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FINANCIAL CRISIS 2008 AND ITS IMPACT ON THE STOCK MARKET INTEGRATION: A STUDY ON SOME SELECTED ASIAN MARKETS

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Abstract

This study looks into the financial market integration among some leading Stock Exchanges of Asia (BSE 30, FTSE Malaysia, Hang Seng, Kospi, Nikkei 225, SSE Composite) and the market integration between Asia and the US (S & P 500), and also examines the impact of crisis on such market integration. Granger Causality test has been applied to find out the long term interdependencies among the selected markets along with Impulse Response analysis under VAR framework to appraise the responses and short term dynamics among the Asian stock markets

Keywords: *Financial market, Financial Co-integration, Unit-root Problem, Cause-Effect Relationship, Financial Crisis, Generalized Impulse Response, VECM*

JEL Classification: *G15, C22, C18, G15, G01, C32, C52*

Introduction

Financial integration is the process through which a country's financial markets become more closely integrated with those in other countries or with those in the rest of the world. It implies the elimination of barriers for foreign financial institutions from some (or all) countries to operate or offer cross-border financial services in others.

The Indian stock market is one of the earliest in Asia being in operation since 1875, but remained largely outside the global integration process until the late 1980s. A number of developing countries in concert with the International Finance Corporation and the World Bank took steps in the 1980s to establish and revitalize their stock markets as an effective way of mobilizing and allocation of finance. In line with the global trend, reform of the Indian stock market began with the establishment of Securities and Exchange Board of India in 1988. Through a continuous process, Indian financial market is gradually co-integrating with the global financial markets.

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This paper empirically investigates the financial integration of some selected leading stock markets of Asia and also with the market leader (US S & P 500). This paper also investigates the impact of the current financial crisis (2008) on the financial integration of the stock markets of different countries of Asia. Rather than one crisis, the current financial crisis actually comprises three separate but related phases. The first phase hit the national housing market in the United States in late 2006 through early 2007, resulting in an increase in delinquencies on residential mortgages. The second phase was a global liquidity crisis in which overnight interbank markets froze. The third phase has proved to be the most serious and difficult to remedy and was initiated by the failure of Lehman Brothers in September 2008. Thus there may have a significant impact on the financial integration of the Asian stock markets effecting from the financial crisis. The paper examines the long term interdependencies among the stock markets through Granger Causality Model. The paper also investigates the long run equilibrium and short run dynamics relationship among the selected Asian markets through Johansen's Co-integration Model and Generalized Impulse Response in Vector Error Correction framework.

Survey of Literature

Numerous studies have investigated the transmission mechanisms of stock price movements across international equity markets and their magnitude and dimension of change over time. It is indeed a matter of investigation whether the variations of cross-country stock returns affect the return volatility of investment portfolios, asset prices, and the cost of capital for individuals and firms. A number of literatures have been reviewed to serve our purpose out of which a few have been mentioned as under.

Kam C. Chan, Benton E. Gup and Ming-Shiun Pan (1997) in their study investigated the integrating relationship of eighteen countries' international stock markets. The study covered a huge period of 32 years, starting from January 1961 to December 1992 and dividing whole the period into four subsections 1961-69, 1970-79, 1980-97 and 1988-92. The stock markets in the study were analyzed region-wise, both individually and collectively, to test for the market efficiency. The cross-country market efficiency hypothesis had been tested in this study by using Johansen's co-integration tests. The stock indices of equity markets that had examined in the study were all exhibited a unit root problem, suggesting that markets were efficient individually. Johansen's co-integration tests found only a small number of stock markets that evidenced the co-integrating relationship with others. Nevertheless, the number of significant co-integrating vectors increased before October 1987 stock market crash, a result that was consistent with the market segmentation hypothesis. The researchers observed that international diversification among the stock markets might be effective; as the study indicated that the stock markets did not have any co-movements in long-run.

