integration implies that two markets in different countries should have a long run equilibrium relationship between them. There might be temporary disequilibrium from this long run path, but there should be some common factor that will make the markets converge to the long run equilibrium path.

The present study tries to examine the issue of stock market integration for India and some of the selected countries of the globe using econometric approach. The thrust of the study is to analyze long run equilibrium relationship between India and the selected countries. The novelty of the study lies in the fact that it examines the long run relationship of India not only with the Asian countries or some other particular region, but examines the long run co-movement of India with as many as 33 other countries across the globe.

Literature Review

Fraser and Oyefeso (2005) opined that a process of convergence is going on in the long run among the major equity markets of the world. In their study of stock market integration, they considered nine countries, that is, Belgium, Denmark, France, Germany, Italy, U.K, U.S.A, Spain, and Sweden. The study used multivariate cointegration approach. The study found evidence of a common stochastic trend in all the markets under study that linked stock markets with each other in the long run.

Hardouvelis, Malliaropulos, and Priestley (2006) opined that the adoption of same monetary policy by the member countries of Economic and Monetary Union (EMU) helped both money and bond markets to get integrated among the member countries. The study used 11 countries from February 7, 1992 to June 26, 1998. The study found that the rising integration among the European stock markets was driven by the common currency; Euro and also formation of EMU .

Yousof and Majid (2006) studied the long run co-movements of three stock markets, that is, Malaysia, Japan, and the U.S.A. The study used cointegration to see the countries that have a long run relationship with Malaysia. The study found that the Malaysian market was better integrated with Japan's stock market as compared to the U.S.

Tian (2007) examined the cointegration and causal link between the Shanghai A and B share markets and also between Shanghai A and B share markets and stock markets of Hong Kong, Taiwan, and Japan. The period of the study was from July 1993 to March 2007. They found evidence of cointegration between Shanghai A share market and other markets in the greater China region. They also found evidence of cointegration between the markets of greater China, Shanghai A share market, and the USA market.

Mukherjee and Mishra (2007) studied the equity market integration of India and other countries such as Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, France, Germany, Italy, Greece, Russia, Spain, Sweden, Switzerland, Canada, USA, and UK. Daily data was used from July 1990 to December 2005. The study used bi-variate Engle Granger cointegration test in order to measure the long run cointegration between India and the selected countries. The results found that the Indian stock market did not have a long run cointegrating relationship with stock markets of the selected countries.

Data

Daily closing prices of stock indices for the present study have been obtained from various sources such as Bloomberg, EconStat, Datastream, and Yahoo Finance. Daily data is used for the present study from January 1999 to December 2011 depending upon availability of data series for each of the countries. The present study included

Table 1. Data Range for Each of the Indices

Country	Start Date	End Date
Australia	01-01-1999	30-12-2011
Hong Kong	01-01-1999	30-12-2011
India	01-01-1999	30-12-2011
Indonesia	01-01-1999	30-12-2011
Malaysia	01-01-1999	30-12-2011
Japan	01-01-1999	30-12-2011
New Zealand	30-04-2004	30-12-2011
Singapore	01-01-1999	30-12-2011
Korea	01-01-1999	30-12-2011
Taiwan	01-01-1999	30-12-2011
Philippines	01-01-1999	02-12-2011
China	14-02-2000	30-12-2011
Austria	01-01-1999	30-12-2011
Belgium	01-01-1999	30-12-2011
France	01-01-1999	30-12-2011
Germany	01-01-1999	30-12-2011
Netherlands	01-01-1999	30-12-2011
Norway	07-02-2001	30-12-2011
Sweden	08-01-2001	30-12-2011
Switzerland	01-01-1999	30-12-2011
UK	01-01-1999	30-12-2011
Greece	01-01-1999	30-12-2011
Finland	01-01-1999	30-12-2011
Netherlands	01-01-1999	30-12-2011
Spain	01-01-1999	30-12-2011
Turkey	01-01-1999	30-12-2011
Canada	04-01-2000	30-12-2011
Argentina	01-01-1999	30-12-2011
Brazil	01-01-1999	30-12-2011
Mexico	01-01-1999	30-12-2011
USA	01-01-1999	30-12-2011
Chile	22-09-2003	30-12-2011
Peru	01-01-1999	30-12-2011
South Africa	05-02-2007	30-12-2011

