

Evaluating policy impacts on international financial integration: a cointegration approach

Evaluación de los impactos de las políticas en la integración financiera internacional: un enfoque de cointegración

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ABSTRACT:

Motivated by the regulatory changes undertaken in leading emerging economies of the world during the last three decades, this study investigates the impacts on international financial integration using co-integration methodologies suggested by Engle and Granger as well as by Johansen. Using financial time series data from stock indices of Argentina, Brazil, China, Greece, India, Indonesia, Malaysia, Mexico, South Korea and Taiwan; the study could empirically prove that the selected economies are at least in the process of getting financially integrated.

Keywords: Financial Integration, Cointegration, Engle & Granger Test, Johansen's Test

RESUMEN:

Motivado por los cambios regulatorios llevados a cabo en las principales economías emergentes del mundo durante las últimas tres décadas, este estudio investiga los impactos sobre la integración financiera internacional utilizando las metodologías de cointegración sugeridas por Engle y Granger, así como por Johansen. Utilizando datos de series temporales financieras de índices bursátiles de Argentina, Brasil, China, Grecia, India, Indonesia, Malasia, México, Corea del Sur y Taiwán; el estudio podría demostrar empíricamente que las economías seleccionadas están al menos en proceso de integración financiera.

Palabras clave: Integración Financiera, Cointegración, Prueba Engle & Granger, Prueba de Johansen.

1. Introduction

Globalization is a comprehensive process that generates pressure through economic policies on closed economies to open up and it is adopted to achieve a sharper and continuing economic integration of the country with rest of the world (Nayar, 2006). Globalization in specific of

finance refers to formulation and implementation of policy measures to increase cross-border capital flows and thereby promotion of global linkages (Prasad, Rogoff, Wei & Kose, 2003). Globalization of finance significantly contributes to enhance linkages of financial markets in individual country with international capital markets and this process is popularly known as 'financial integration' (Prasad et al., 2003). Therefore, since globalization of finance is the perforce to financial integration, the two terms i.e. financial globalization and financial integration are generally used interchangeably. Financial globalization causes financial integration of domestic financial markets with the international financial markets and consequently compels the financial system in the economy to develop. Development of financial system in emerging economies sourced by financial integration involves deeper, more stable, better-functioning and better-regulated financial markets (Schmukler, 2004). In addition to it, due to financial integration the emerging economies can get access to foreign capital and investible funds may flow from capital surplus markets to capital scarce economies without any hurdle. This facilitates technology transfer, enhances international risk sharing and consequently increases economic efficiency (Ostry, 2007). Developed countries including United States, United Kingdom and Japan liberalized their financial systems in late 1970s after which the impact of deregulation and internationalization on global capital flows could become visible to the world. Keeping in view the potential benefits of financial globalization, most of the emerging economies throughout the world relaxed capital controls during late 1980s and early 1990s (Wong et al., 2004). Consequently, the policy of financial globalization adopted by developed and emerging economies significantly increased the possibilities of international diversification of investible funds. It is because after globalization of finance, international investors could now get more choices in the basket of foreign securities offered to them by international financial markets and also an increased reward-to-volatility ratio. Hence, it is also essential for financial market of the home economy to move together with financial markets of other emerging economies so that benefit from international diversifications will be limited and the economy can avoid the danger of sudden withdrawal of funds. Co-movement of financial markets is possible when there is international financial integration and the concept of cointegration best reveals the existence of financial integration. The present study is an attempt to detect the possibility for portfolio diversifications among a few chosen emerging and frontier financial markets by application of cointegration approach. Here, we have taken India as the host investment destination and aimed at evaluating its policy impacts on international financial integration.

