Stock Market Integration and Financial Crisis in Asian Economies: An Empirical Analysis

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Abstract- The present paper conducts an extensive and comprehensive study for understanding the extent of stock market interdependence among three emerging Asian economies and the changes in the extent of interdependence overtime with specific reference to the Global Financial Crisis 2008-09. The data set span for a period of eleven years from April 2007 to March 2018. The long-run relationship has been tested for the three periods [pre-crisis, crisis, and post-crisis]. For this purpose, Johansen's cointegration test, VECM, Impulse response function and variance decomposition has been applied. The results obtained in the study suggest that all the markets analyzed reacted differently in different period. In the pre-crisis period, the Taiwan Stock Exchange (TWII) and South Korea Stock Exchange (KS11) were found to be interdependent with an adjustment speed of 5.74% respectively towards the long run equilibrium. However, the study does not find any long run relationship of NIFTY with TWII and KS11. During the crisis period, the cointegration test applied pair-wise on the markets revealed that only National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII) exhibit a long run relationship with 12.69 % adjustment speed in case of any deviations from the long run equilibrium. All the other markets lack to show any evidence of such long run relationship with each other. Further, in the aftermath of crisis the markets behaved differently thus changing the long run relationship among markets. No evidence of any long run interlinkages was found among the markets in the post crisis period.

Introduction

One of the key themes of the present day is stock market integration and all the economies are adopting policies to make their markets more attractive to global financial flows for the sole purpose of economic growth and development. The proposed reasons for such interest in this theme include increased global capital flows, diversification benefits, and market growth. On the other hand, the integration of markets also poses some degree of threat to integrated markets, such as spillover, contagion and may lead to crisis. On the contrary, increased integration can also be seen as a "double-edged sword". It brings benefits such as portfolio diversification and market development, but on the other hand, it also makes markets more vulnerable to crises and spillovers. If markets are more correlated today, it could be because people are diversifying by investing globally but when something bad happens in the world, they sell assets across all markets, and the whole diversification strategy becomes questionable. All the benefits of market interdependence become questionable when there is a spillover or crisis.

If markets are more correlated, it could be because market participants are diversifying by investing around the world, but when something bad happens at macro level, investors tend to sell across all markets and the entire diversification strategy becomes questionable. Hence, all the advantages of market integration become questionable when crisis occur. The 2008-09 global financial crisis, which began as a small shock in a segment of the US market, quickly spread to all segments and most of the global economy, including developed and developing economies. The Asian economies were also affected by the crisis. However, the impact on Asian markets has been limited, as they are not exposed directly to the US asset segments that are problematic (Park & Lee ,2011).

While the analysis of dynamic market connections in the short and long term is of utmost importance to investors, policy-makers and economies, the study of changes in these connections in turbulent periods gained greater significance in recent times, particularly after the GFC (Global Financial Crisis) of 2008.

Review of Literature

Aswani J. (2017) examines the network dynamics of fourteen Asian Stock Markets (ASMs) in three phases (pre, during, and post) of financial crisis of 2008. Based on network statistics, I find that ASMs network is more interconnected during the crisis period than pre-and post-crisis period. Furthermore, using the Minimum Spanning Tree (MST) diagram, I find that the stock markets of Hong Kong, Japan, Korea, and India play a significant role in these networks and any shock to these markets can lead to contagion. The trade and the interest rate differential are the major driving forces behind these linkages. This work has practical implications as it provides insight on portfolio diversification during the crisis period and can also be used in anticipating the route of crisis.

Beirne J. & Gieck J. (2012) provides an empirical assessment of interdependence and contagion across three asset classes (bonds, stocks, and currencies) for over 60 economies over the period 1998 to 2011. Using a global VAR, we test for changes in the transmission mechanism – both within and cross-market changes - during periods of turbulence in financial markets. Our results suggest that within-market effects over the sample period for each asset market are highly significant for advanced economies.

Dhal S. (2009) derives some crucial insights from the multivariate cointegration analysis of stock price indices for the global markets of the US, the UK and Japan and select regional markets such as Hong Kong, Singapore and India, with a focus on the latter, a leading emerging market economy. These markets shared a single cointegration relationship and the Indian market played the key role. The analysis for the full sample and the subsample (excluding the crisis phase) showed that the global crisis could not have been associated with the breakdown of the long-run relationship among the markets.