Source: Bloomberg, EconStat, Datastream, and Yahoo Finance

33 countries and India (total 34 countries) to analyze the long run equilibrium relation. The countries selected under the study are: India, Australia, Hong Kong, Indonesia, Malaysia, Japan, New Zealand, Singapore, Korea, Taiwan, Philippines, China, Austria, Belgium, France, Germany, Netherlands, Norway, Sweden, Switzerland, UK, Greece, Finland, Netherlands, Spain, Istanbul, Canada, Argentina, Brazil, Mexico, USA, Chile, Peru, and South Africa. In order to deal with the problem of missing values in data series, the study used five day moving average to replace the missing values. The Table 1 lists the data range for each of the country stock indices. The study split the data series and the whole analysis into four periods such as:

Table 2. Correlation Coefficient of India with Other Countries

Country	1999 to 2011	1999 to 2003	2004 to 2007	2008 to 2011
Australia	0.34	0.22	0.38	0.41
Hong Kong	0.41	0.22	0.44	0.54
India	1.00	1.00	1.00	1.00
Indonesia	0.33	0.13	0.40	0.47
Malaysia	0.19	0.13	0.30	0.20
Japan	0.28	0.19	0.34	0.32
New Zealand	N.A.	N.A.	0.13	0.25
Singapore	0.44	0.27	0.48	0.59
Korea	0.30	0.21	0.41	0.41
Taiwan	0.24	0.16	0.35	0.29
Philippines	0.20	0.12	0.23	0.27
China	0.17	0.03	0.12	0.26
Austria	0.30	0.09	0.36	0.39
Belgium	0.28	0.09	0.36	0.41
France	0.28	0.12	0.34	0.41
Germany	0.26	0.11	0.30	0.41
Netherlands	N.A.	N.A.	0.34	0.44
Norway	0.36	0.17	0.31	0.44
Sweden	0.32	0.17	0.33	0.39
Switzerland	0.27	0.11	0.34	0.40
UK	0.29	0.12	0.32	0.42
Greece	0.28	0.17	0.36	0.36
Finland	N.A.	0.14	N.A.	0.37
Netherlands	0.21	0.05	0.34	0.44
Spain	0.27	0.14	0.32	0.38
Turkey	0.21	0.07	0.34	0.40
Canada	0.24	0.10	0.21	0.33
Argentina	0.17	0.03	0.17	0.34
Brazil	0.19	0.06	0.20	0.33
Mexico	0.20	0.09	0.21	0.33
USA	0.17	0.01	0.12	0.31
Chile	N.A.	N.A.	0.19	0.31
Peru	0.22	0.12	0.20	0.29
South Africa	N.A.	N.A.	N.A.	0.39

(1) The whole sample from January 1, 1999 to December 31, 2011.
(2) From January 1, 1999 to December 30, 2003.
(3) From January 1, 2004 to December 31, 2007.
(4) From January 1, 2008 to December 30, 2011.

Methodology and Test Results

(1) Correlation Test : To measure the strength of liner relationship between two stock indices, the study resorted to the simple correlation approach for stock indices returns which is calculated using daily data of each of the index as $\ln(P_t/P_{t-1})*100$ and selected the Indian stock index (SENSEX) over four different periods as mentioned in the previous section. In Table 2, we report the correlation coefficients of stock index returns.