In a study **Click and Plummer** (2005) examined the degree of financial co-integration among five South Asian (ASEAN-5) countries; Indonesia, Malaysia, the Philippines, Singapore and Thailand in the upshot of the Asian financial crisis. The empirical results of the paper found that the stock markets of ASEAN-5 in the period after the Asian financial crisis (July 1, 1998 through December 31, 2002) were co-integrated, whether analyzed using daily data and weekly data, or whether analyzed in local currencies, the US dollar, and the Japanese yen. However, the study identified only one co-integrating vector among the five stock markets, leaving four common trends among the five variables. Thus the authors opined that ASEAN-5 stocks might have integrated in economic sense and that integration was incomplete. From the perspective of the international portfolio investors, the authors suggested that the efficient flows of capital across borders within the region would have the capacity to mitigate the effects of any asymmetric macroeconomic shocks. The authors finally concluded that Stock market integration had an important component of overall economic integration of the region and might be a useful precondition for monetary unification.

Chelley, S. P. L. (2005) in his paper investigated whether the Eastern European equity markets of Hungary, Poland, Russia and the Czech Republic were heavily segmented, instead were integrated. The study had been made over a period of five years (July 1994 until December 1999). Necessary data were obtained from Datastream Database package and published documents of International Financial Statistics. Using a variety of tests the author observed a consistent increase in the co-movement of some Eastern European markets and developed markets. Using the variance decompositions under vector autoregressive framework, the author observed that global factors had an increasing influence on the equity returns for Poland and Hungary, which had been indicative of increased equity market integration of the countries. The stocks markets of Hungary and Poland had made rapid progress towards becoming an integrated market. On contrary, the author found the weakest progress towards market integration in Russia. Despite a promising move towards integration up until 1997, the Russian equity market remained the most heavily segmented Eastern European market out of the four markets studied by the researcher.

Hunter (2006) in his paper examined the financial integration of the equity markets of Argentina, Chile, and Mexico in the post-liberalization period by using American Depository Receipts (ADR). He also examined the direct and/or indirect barriers that caused any segmentation among markets. The study was based on the hypothesis that if the markets were integrated, then the prices of systematic risks of portfolios of the region's ADRs would be the same as the risk prices of the U.S. market portfolio. The researcher found that liberalization had not successfully led to a high and sustained level of integration of Latin American markets to the international capital market. The results also indicated that there had been no tendency towards the increase in the level of integration over the period and that the level of integration

in all three selected markets was negatively affected by currency crises. Additionally, the outcome of the study suggested that the countries with emerging and transitional economies, opening their markets to foreign investors through liberalization might not result full integration and thereby unable to enjoy its potential benefits.

Huyghebaert and Wang (2009) in their paper made an effort to examine the long term and short term causal relationships among the seven major stock exchanges in East Asia. They also considered the magnitude of interactions of such stock exchanges with the U S Stock market. The researchers applied multivariate Vector auto-regression (VAR) model to examine the degree of co-integration among those stock markets. The study had been made over a period of 12 years (1st July, 1992 to 30th June, 2003), dividing the time into pre-crisis, crisis and post-crisis periods, and giving a special attention to the East Asian financial crisis (1997-98). Johansen's co-integration tests had been applied to find the long-run equilibrium relationship (s), separately on pre-crisis, crisis and post-crisis periods. Granger causality test had also been applied to find the cause-effect relationships among the stock market prices. The study found that, in pre-crisis period the stock markets in East Asia, except Shanghai and Shenzhen, responded to world-wide shocks. Regional innovations had little effect on those stock prices. It was also found that Asian financial crisis had strengthened the linkages among the stock markets of East Asia, except of those in Mainland China, and thus had strengthened their interdependencies. They found that Hong Kong and Singapore stock markets played crucial roles in spreading the crisis in East Asia and in the world. The study found that in the post-crisis period the financial integration had been improved in comparison to pre-crisis period but it was not as strong as was observed in crisis period.

Finally, the authors concluded that the integration of stock market in East Asia had been gradually improving with each other and also with USA, which might be from the effect of stronger macro-economic linkages among the countries world-wide.