Bekaert G., Harvey C. & Ng A. (2005) takes, as a starting point, a two-factor model with time-varying betas that accommodates various degrees of market integration between different markets. We apply this model to stock returns in three different regions: Europe, South-East Asia, and Latin America. In addition to providing new insights on contagion during crisis periods, we document patterns through time in world and regional market integration and measure the proportion of volatility driven by global, regional, and local factors.

The paper looks at how the co-movement of seven countries' stock markets has changed over the periods before, during and after the Asian ®nancial crisis. To see this, we conducted correlation coef®cients tests, co-integration tests, and Granger causality tests. The main ®ndings are as follows.

Before the crisis, there is almost no co-movement in the stock markets of seven Asian countries. However, uni-directional and bi-directional linkage among Asian equity markets has increased sharply since the ®nancial crisis struck Asia in June 1997. In particular, a drastic increase in the co-movement among the four Southeast Asian countries of Hong Kong, Thailand, Indonesia, and Singapore is notable. During the 8 months of the post-crisis periods after January 1998 when the ®nancial crisis reached the peak and the corresponding 8 months in 2000, the strong co-movement is still found and in some cases, the linkage among Asian stock markets gets even stronger.

Major difference between this study and Malliaris and Urrutia (1992), which looked at the linkage among the major stock markets around the October crash of 1987 is that they report the crash increases the co-movement of world stock markets but after the crash, they ®nd no signi®cant linkage among stock markets. In our study, however, the co-movement of Asian stock markets remains strong even after the Asian ®nancial crisis The paper looks at how the co-movement of seven countries' stock markets has changed over the periods before, during and after the Asian ®nancial crisis. To see this, we conducted correlation coef®cients tests, co-integration tests, and Granger causality tests. The main ®ndings are as follows.

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Kim B., Kim H. & Lee B. (2015) examine spillover effects of the recent U.S. financial crisis on five emerging Asian countries by estimating conditional correlations of financial asset returns across countries using multivariate GARCH models. We propose a novel approach that simultaneously estimates the conditional correlation coefficient and the effects of its determining factors over time, which can be used to identify the channels of spillovers. We find some evidence of financial contagion around the collapse of Lehman Brothers in September 2008. We further find a dominant role of foreign investment for the conditional correlations in international equity markets. The dollar Libor-OIS spread, the sovereign CDS premium, and foreign investment are found to be significant factors affecting foreign exchange markets.

Li V. & Daly H. (2017) assesses China's integration with the global stock market during crisis and non-crisis periods within a two-beta Capital Asset Pricing Model framework. We obtain time varying global and national systematic risks for ten Chinese sectors from a state-space representation and investigate how these risks are priced within and without crisis. Crisis is modelled by, firstly, a dummy variable approach and, secondly, the Markov regime-switching technique. Consistent with the literature, the degree of integration with the global market is found to be strengthened in crises. Complete integration is, however, only evident in the recent financial crisis and then not in all sectors. In other high-volatility episodes, partial integration is more evident, suggesting the opportunity for international risk diversification into China even in crises. Particular to the Chinese context, the weak integration of some sectors that appear to show financial openness may be because public sector equity holdings leave those sectors exposed to national systematic risk through a political channel.

Different studies by ardent researchers in different countries in the context of stock market integration and crisis have documented assorted conclusions during different time periods and different crises. It becomes pertinent to explore the said dimension through further empirical investigations.

Although the study of dynamic market linkages in the short run and long run is of extreme prominence for the investors, policy makers and the economies, the analysis of changes in these linkages in turbulent period gained more importance in the recent times, more specifically after the Global Financial Crisis (GFC) 2008. The present paper studies the market interdependence of the National Stock Exchange (NIFTY), South Korea Exchange (KS11) and Taiwan Stock Exchange (TWII) during the tranquil period, period of crisis and afterwards.

Objectives

The present study examines the changes in the long run relationship among the stock markets of the emerging Asian economies viz. India, Taiwan and South Korea with special reference to global financial crisis 2008-09. As each stock market behaves differently and adopts varied approach to cope up with the crisis, its linkages with other markets also vary considerably. This study explores how the market linkages change during the global financial crisis 2008-09.