1.1. Relevance of the study

In the post globalization era of India, it is given that its re-emergence and grand strategy as a rising power have been predicated on economic reintegration into the global economy. But, India has not fully adopted financial globalization in a stock sense even after around two decades of launching its optimistic New Economic Policy (NEP) in 1991 (Kramer, Poirson & Prasad, 2008). However, the economy is fast globalizing by opening at least to capital inflows and motivated by recent regulatory efforts in Indian economy in this direction, we investigate here the state of integration of stock market of India with those of emerging economies as a global perspective. The study addresses three issues. First, is Indian financial market already integrated or at least in a process towards integration with the leading emerging economies? Second, if financial market integration with the emerging economies is actually occurring, is it restricted to a few countries only or is it uniformly taking place with each one of them? Third, is there any long-run financial relationship between India and other emerging economies established in post globalization era? To answer these three questions, the study is structured as follows. Section 1.2 and section 1.3 with the captions 'Globalization of finance and Indian economy' and 'Benefits of international financial integration' discusses about the present shape of Indian economy and expected benefits from financial integration for it respectively. In section 2 with the caption 'Methodology', methodological foundations of the study are laid out. Section

3 reports the result of empirical investigations undertaken for detecting financial integration of India with the selected emerging economies. Finally, section 4 contains the conclusions and policy implications of our results for Indian economy.

1.2. Globalization of finance and Indian economy

During the first four and a half decades of independent India, the policy makers put maximum efforts to gain the most from a mixed economy model in the country that facilitates to take advantages from market forces as well as ensures a prescribed role for the government (Kaushik, 1997). But even after policy interventions for such a long period of time and in almost every facet of the economy, prosperity in terms of growth rate could not be brought (Sodhi, 2008). An irrepressible condition came when the inward looking policies coupled with long years of political instability and an oil crisis caused by Gulf war in 1980s brought the exchange reserves of the country to a precarious position by 1990 (Mathur, 1993; Denoon, 1998). This was time when the country was forced to knock doors of the World Bank (WB) and International Monetary Fund (IMF) for an immediate recourse. WB and IMF provided loans in terms of Special Drawing Rights (SDRs) with conditionalities attached to implement structural adjustment programme prescribed by them (Mathur, 1993). And finally, India got into globalization by accepting liberalization as a national agenda since then. Under this campaign of opening the Indian economy, slow but consistent capital account liberalization along with massive trade liberalization got undertaken (Shah & Patnaik, 2011). The financial sector reforms since 1991 has speed up the increasing linkages of Indian economy with global markets (Kaushik, 1997). Now, after more than two and a half decades of regular reforms to globalize Indian economy with the objective to achieve economic reintegration, in specific a study to detect financial integration of the country with leading emerging economies is worthwhile. And the present study is an attempt in this direction.

1.3. Benefits of international financial integration

The Cecchini report released in 1988 is perhaps the first of its kind which is based on a major study undertaken by Commission of the European Communities with the objective to evaluate scientifically the benefits of financial integration. According to the report full financial integration among markets has the potential to create opportunities for growth, job creation, economies of scale, improved productivity and profitability, healthier competition, professional and business mobility, stable prices and consumer choice. Though the report was intended to visualize total potential economic gain for the European Union (EU) member countries after getting fully integrated their financial markets, there is relevance of the report even for other economies including India. Following the Cecchini report, the EU member countries started working towards liberalization and deregulation of their financial markets which was very much a politically promoted process. And within few years researchers including Neven (1993) and Zimmerman (1995) could detect overall advancement of European financial markets. Briefly, financial integration assumes a vital role in economic development of especially emerging economies like India for the following reasons: (1) Financial integration significantly increases access of emerging economies to foreign capital, (2) Financial integration promotes the development of financial system so that the required absorptive capacity for the inward capital movements can be achieved, (3) Financial integration help emerging economies to reduce macroeconomic volatility, (4) Financial integration enhances international risk sharing, (5) Since financial integration ensures heavy flow of capital, it can bring economies of scale, economies of scope and healthy competitive pressures.

2. Methodology

The broad objective of this study is to make available empirical evidence on international financial integration of India with leading emerging and frontier economies of the world. For this

purpose, data of financial time series from financial markets of selected countries have been taken into consideration and such a setting where time series of individual variables can wander extensively and yet some pairs of series may be expected to move so they do not drift too far apart is best studied in the context of a 'co-integration analysis' (Kleimeier and Sander, 2000). Following this, the specific objective of the present study has been framed as: to detect whether the selected financial time series are cointegrated or not.