(2) Unit Root and Test of Stationarity : An essential element of time series data is that mostly they contain a unit root. That means the data is not stationary. Gujarati (2004) explained the phenomenon thus. Let us have a random walk model such as:

$$Y_t = \rho Y_{t-1} + U_t \text{ where } -1 \leq \rho \leq 1 \qquad (1)$$

The equation (1) is an autoregressive model with lag one. If ρ takes a value such as ρ = 1, then equation (1) faces the problem of non-stationarity. In this case, the variance of Y_t will not be stationary. However, if ρ takes a value such that $|\rho| \leq 1$, the series Y_t will be stationary. A stochastic process is stationary if its mean, variance, and auto-covariance remain the same over the entire series such that it satisfies the mean reversion criterion, and if a series does not satisfy this criterion, then it is termed as a non-stationary series. A time series analysis requires that the series should be stationary. Thus, for any time series analysis, it is essential to check if the series contains any unit root.

There are several tests of stationarity both parametric and non-parametric. In this paper, we have resorted to the most commonly used Augmented Dickey-Fuller (ADF) test of stationarity (Said & Dickey, 1984) , which is an extension of the earlier Dickey-Fuller (D-F) Test (Dickey & Fuller, 1979) by augmenting the model by introducing *p* lags of the dependent variable. The ADF Test is for the presence of a unit root as null hypothesis against the alternative hypothesis that there is no unit root. Thus, the ADF model is written as:

$$\Delta Y_t = \alpha Y_{t-1} + \Sigma^{p}_{i=1} \beta_i \Delta Y_{t-i} + U_t \qquad (2)$$

The null hypothesis is the existence of a unit root which means that the series is non-stationary against the alternative hypothesis of no unit root or stationary series. Thus,

$$H_0: \alpha = 0 \text{ and } H_1: \alpha < 0$$

We report the ADF test results on log differenced series for different stock indices under study for all the sub-sample periods in Table 3.

(3) Engle Granger Co-integration Test : In order to analyze the long run integration, the study resorted to the Engle-Granger two step co-integration technique. Engle and Granger (1987) stated that, "if each element of a vector of time series *x*, first achieves stationarity after differencing, but a linear combination $\alpha' x$ is already stationary, the time series *x* are said to be co-integrated with co-integrating vector α" (p. 251). The Engle-Granger