Data

In the context of the global financial crisis of 2008-09, the main focus of the study is on the volatility of the relationship between the emerging economies of India, Taiwan and South Korea. The study accommodated the following indices: CNX NIFTY: National Stock Exchange, TWII: Taiwan Stock Exchange and KS11: South Korean Stock Exchange.

Daily data of all the indices representing the markets has been used. The data covers 11 years, starting in April 2007 and ending in March 2018 and has been decomposed into three sub-periods: before the crisis (from April 2007 to August 2008), during the crisis (from August 2008 to September 2009) and after the crisis (from September 2009 to March 2018). Data has been retained on a daily basis and spans an extensive eleven-year period, beginning in April 2007 and ending in March 2018. The data has been broken down into three distinct periods: the pre-crisis (April 2007-August 2008), the crisis (September 2008-August 2009), and the post-crisis (September 2009-March 2018). The data has been adjusted for the days on which all markets were open. Market indices have been reported in their own currency rather than being converted into a common currency.

Methodology

The daily stock market indices data for the sample markets has been collated then converted into its natural logarithmic form to facilitate further analysis using the following formula:

$\mathbf{R_t = \ln (P_t/P_{t-1})}$

In general, time series data is not stationary. Therefore, before using any model or method, it is necessary to check the unit root characteristics of data series. Forecasting based on stochastic data series can be misleading. The ADF test is one of the most commonly used ADF tests to check unit root characteristics of a time series. The time series variables considered in this paper are daily stock indices prices of sample countries and the ADF unit root test is performed by using the following equations:

$$\Delta Y_t = \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots Equation\ 1$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots Equation\ 2$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 t + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots Equation\ 3$$

When the relationship between two nonstationary series is linear and stationary, it is called the cointegration relationship. To evaluate the cointegration relation, we have applied the cointegration function to the data. Johansen's cointegration function was developed in 1990 by Johansen & Jesulius. It is the most powerful cointegration function available to date. The fundamental premise of this function is that two variables should have the same order of integration. The hypothesis to be tested under this function is whether or not there is cointegration between the variables. Rejecting the null hypothesis means that there is at least one Cointegrating vector and that the long run equilibrium relation between the variables is confirmed.

In case of existence of co-ingration between variables, ECM has been used to evaluate the short-run dynamics of the relationship between the markets. Once the co-integration relationship has been established, it is used to construct the Error Correction Model (ECM). The ECM determines the rate of adjustment to the long-run equilibrium whenever there are short-term deviations from the long-term equilibrium. A negative ECT coefficient shows convergence and a positive one shows divergence. A zero ECT coefficient shows no adjustment and a 100 ECT indicates immediate adjustment. ECM for the co-integrating relationship is as follows:

For Pre-Crisis Period:

South Korea Stock Exchange (KS11) and Taiwan Stock Exchange (TWII):

$$\Delta KS11_t = \alpha_0 + \beta_0 + \sum_{j=1}^{p} \delta_j \Delta KS11_{t-j} + \sum_{j=1}^{q} \gamma_j \Delta TWII_{t-j} + £ECT_{t-1} + \varepsilon_{t2}$$

For Crisis Period:

National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII):

$$\Delta NIFTY_t = \alpha_0 + \beta_0 + \sum_{j=1}^{p} \delta_j \Delta NIFTY_{t-j} + \sum_{j=1}^{q} \gamma_j \Delta TWII_{t-j} + £ECT_{t-1} + \varepsilon_{t1}$$

Consequent upon the ECM outputs, impulse response function analysis uses VAR models as a basis and describes a variable's response to an impulse in one or more other variables. When a variable reacts to an impulse in other variables, the second variable is defined as the cause of the first. The causal relationship is tested by looking at how an exogenous shock (or innovation) in one variable affects the dependent variables. For the purposes of this study, IRF takes into account the time taken by markets to respond to information, innovations, and shocks in other markets, and then return to normal.

Subsequently, variance decomposition is done to explore the extent of information each variable contributes to the other variables in the auto-regression. It specifies the proportion of the movements in the dependent variables as explained by their 'own' shocks, contrasted with shocks to the other variables. Any shock to the n^{th} variable would affect the same variable as well as its effects would also be transferred to the other variables in the VAR system. In general, it is evident that to a larger extent most of variables are explained by their own shocks.