2.1. A theoretical analysis on financial integration as cointegration

There are many researchers who have applied the concept of cointegration as an indicator of financial integration in their studies especially during the past two decades. In this section we have reviewed the works of a chosen few only in order to understand the significance of cointegration approach. Bangake and Eggoh (2010) detected the link between finance and economic growth in their study by implementing causality and cointegration tests in OECD countries. The results of their study shown that economic growth, financial development and the auxiliary variables are co-integrated and the evidence also points out a bi-directional causality between financial development and economic growth in countries taken into consideration that supports the point of view that both banks and stock markets could be a driving force of economic growth. The implication is that policies aiming at improving financial sector and their functions will have in the long-run, a significant effect on economic growth. In the same line of research, Starkey (2010) also proved that financial system development and economic growth are correlated by conducting cointegration analysis in selected African countries. Similarly, Elfakhani et al. (2008) conducted a cointegration study on Arab, U.S. and some emerging stock markets and found that globalization has offered opportunities for international diversification in many Arab markets and this is happening because there is lack of cointegration. From these studies it is evident that 'financial integration is cointegration' and absence of cointegration gives birth to the scope for international diversifications. In this context, Tahai et al. (2004) and Batori (2009) have contributed significantly by examining international financial integration among developed markets by application of the technique of cointegration. In the same line of research, Herwany and Febrian (2008) and Ozberki (2010) also applied the technique of cointegration to detect the presence of financial integration but they have taken in to consideration even a few selected emerging markets in their studies. Apart from it Jayanthi and Pandian (2008) in their study undertook an empirical study on cointegration among Indian, emerging and developed financial markets. All of these studies been extensively reviewed in the present section suggests that cointegration is the most robust technique available for detecting financial integration and following it we have finally decided to make use of this method in our project.

2.2. Profile of the sample economies

When we talk about the financial market of any economy and attempt to detect the integration of financial markets, there should be an indicator which can ideally be taken for analysis. Financial market of an economy includes money market and capital market. Positions of money market or capital market can be indicated by interest rates, repo rates, reverse repo rates, dividends paid, positions of stock indices etc. Out of these indicators the best one that can represent whole of a country's financial market is the positions of stock indices and this has been found from the review of past researches on financial integration. Hence, it has been decided in the present study to take positions of selected stock indices of India and emerging economies for analysis.

Once the type of financial time series to be taken is decided, the next task is to select the countries and for this purpose there are three important indicators considered here which ideally represent the level of integration of any country with the world economy. They are:

trade in goods and services, capital flows, and migration of people (Nayar, 2006). On the basis of these indicators there are nine (09) emerging markets and one (01) frontier market selected in the study which includes: Argentina, Brazil, China, Greece, India, Indonesia, Malaysia, Mexico, South Korea and Taiwan. Here, Argentina is the only frontier market as per Morgan Stanley Composite Index (MSCI) Country Classifications 2015. The daily closing level data of the sample indices i.e. MerVal of Argentina, Bovespa of Brazil, Shanghai Composite of China, Athex of Greece, BSE 30 of India, Jakarta Composite of Indonesia, KLSE Composite of Malaysia, IPC of Mexico, KOSPI Composite of South Korea and Taiwan Weighted of Taiwan have been taken from the online database maintained by <https://in.finance.yahoo.com/> for the period July 01.07.1997 to 31.12.2016. The study spans the period July, 1997 through Dec, 2016 and there is a valid reason for taking this period under consideration. As the primary objective of the study is to measure the financial integration of Indian economy and to analyze the implications of globalization on it, the period ideal for analysis should start in 1997 only. It is because though India started globalization only after the launch of NEP in the year 1991, globalization of finance in a true sense started in 1997 only. Globalization of finance could be possible with the free flow of capital between the country and the rest of the world once the country meets the pre-requisite mandate to welcome de facto financial integration. It takes some years to see the de facto financial globalization after introducing the de Jure financial globalization. Hence though the financial sector reforms started in 1991, globalization of finance as an event can be said to have happened in 1997 i.e. with the implementation of second generation of financial sector reforms.