Table 3. Augmented Dickey-Fuller Test on the Log Difference Series

Countries	1999 to 2011		1999 to 2003		2004 to 2007		2008 to 2011	
	t-Statistic	Prob.	*t*-Statistic	Prob.	*t*-Statistic	Prob.	*t*-Statistic	Prob.
Indonesia	-58.827	0.0001	-35.182	0.0000	-25.187	0.0000	-33.753	0.0000
Hong Kong	-62.500	0.0001	-38.011	0.0000	-18.143	0.0000	-35.612	0.0000
India	-63.213	0.0001	-39.375	0.0000	-32.344	0.0000	-36.407	0.0000
Malaysia	-65.443	0.0001	-33.580	0.0000	-29.123	0.0000	-29.103	0.0000
Japan	-63.519	0.0001	-39.311	0.0000	-34.531	0.0000	-22.656	0.0000
New Zealand	N.A.	N.A.	N.A.	N.A.	-31.214	0.0001	-32.316	0.0000
Singapore	-58.613	0.0001	-34.998	0.0000	-34.214	0.0000	-33.122	0.0000
Korea	-62.159	0.0001	-39.187	0.0000	-34.115	0.0000	-33.328	0.0000
Taiwan	-60.739	0.0001	-38.251	0.0000	-31.879	0.0000	-33.699	0.0000
Philippines	-54.868	0.0001	-34.640	0.0000	-23.275	0.0000	-29.250	0.0000
China	-56.238	0.0001	-31.239	0.0000	-32.291	0.0000	-33.376	0.0000
Austria	-58.098	0.0001	-37.762	0.0000	-33.808	0.0000	-31.586	0.0000
Belgium	-54.804	0.0001	-32.186	0.0000	-32.592	0.0000	-31.290	0.0000
France	-37.510	0.0000	-36.365	0.0000	-35.127	0.0000	-33.921	0.0000
Germany	-60.481	0.0001	-38.388	0.0000	-33.537	0.0000	-32.503	0.0000
Netherlands	N.A.	N.A.	N.A.	N.A.	-33.203	0.0000	-33.144	0.0000
Norway	-56.017	0.0001	-26.487	0.0000	-38.787	0.0000	-32.800	0.0000
Sweden	-53.228	0.0001	-25.859	0.0000	-34.296	0.0000	-32.815	0.0000
Switzerland	-26.992	0.0000	-35.987	0.0000	-33.936	0.0000	-16.167	0.0000
UK	-30.569	0.0000	-24.560	0.0000	-36.311	0.0000	-16.279	0.0000
Greece	-58.236	0.0001	-35.846	0.0000	-32.624	0.0000	-32.633	0.0000
Finland	-60.616	0.0001	-38.642	0.0000	N.A.	N.A.	-32.566	0.0000
Netherlands	-41.186	0.0000	-36.936	0.0000	-33.106	0.0000	-33.146	0.0000
Spain	-60.538	0.0001	-39.508	0.0000	-33.684	0.0000	-24.427	0.0000
Turkey	-58.438	0.0001	-36.517	0.0000	-33.008	0.0000	-31.115	0.0000
Canada	-43.425	0.0000	-31.880	0.0000	-36.150	0.0000	-26.142	0.0000
Argentina	-58.308	0.0001	-36.209	0.0000	-32.863	0.0000	-31.909	0.0000
Brazil	-60.749	0.0001	-36.198	0.0000	-33.549	0.0000	-35.474	0.0000
Mexico	-57.340	0.0001	-35.973	0.0000	-31.467	0.0000	-31.487	0.0000
USA	-67.240	0.0001	-38.155	0.0000	-36.171	0.0000	-39.743	0.0000
Chile	N.A.	N.A.	N.A.	N.A.	-31.871	0.0000	-22.951	0.0000
Peru	-25.759	0.0000	-33.829	0.0000	-27.248	0.0000	-13.629	0.0000
South Africa	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-32.768	0.0000
Australia	-61.447	0.0001	-37.601	0.0000	-18.097	0.0000	-34.030	0.0000

two step co-integration technique maintains that if two variables are non-stationary at levels, then the regression of one on the other is spurious. However, if a liner combination of the two variables obtained out of a regression is found to be stationary, then the regression is not spurious and the two series are said to be co-integrated in the long run. The Engle-Granger two step technique first requires to see if there exists a unit root in each of the series at

levels. If it is found that each of the series contains a unit root at levels, but they are integrated of the same order, for example *I*(1), then we should proceed on to check if the liner combination of the variables is *I*(0). If the residuals of the regression are found to be stationary at levels then the variables integrated of the same order are said to be co-integrated. Engle and Granger (1987) estimated the critical values at 1%, 5%, and 10% levels of significance to check the stationarity of the residual.