Empirical Results

The test results of ADF test are documented in Table 1. Variables has been tested both with intercept and trend. The results of the ADF test at the level suggest all the variables are non-stationary at level. The corresponding p-values are greater than five percent and thus the null hypothesis cannot be rejected for all the four variables. The results of the ADF test at the first difference display that the p-value is less than five percent and the corresponding test statistics is greater than the critical value at five percent level for all the variables. Thus, the null hypothesis of 'unit root' can be rejected. Based on the test results, all three variables are integrated of same order i.e. I (1).

Table 1: ADF Test Outputs during Pre-Crisis Period

ADF Test Outputs during Pre-Crisis Period					
		Intercept		Trend & Intercept	
		Level	**1st Diff**	**Level**	**1st Diff**
CNX NIFTY	t- Statistics	-2.102624	-18.24269	-1.83516	-18.35374
	P-Value	0.2439	0	0.6854	0
KS11	t- Statistics	-1.681337	-17.06152	-2.134151	-17.28688
	P-Value	0.4398	0	0.5243	0
TWII	t- Statistics	-1.258147	-18.25364	-2.081705	-18.32088
	P-Value	0.6497	0	0.5563	0

Source: Computed

To test the existence of any long run relationship between the three emerging markets i.e. National Stock Exchange (NIFTY), Taiwan Stock Exchange (TWII) and South Korea Stock Exchange (KS11) for the pre-crisis period (April 2007- August 2008), Johansen's cointegration test has been applied and the results are summarized in Table 2.

Table 2: Co-integration Test outputs for Pre-Crisis Period

Co-integration Test outputs for Pre-Crisis Period					
Null Hypothesis		**Eigen Value**	**Trace**	**Critical Value**	**Prob.**
NIFTY-TWII	None	0.014586	7.139886	15.49471	0.5614
NIFTY-KS11	None	0.017594	8.83083	15.49471	0.3813
KS11-TWII	None	0.046138	17.84681	15.49471	0.0217

Source: Computed

The output reported in Table 2 testing the null hypothesis of no cointegration displays the trace statistics. The trace statistics has been reported to be greater than the critical value in case of South Korea Stock Exchange (KS11) & Taiwan Stock Exchange (TWII). Besides, the p-value is also statistically significant thus indicating long run relationship between South Korea Stock Exchange (KS11) & Taiwan Stock Exchange (TWII). In all the other cases, the trace statistics values are less than the respective critical value and the p-value is also more than 5% i.e. statistically insignificant thus implying no long run relationship between National Stock Exchange (NIFTY) & Taiwan Stock Exchange (TWII) and National Stock Exchange (NIFTY) & South Korean Stock Exchange (KS11) during the pre-crisis period.

Considering the long run relationship between the variables, the study proceeds to capture the short-run dynamics by generating an error correction term (ECT). The ECT_{t-1} coefficient represents the speed of adjustment towards the long run equilibrium. The results reported in Table 3 reveal that the short run impact is statistically significant and negative. The result affirms that there could be deviations from the equilibrium in the short run, however, it will converge at a speed of 57.45 % in case of South Korea Stock Exchange (KS11) and Taiwan Stock Exchange (TWII).