2.3. Techniques of data analysis

The present study used various appropriate techniques/ models for the calculation/testing of the following: (1) Calculation of descriptive statistics, (2) Normality test of the time-series data, (3) Stationarity test of the time-series data, (4) Test of cointegration. The descriptive statistics like mean, median, mode, maximum, minimum, standard deviation, skewness and kurtosis of daily closing prices of all the selected indices are computed for the total period defined in the study. The values of these descriptive statistics give an impression about the nature of data in the time series and these values in this case specifically are helpful to know the average performance of the sample indices and stocks over the period of the study. The formula used for the above moments are stated below:

And find that u_t [i.e. the linear combination $\text{Index1}_t - \beta_1 - \beta_2 \text{Index2}_t$] is $I(0)$ or stationary, then we say that the variables Index1 and Index2 are cointegrated; so to speak, they are on the same wavelength. It should be noted here that the nonstationarity of the time series data should comply here to the condition that they are going to be integrated of same order i.e. they will become stationary after uniform number of differences. This method of detecting cointegration has been developed by Engle and Granger. Another method for testing cointegration is the Johansen test, named after Soren Johansen, is a procedure for testing co-integration of several $I(1)$ time series. This test permits more than one co-integrating relationship so is more generally applicable than the Engle–Granger test which is based on the Dickey–Fuller (or the augmented) test for unit roots in the residuals from a single (estimated) co-integrating relationship. Both of the suggested methods for cointegration has been adopted in the present study to detect financial integration.

3. Results

The results of empirical investigations have been summarized in the following descriptions sequentially as per the analyses discussed in the previous section.

3.1. Descriptive Statistics

Table 3.1 presents the descriptive statistics obtained from the level data. It includes descriptive statistics like: Mean, Median, Standard Deviation, Skewness and Kurtosis of the ten variables:

MerVal, Bovespa, Shanghai Composite, Athex Composite, BSE 30, Jakarta Composite, KLSE Composite, IPC, KOSPI Composite and Taiwan Weighted. In addition to these, the table also reveals the computed value of Jarque Bera (JB) and its respective p-values for each of level data series at 5% level of significance.

Table 3.1							
Descriptive Statistics & Normality Test Results of Level Data							
Index Name	Mean	Median	SD	Skew.	Kurt.	JB	Prob.
MerVal	3022.2	1672.5	3834.0	2.1	6.5	5847.1	0.00
Bovespa	37391.4	40309.0	20850.6	0.0	1.4	489.9	0.00
Shanghai Composite	2193.1	2041.3	923.6	1.3	4.8	1981.2	0.00
Athex Composite	2417.5	2204.9	1326.0	0.6	2.5	358.3	0.00
BSE 30	12524.1	12019.7	8251.3	0.4	1.8	390.4	0.00
Jakarta Composite	2212.4	1563.2	1745.9	0.5	1.7	534.2	0.00
KLSE Composite	1095.2	933.3	417.5	0.4	1.9	344.5	0.00
IPC	23016.1	21994.0	15226.9	0.1	1.4	521.3	0.00
KOSPI Composite	1325.5	1374.3	580.2	-0.1	1.5	490.3	0.00
Taiwan Weighted	7283.5	7570.3	1482.9	-0.4	2.2	235.1	0.00
Note: Null Hypothesis: Level data series follow normal distribution. Alternative Hypothesis: Level data series do not follow normal distribution.							
Source: Compiled from E-Views Output							

The average daily closing level price and standard deviation for the stock market indices are almost different for the period under study. The skewness statistics of daily data whether found to be positive or negative, but are less than 1 for all the indices except MerVal and Shanghai Composite indicating that the level data distribution is almost symmetric. In case of MerVal and Shanghai Composite, the distribution is asymmetric. Kurtosis is less than or almost equal to three for all the indices again except MerVal and Shanghai Composite during the period suggests that the underlying data is platykurtic i.e. squat with short tails about the mean, which indicates that the data is not normally distributed. MerVal and Shanghai Composite kurtosis values are more than three i.e. 6.5 and 4.8 respectively which indicates that the distributions for them are having high kurtosis. Additionally the application of Jarque-Bera (JB) statistics calculated to test the null hypothesis of normality in the data rejects the normality assumption at 5% level of significance. The results confirm the well known fact that daily level data of the indices under consideration are not at all normally distributed and so they are skewed.