Table 4. Engle-Granger Cointegration Coefficients for India with Other Countries

Serial Number	Countries	1999 to 2011	1999 to 2003	2004 to 2007	2008 to 2011
1	Australia	-1.42	-0.55	-2.75	-1.65
2	Hong Kong	-3.46*	-1.52	-1.82	-3.71*
3	Indonesia	-3.31*	-2.5	-2.49	-2.5
4	Malaysia	-3.33*	-2.19	-1.46	-3.01
5	Japan	-0.91	-1.2	-0.19	-1.04
6	New Zealand	N.A.	N.A.	-2.26	-2.02
7	Singapore	-3.57*	-1.63	-1.71	-3.58*
8	Korea	-4.10*	-1.31	-2.61	-3.28*
9	Taiwan	-3.56*	-1.98	-2.14	-3.66*
10	Philippines	-3.26*	-1.56	-2.44	-2.65
11	China	-2.2	-1.4	-1.29	-1.8
12	Austria	-0.59	-1.29	-3.71*	-2.63
13	Belgium	-0.96	-1.09	-3.82*	-1.21
14	France	-0.97	-0.56	-4.38*	-2.3
15	Germany	-1.52	-0.75	-3.45*	-2.28
16	Netherlands	-0.92	-1.91	-4.06*	-1.98
17	Norway	-2.09	-2.02	-4.02*	-1.89
18	Sweden	-2.67	0.02	-3.88*	-3.83*
19	Switzerland	-2.99	-1.84	-3.44*	-2.3
20	UK	-1.26	-1.94	-4.08*	-2.1
21	Greece	-1.14	-2.95	-4.14*	-2.23
22	Finland	-0.77	-1.81	N.A.	-1.2
23	Netherlands	N.A.	N.A.	-4.06*	-1.98
24	Spain	-3.54*	-2.94	-3.50*	-1.16
25	Turkey	-3.60*	-1.32	-2.71	-3.55*
26	Canada	-3.62*	-3.58*	-4.03*	-2.46
27	Argentina	-2.51	-2.71	-3.1	-3.23*
28	Brazil	-4.57*	-1.63	-3.38*	-4.20*
29	Mexico	-3.53*	-2.59	-3.79*	-3.54
30	USA	-3.61*	-3.27*	-3.73*	-4.56*
31	Chile	N.A.	N.A.	-1.76	-2.94
32	Peru	-3.72*	-2.33	-1.96	-2.98
33	South Africa	N.A.	N.A.	N.A.	-2.319

Source: The * indicates significance at the 5% level.

Let us assume that we have two $I(1)$ variables such as X and Y. Now, if we regress one on the other on levels then it would be a spurious regression. Thus,

$$Y_t = \beta_1 + \beta_2 X_t + U_t \quad (3)$$

Re-arranging equation (3) we get,

$$U_t = Y_t - \beta_1 - \beta_2 X_t \quad (4)$$

However, if the residual U_t of equation (4) having put for test of unit root is found to be stationary at level, then we should say that the liner combination of the two variables X_t and Y_t in equation (4) is stationary. In order to test if U_t in equation (4) is stationary, we use the Augmented Dickey-Fuller test as given in equation (2). In the Table 4, we report the Engle-Granger cointegration test results for India with other countries for all sub-sample periods.

Results

In Table 4, we put star (*) against the values for which we reject the null hypothesis of presence of unit root (non-stationary) at the 5% level against the alternative hypothesis of no unit root (stationary). The Engle-Granger two step residual based co-integration test shows that India exhibits a long run equilibrium relationship with some of the Asian countries under study, which means we reject the null hypothesis of presence of unit root in equation (2). It is observed that India has co-integration with a few Asian countries such as Hong Kong, Korea, Singapore, Taiwan, etc. mostly over the full-sample period, that is, from 1999 to 2011, and also over the sub-sample period from 2008 to 2011, that is, during the economic contraction phase as a result of the sub-prime meltdown in USA. Thus, the Indian stock market is found to be more responsive to the other Asian stock markets during the recession phase, that is, 2008 to 2011 than in any other sub-sample periods. The study of Mukherjee and Mishra (2007) applied Engle-Granger cointegration test to ascertain a long run relationship between India and 22 selected countries across the world. The results of the study could not find many significant cointegrating relationships between India and other countries over 1990 to 2005. Even in our study also, we hardly find any cointegration of India with other countries between the 1999 to 2003 sub-period. However, this cointegration has improved over the years as evident in the sub-period 2004 to 2007 and 2008 to 2011. We have observed that India shared a long term equilibrium relationship with many of the European countries under study during 2004 to 2007, that is, the period of economic expansion. Our results find significant co-integrating relation with the U.S. and a few of the South American countries such as Peru, Mexico, Brazil, and Argentina.

Thus, it is observed that Indian market is getting more integrated with the Asian markets in the recent past. Similar is the case of the Indian market with the other markets of the world where we see that the Indian market is more integrated during 2004 to 2007.