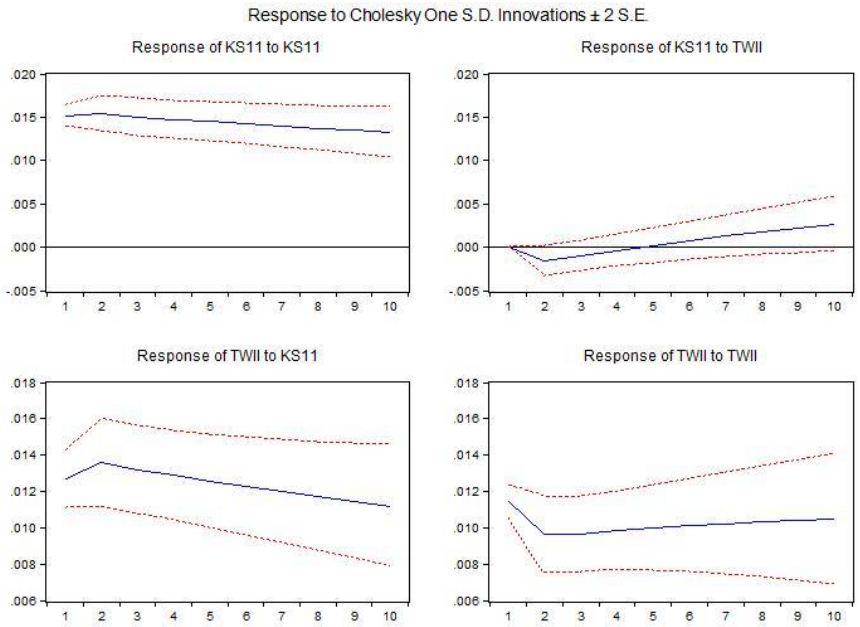
Table 3: Error Correction Representation

Null Hypothesis	**Coefficient**	**Probability**
KS11-TWII	-0.057450	0.0016

Source: Computed

Impulse response function estimations provide insight on how an innovation or shock in a particular market in the arrangement affected other markets through dynamic interactions among markets. The results have been displayed in Graph 1.

Graph 1:Impulse Response of NIFTY and TWII during Pre-Crisis Period



TWII and KS11 reported a moderate response during the pre-crisis period. The response for a shock in the Taiwan Stock Exchange (TWII) on KS11 reported a significant influential response. In case of a shock in South Korea Stock Exchange (KS11), the response of TWII remained insignificant in the initial period but it responded positively in later period.

To understand the movement of returns in a particular exchange as explained by its own shock, and, shock in other exchanges, Forecast Error Variance Decomposition has been used. The variance decomposition table provides the percentage of forecast error variance which is attributable to prior innovations from itself and from other series. The output for pre-crisis period has been summarized in Table 4.

Table 4: Variance Decomposition of KS11 and TWII

Variance Decomposition of KS11					**Variance Decomposition of TWII**			
Period	**S.E.**	**KS11**	**TWII**		**Period**	**S.E.**	**KS11**	**TWII**
1	0.01519	100	0		**1**	0.01708	55.2805	44.7195
2	0.02169	99.4585	0.54154		**2**	0.02385	60.7239	39.2761
3	0.0264	99.4885	0.51151		**3**	0.02891	62.1099	37.8901
4	0.03024	99.5948	0.40518		**4**	0.03314	62.3553	37.6448
5	0.03354	99.6667	0.33331		**5**	0.03683	62.1669	37.8331
6	0.03644	99.6745	0.32553		**6**	0.04012	61.7707	38.2294
7	0.03905	99.6093	0.39074		**7**	0.04311	61.2635	38.7365
8	0.04143	99.4699	0.53007		**8**	0.04586	60.6946	39.3054
9	0.04363	99.2588	0.74123		**9**	0.0484	60.0912	39.9088
10	0.04567	98.9798	1.02023		**10**	0.05077	59.4698	40.5302

Source: Computed

The test results of ADF test are documented in Table 5 for the crisis period. Variables has been tested both with intercept and trend. The results of the ADF test at the level suggest all the variables are non-stationary at level. The corresponding p-values are greater than five percent and thus the null hypothesis cannot be rejected for all the four variables. The results of the ADF test at the first difference display that the p-value is less than five percent and the corresponding test statistics is greater than the critical value at five percent level for all the variables. Thus, the null hypothesis of 'unit root' can be rejected. Based on the test results, all three variables are integrated of same order i.e. I (1).

Table 5: ADF Test Outputs during Crisis Period

ADF Test Outputs during Crisis Period					
Indices		Intercept		Trend & Intercept	
		Level	1st Diff	Level	1st Diff

CNX NIFTY	t- Statistics	-0.891213	-13.17541	-2.417333	-13.39648
	P-Value	0.7897	0	0.3695	0
KS11	t- Statistics	-1.202747	-13.76163	-2.404797	-13.82889
	P-Value	0.6736	0	0.376	0
TWII	t- Statistics	-1.034447	-13.43744	-3.07581	-13.61157
	P-Value	0.741	0	0.1148	0

Source: Computed

Based on the outputs of ADF test, co-integration test is conducted on sample indices. The results documented in Table 6 shows the trace statistics The trace statistics has been reported to be significant in case of National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII). Besides, the p-value is also statistically significant thus indicating long run relationship among 'National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII). Further, long run relationship is not found in other combinations.