The graphical presentations of the variables seemed of having a trend, implying that the data are non-stationary in nature. However, the results of ADF Test and PP Test are given in Table

3.2. In case of Dickey Fuller (DF) Test, there may create a problem of autocorrelation. To tackle autocorrelation problem, Dickey Fuller have developed a test that has three shapes which has been already discussed in the previous section i.e. methodology. From the application of ADF Test, we come to a conclusion that the level data of selected stock indices are nonstationary and in order to verify the results the PP Test has also been performed which gave similar results. But, when the ADF and PP Tests are again applied to the first differences of the selected indices, they became stationary (See Table 3.3). Hence, it implies that since all the selected indices are nonstationary in their level form and are becoming stationary in their first difference, we may call them integrated of order '1' i.e. I (1)

Table 3.2 ADF & PP Test Results Of Level Data						
Index Name	ADF Test Results			PP Test Results		
	Computed Value	Critical Value at 5% Level	P Value	Computed Value	Critical Value at 5% Level	P Value
MerVal	0.32	-3.41	0.99	0.44	-3.41	0.99
Bovespa	-2.26	-3.41	0.45	-2.10	-3.41	0.53
Shanghai Composite	-2.34	-3.41	0.40	-2.28	-3.41	0.44
Athex Composite	-2.17	-3.41	0.50	-2.11	-3.41	0.53
BSE 30	-2.97	-3.41	0.13	-2.83	-3.41	0.18
Jakarta Composite	-2.68	-3.41	0.24	-2.65	-3.41	0.25
KLSE Composite	-3.06	-3.41	0.07	-3.07	-3.41	0.06
IPC	-3.10	-3.41	0.10	-2.76	-3.41	0.20
KOSPI Composite	-3.17	-3.41	0.09	-3.20	-3.41	0.08
Taiwan Weighted	-3.09	-3.41	0.10	-3.08	-3.41	0.10

Note: Null Hypothesis: There is unit root. Alternative Hypothesis: There is no unit root
Source: Compiled from E Views Output

Table 3.3 ADF & PP Test Results Of First Difference in Level Data						
	ADF Test Results			PP Test Results		

Index Name	Computed Value	Critical Value at 5% Level	P Value	Computed Value	Critical Value at 5% Level	P Value
MerVal	-64.85	-3.41	0.00	-64.73	-3.41	0.00
Bovespa	-70.81	-3.41	0.00	-71.03	-3.41	0.00
Shanghai Composite	-31.70	-3.41	0.00	-68.05	-3.41	0.00
Athex Composite	-61.43	-3.41	0.00	-61.11	-3.41	0.00
BSE 30	-64.28	-3.41	0.00	-64.29	-3.41	0.00
Jakarta Composite	-42.44	-3.41	0.00	-64.23	-3.41	0.00
KLSE Composite	-66.68	-3.41	0.00	-66.69	-3.41	0.00
IPC	-65.41	-3.41	0.00	-65.57	-3.41	0.00
KOSPI Composite	-67.22	-3.41	0.00	-67.19	-3.41	0.00
Taiwan Weighted	-66.26	-3.41	0.00	-66.28	-3.41	0.00

Note: Null Hypothesis: There is unit root. Alternative Hypothesis: There is no unit root
Source: Compiled from E Views Output