India has embarked upon different policy initiatives to liberalize its financial markets to attract foreign investment into the country to boost its domestic economy. India is moving on the path of capital account convertibility as mentioned in first and second Tarapore Committee reports of 1997 and 2006, respectively (Reserve Bank of India, 1997, 2006a). Equity markets of India along with many other countries exhibited strong growth in 2005-06 (Reserve Bank of India, 2004, 2007, 2008) .

In India, according to Reserve Bank of India (2006b) :

> Positive measures announced in the Union Budget, 2006-07 such as raising FII investment limit in government securities and corporate debt, treating open-ended

> equity-oriented schemes and close-ended equity-oriented schemes, on par for dividend distribution tax, rationalisation of excise duties, and relaxation in fringe benefit tax (FBT) also helped to boost the market sentiment. (p. 70)

Low interest rates in countries such as the U.S. helped boost equity market during this phase. During the sample period from 2008 to 2011, the world economy was trying to recover from the aftermath of the sub-prime crisis. To this end, the U.S. in particular, introduced a quantitative easing programme which resulted into large inflow of capital to the emerging markets. The Indian financial markets, similar to many other emerging economies, shoot up because of such capital inflow from the U.S. This might have been a reason of cointegration of Indian equity market with a few emerging equity markets during 2008 to 2011 including a few Asia (Reserve Bank of India, 2009, 2010a).

According to Reserve Bank of India (2010b) :

> Reduction in risk perception towards EMEs along with continuance of low policy rates in the advanced economies for extended periods, led to the revival in capital flows, which, in turn, contributed to increase in asset prices and also kept appreciation pressures on the exchange rates of EMEs. (p. 986)

Discussion

Mukherjee and Mishra (2007) applied Engle-Granger cointegration test to see the long run relationship between India and 22 selected countries across the world. The results of the study could not find many significant cointegrating relationships between India and other countries over 1990 to 2005. Even in our study also, we hardly find any cointegration of India with other countries between 1999 to the 2003 sub-period. However, this cointegration has improved over the years as evident in the sub-period from 2004 to 2007 and 2008 to 2011. We have observed that India shared a long term equilibrium relationship with many of the European countries under study during 2004 to 2007, that is, the period of economic expansion. Our results find a significant cointegrating relation with the U.S. and a few of the South American countries such as Peru, Mexico, Brazil, and Argentina. Raj and Dhal (2010) analyzed stock market integration of India with a few other markets, that is, Singapore, Hong Kong, Japan, USA, and UK for three different sample periods, that is, 1993 to 2008, 1993 to 2003, and 2003 to 2008. The study found increased cointegration among the markets after 2003. We also observed increasing integration from our second sample period, that is, 2004 to 2007. However, coverage of our study in terms of countries is much higher.

Research Implications, Limitations of the Study, and Scope for Future Research

The present study will help the policy makers to understand the policy impacts on the Indian financial market. India has been taking different policy initiatives over the years to make the financial market more efficient. This study will help us understand how far India has succeeded to make its market integrated with foreign markets. In this study, though we have split the data into different sub-samples, but we have not used any formal statistical test on structural break to identify the break periods. We plan to incorporate the same in a future study. Also, the present study does not take into account the presence of seasonality in the data series. Stock market data may exhibit seasonal patterns sometime. We keep this work for our future research. An interesting study for future will be to use a regime switching model to see the cointegration in the bull and bear markets. Also, in the future, Johensen cointegration model can be used to see cointegration among the countries.

Conclusion

Thus, to conclude, it can be said that we have observed that the Indian stock market is getting increasingly integrated with other stock markets over the years. The main factor that can be attributed to this is the liberalization of the financial markets and the efforts to harmonize the financial laws and regulations thus, making institutional investments mobile across regions. India has been moving towards capital account convertibility as recommended by the first and second Tarapore committee reports that helps its financial market to get integrated to the other financial markets of the world. The study finds that the Indian stock market is more responsive to the other Asian stock markets during the aftermath of the sub-prime crisis in the U.S. than in any other sub-sample periods.

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