Table 6: Co-integration Test outputs for Crisis Period

Co-integration Test outputs for Crisis Period					
Null Hypothesis					
		Eigen Value	Trace	Critical Value	Prob.
NIFTY-TWII	None	0.070841	18.18186	15.49471	0.0192
NIFTY-KS11	None	0.047748	12.0362	15.49471	0.1552
KS11-TWII	None	0.051729	13.86759	15.49471	0.0866

Source: Computed

Once the long run relationship was established between the variables, the study moves forward to capture the short-run dynamics by generating an error correction term (ECT). The results reported in Table 7 reveal that the short run impact is statistically significant and negative. The result affirms that there could be deviations from the equilibrium in the short run, however, it will converge at a speed of 12.69 % in the long-run in case of NIFTY &TWII.

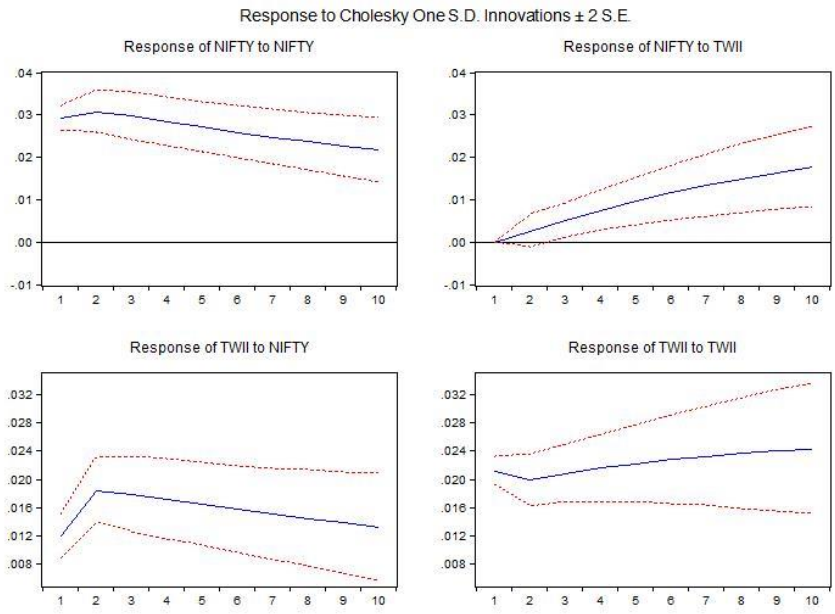
Table 7: Error Correction Representation

Null Hypothesis	**Coefficient**	**Probability**
NIFTY-TWII	-0.126909	0.0001

Source: Computed

Impulse response function indicates how an innovation or shock in a particular market in the arrangement affected other markets through dynamic interactions among markets. The results for the crisis period have been documented in Graph 2. Firstly, in response to a shock in National Stock Exchange (NIFTY), TWII reported an insignificant response during the crisis period. The responsiveness for a shock in the Taiwan Stock Exchange (TWII) has been noteworthy as NIFTY reported a substantial influential response.

Graph 2: Impulse Response of NIFTY and TWII during Crisis Period



The output of variance decomposition for crisis period has been summarized in Table 8. The results reveal that a major proportion of movement in all the markets were affected by their own shocks or innovations and other markets make only a moderately significant contribution to their movements. The results of National Stock Exchange (NIFTY) exhibited a strong endogenous impact implying major movements in the NIFTY was explained by its own innovations itself with a moderate contribution from TWII. The volatility in the Taiwan Stock Exchange (TWII) was partially explained by innovations in itself in the short horizon with significant influence from NIFTY in the short as well as long horizon.