Now, we may proceed for a test of cointegration. For pair wise test of cointegration, the precondition is that both the variables should be integrated of same order. Since the selected series of data are nonstationary in the level and stationary in the first differences, it is known to be integrated of order '1'. The level at which the data is found to be stationary is called the order of integration for that data series. Detection of cointegration through the method suggested by Engle and Granger has been done here by taking the financial time series on a one to one basis. Here, the two variables have been tested for their long run relationship interdependence by means of Ordinary Least Squares (OLS) regression of BSE 30 on any one of the selected indices first and then the selected one on BSE 30. The linear association can be tested between the variables by testing the significance of the β coefficient. As shown in Table 3.4, the β coefficient for regression of BSE 30 on the selected indices is given and for all the cases the p-value is 0.00. But there remains the symptom of spurious regression here as the R-squared value in the respective cases is greater than Durbin-Watson (DW) statistics. As the regression results are showing symptoms of spurious regression, if the residuals of the model will be found stationary, then it would remain no longer spurious, we can accept the model. If the residual of the model is found stationary, it also mean that variables in the model are cointegrated or they have long-run relationship or equilibrium relationship between them. In other words, the model is a long-run model. After estimating the model, in order to know whether the residual are stationary or not, we run the ADF Test on residual, but we need the Engle Granger critical values i.e. -3.34 at 5% level for the unit root testing. Here, the ADF test statistic is found to be less than -3.34 at 5% level in all the cases except for KLSE Composite, IPC and Taiwan Weighted of Malaysia, Mexico and Taiwan respectively, which implies that null hypothesis of the presence of unit root is accepted. It means the residual is not stationary,

hence BSE 30 and any of the indices except KLSE Composite, IPC and Taiwan Weighted are not cointegrated. Further, the regression of the selected indices on BSE 30 has been computed. As shown in Table 3.5, the β coefficient for regression of the selected indices on BSE 30 has been computed and p-value is found to be 0.00 for all the cases. But there remains the symptom of spurious regression here as the R-squared value is greater than Durbin-Watson statistic in all the cases. Then the same procedure of testing for the presence of unit root in the residuals has been followed and it has been found that except KLSE Composite, IPC and Taiwan Weighted, all the other indices are not cointegrated with BSE 30.

Table 3.4

Regression Results with BSE 30 as Dependent Variable

Index Name	Coefficient	p val.		DW Stat.	ADF Test Statistic for Residual	Engle Granger Critical Value (5%)
MerVal	1.77	0.00	0.68	0.00	-0.31	-3.34
Bovespa	0.34	0.00	0.73	0.00	-1.79	-3.34
Shanghai Composite	6.10	0.00	0.48	0.00	-2.99	-3.34
Athex Composite	-2.52	0.00	0.18	0.00	-2.14	-3.34
Jakarta Composite	4.56	0.00	0.93	0.00	-2.69	-3.34
KLSE Composite	17.12	0.00	0.90	0.01	-3.46*	-3.34
IPC	0.52	0.00	0.94	0.01	-3.42*	-3.34
KOSPI Composite	13.40	0.00	0.88	0.00	-2.79	-3.34
Taiwan Weighted	3.67	0.00	0.43	0.00	-4.17*	-3.34

Note: Null Hypothesis: There is unit root. Alternative Hypothesis: There is no unit root. '*' = Null Hypothesis Rejected/Significant at 5% Level

Source: Compiled from E Views Output

Table 3.5

Regression Results with BSE 30 as Independent Variable

Index Name	Coefficient	p val.		DW Stat.	ADF Test Statistic for Residual	Engle Granger Critical Value (5%)
MerVal	0.38	0.00	0.68	0.00	0.32	-3.34

Bovespa	2.16	0.00	0.73	0.00	-1.74	-3.34
Shanghai Composite	0.07	0.00	0.48	0.00	-2.61	-3.34
Athex Composite	-0.07	0.00	0.18	0.00	-2.06	-3.34
Jakarta Composite	0.20	0.00	0.93	0.00	-2.50	-3.34
KLSE Composite	0.05	0.00	0.90	0.01	-3.63*	-3.34
IPC	1.79	0.00	0.94	0.01	-3.45*	-3.34
KOSPI Composite	0.06	0.00	0.88	0.00	-2.85	-3.34
Taiwan Weighted	0.11	0.00	0.43	0.00	-3.35*	-3.34

Note: Null Hypothesis: There is unit root. Alternative Hypothesis: There is no unit root. '*' = Null Hypothesis Rejected/Significant at 5% Level

Source: Compiled from E Views Output

After the results of cointegration through the methodology suggested by Engle and Granger are in hand, in order to verify it the Johansen's test got conducted in the present study. Table 3.6 shows that for emerging economies the Johansen's test of cointegration detected three cointegrating equations. It is because the null hypothesis that there is at most two cointegrating equations has been rejected and the null hypothesis that there is at most three cointegrating equations has been accepted as per results of the test. Here, the Johansen's test results for emerging economies are also in line with the results of tests by Engle and Granger technique. As discussed earlier BSE 30 of India is cointegrated with three emerging markets indices i.e. KLSE Composite of Malaysia, IPC of Mexico and Taiwan Weighted of Taiwan and these indices are also cointegrated with BSE 30 of India as per Engle and Granger cointegration test results. And the same number of cointegrating equations i.e. three has been detected here through Johansen's test also. It should be noted here that while conducting Johansen's test for cointegration, MerVal of Argentina has not been taken into account. It is because, it has been already discovered through Engle and Granger test that MerVal of Argentina is not cointegrated with BSE 30 of India. And since Argentina is a frontier market, in order to restrict the Johansen's test to emerging economies only, Argentina has not been included while performing the test of cointegration by Johansen's method.

Table 3.6				
Trace Test and Maximul Eigen Value Test for Emerging Economies				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.015	198.339	197.371	0.009
At most 1*	0.012	167.191	159.530	0.041

At most 2*	0.008	126.024	125.615	0.047
At most 3	0.005	63.713	95.754	0.892
At most 4	0.004	45.142	69.819	0.826
At most 5	0.004	29.997	47.856	0.719
At most 6	0.002	16.041	29.797	0.709
At most 7	0.002	7.340	15.495	0.538
At most 8	0.000	0.003	3.841	0.957

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.015	64.148	58.434	0.012
At most 1*	0.012	53.166	52.363	0.031
At most 2*	0.008	50.311	46.231	0.043
At most 3	0.005	18.571	40.078	0.988
At most 4	0.004	15.145	33.877	0.973
At most 5	0.004	13.956	27.584	0.826
At most 6	0.002	8.701	21.132	0.856
At most 7	0.002	7.337	14.265	0.450
At most 8	0.000	0.003	3.841	0.957

Max-Eigen value test indicates 3 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values

4. Conclusions

The present study had been initiated with the objective to detect financial integration of Indian economy with the leading emerging and frontier markets of the world by application of the methodology of cointegration. And as per the results of cointegration tests conducted on stock indices selected from India and other emerging and frontier markets through the method suggested by Engle and Granger and then by Johansen; it has been found that Indian economy is financially integrated in a real sense with three emerging economies i.e. Malaysia, Mexico and Taiwan. So, it can be said that even if India is not fully integrated, but still it is at least in the process of getting financially integrated with the emerging economies of the world. This finding is on the basis of the fact that during the past years, the Indian financial markets could establish long run equilibrium with three major emerging financial markets of the world namely, Malaysia, Mexico and Taiwan.

4.1. Policy Implications

Though international financial integration alone does not guarantee the establishment of a perfectly competitive market, it is still desired at least for attending price equilibrium. And if the Indian economy will succeed in achieving international financial integration with most of the emerging and frontier financial markets of the world, then it will be tremendously beneficial for the economy. However, it will never happen automatically and consistent regulatory efforts are essential. It is visible from the results that there exists a multilateral setting in external economic policies of India and that is why inter-regional integration is missing. This should be taken as the main implication of our study for further policy interventions.

4.2. Scope for further research

There are two limitations of the present study. First, it considered only the stock indices for detecting cointegration, there are many other variables belonging to international financial markets like interest rates which can be taken into account for this purpose. Second, the Error Correction Mechanism (ECM) and Vector Auto Regressive (VAR) models have not been implemented in the present study after the tests of cointegration. ECM and VAR can give additional insights to the analysis. These two limitations are expected to be taken care of in future researches.

4.3. Acknowledgements

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