Table 8: Variance Decomposition of NIFTY and TWII during Crisis

Variance Decomposition of NIFTY					Variance Decomposition of TWII			
Period	S.E.	NIFTY	TWII		Period	S.E.	NIFTY	TWII
1	0.0293	100	0		1	0.024304	24.10762	75.89238
2	0.042561	99.63533	0.364666		2	0.036396	36.34652	63.65348
3	0.052127	98.79499	1.205011		3	0.04558	38.53663	61.46337
4	0.059809	97.52753	2.472471		4	0.05326	38.59762	61.40238
5	0.06636	95.89313	4.106865		5	0.06	37.90648	62.09352
6	0.072166	93.9556	6.044403		6	0.066079	36.91612	63.08388
7	0.07745	91.77868	8.22132		7	0.071658	35.80853	64.19147
8	0.082354	89.42323	10.57677		8	0.076836	34.6685	65.3315
9	0.086969	86.94505	13.05495		9	0.081681	33.53894	66.46106
10	0.091358	84.3936	15.6064		10	0.086241	32.44236	67.55764

Source: Computed

The results of the ADF test for the post-crisis period have been documented in Table 9. The results of the ADF test at the first difference display that the p-value is less than five percent and the corresponding test statistics is greater than the critical value at five percent level for all the variables. Thus, the null hypothesis of 'unit root' can be rejected. Based on the test results, NIFTY, TWII and KS11 were integrated of same order.

Table 9: ADF Test Outputs during Post-Crisis Period

ADF Test Outputs during Post-Crisis Period					
Indices		Intercept		Trend & Intercept	
		Level	1st Diff	Level	1st Diff
CNX NIFTY	t- Statistics	-0.95764	-39.9995	-2.74977	-39.9891
	P-Value	0.7699	0	0.2166	0
KS11	t- Statistics	-2.21953	-42.78	-3.34068	-42.7686
	P-Value	0.1994	0	0.0601	0
TWII	t- Statistics	-1.70526	-41.5626	-2.76466	-41.5524
	P-Value	0.4285	0	0.2107	0

Source: Computed

To investigate the presence of any long run relationship between the variables having similar order of integration i.e. National Stock Exchange (NIFTY), Taiwan Stock Exchange (TWII) and South Korea Stock Exchange (KS11) for the post-crisis period (September 2009- March 2018), Johansen's cointegration test has been applied and the results are summarized in Table 10.

Table 10: Co-integration Test outputs of NIFTY, KS11 and TWII for Post-Crisis Period

Null Hypothesis		Eigen Value	Trace	Critical Value	Prob.
NIFTY-TWII	None	0.005303	11.08983	15.49471	0.206
NIFTY-KS11	None	0.005121	10.6109	15.49471	0.2366
KS11-TWII	None	0.00428	11.42301	15.49471	0.1868

Source: Computed

The trace statistics were found to be less than the respective critical value and the corresponding p-value to be more than 5% i.e. statistically insignificant thus implying no long run relationship between National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII), National Stock Exchange (NIFTY) and South Korean Stock Exchange (KS11) and South Korea Stock Exchange (KS11) and Taiwan Stock Exchange (TWII) during the post-crisis period.

Conclusion

The present paper conducts an extensive and comprehensive study for understanding the extent of stock market interdependence among three emerging Asian economies and the changes in the extent of interdependence overtime with specific reference to the Global Financial Crisis 2008-09. The data set span for a period of eleven years from April 2007 to March 2018. The long-run relationship has been tested for the three periods [pre-crisis, crisis, and post-crisis]. For this purpose, Johansen's cointegration test, VECM, Impulse response function and variance decomposition has been applied. The results obtained in the study suggest that all the markets analyzed reacted differently in different period. In the pre-crisis period, the Taiwan Stock Exchange (TWII) and South Korea Stock Exchange (KS11) were found to be interdependent with an adjustment speed of 5.74% respectively towards the long run equilibrium. However, the study does not find any long run relationship of NIFTY with TWII and KS11. During the crisis period, the cointegration test applied pair-wise on the markets revealed that only National Stock Exchange (NIFTY) and Taiwan Stock Exchange (TWII) exhibit a long run relationship with 12.69 % adjustment speed in case of any deviations from the long run equilibrium. All the other markets lack to show any evidence of such long run relationship with each other. Further, in the aftermath of crisis the markets behaved differently thus changing the long run relationship among markets. No evidence of any long run interlinkages was found among the markets in the post crisis period.

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