Bely (2009**)** in his paper examined the dynamics and concurrent interactions of Euro stock markets at the country level and at economic sector level. Overall outcome of the study revealed that the financial market integration process was time-varying. The study found that formulation of currency union had integrated the countries more during the period 1998-2003. The researchers opined that monetary policy convergence might be facilitated the divergence of economic variables. It had revealed that return behavior of the markets were changing and stock markets within the Euro zone were starting to drift apart. The results of the study suggested that the diversification had benefited the investors in the Euro zone with the introduction of the single currency.

In a research paper **Buttner and Hayo** (2011) examined the determinants of stock market integration among the EU member states and their dynamic conditional relationship by DCC-

MGARCH Models. The authors divided the EU member countries into three parts: euro area members, old EU members not participating EMU and new member states, for their analysis. The authors found that in almost all groups of countries, there was a significant trend towards more integration. The authors then explained the relationship by interest rate risk, exchange rate risk, market capitalization and business cycle synchronization applying pooled OLS model. They found that foreign exchange risk and interest rate spread depressed integration among the old EU member states and for the new participants of euro area. But when non-euro area countries adopted euro, the integration had improved. The authors found that the size of absolute and relative market capitalization promoted the equity market integration among the countries.

Frijns, Tourani-Rad and Indriawan (2012) in their study investigated the role of political crises towards the degree of stock market integration in emerging markets over the period 1991–2006.Using the International Crisis Behavior database, containing detailed information on political crises around the world, the researchers examined whether political crises affected stock market integration in 19 emerging markets in South and East Asia, Latin America, and Central and Eastern Europe. In investigation of the role of political crises in explaining stock market integration for the full sample of emerging markets and for the different regions individually, the authors observed that those political crises and their specific characteristics had significant negative impacts on their financial integration. In addition, crises those involved in violent acts, as well as crises those involved the US, and crises those had taken place within the region of a particular country had significant negative impact on the degree of stock market integration. Robustness tests made by the researchers using panel regression largely confirmed those results.

Objective of the Study

The objective of the study is of two fold.

1. To examine the nature and extent of financial integration among the stock markets of Asia and the financial integration with the market leader USA,
2. To assess the impact of current global financial crisis (2008) on the financial integration of different stock markets of Asia.

Data base and Methodology

The study has been conducted on some of the promising stock markets of Asia and also on the most powerful market leader, USA. The study is based on over a period of 10 years (April 2003 to March, 2013). The study period has been decomposed into three phases viz. Pre-crisis period (1st April, 2003 to 30th September, 2008), Crisis period (1st October, 2008 to 30th September, 2009) and Post-crisis period(1st October, 2009 to 31st March, 2013), as

it is seen that the global financial crisis mostly affected the financial market in late 2008 and early 2009. The study is based on the secondary capital market data. Relevant data of different Stock Market Indices have been down loaded from Datastream and Capitaline database Package and also from different websites. Augmented Dickey-Fuller test has been applied to identify the unit root problem in the time series stock market data. Normally the stock market time series data is non-stationary and co-integrated at I (1). If the data is found to be non-stationary, it would be made stationary taking lag differences of different orders. Next three analyses will be made a) Johansen's Cointegration analysis in order to find any long run equilibrium relationship b) Granger Causality analysis for finding the interdependencies among the selected stock market, c) General Impulse Response analysis under Vector Error Correction (VEC) framework to capture short run responses for one unit change in different markets.

Analysis and Findings

Outcome of Augmented Dickey-Fuller (ADF) Unit root test:

Null Hypothesis (H_0): The stock price data has a unit-root

Table - 1

Result of Augmented Dickey-Fuller (ADF) Unit root test

Market index	Price	p-value	? Price	p-value
BSE 30	-1.592943	0.4860	-45.02813***	0.0001
FTSE Malaysia	-1.011238	0.7513	-50.13216***	0.0001
HG-SG	-1.811212	0.3754	-35.60728***	0.0000
KOSPI	-2.149362	0.2254	-46.17431***	0.0001
NIKKEI 225	-1.766615	0.3975	-36.27714***	0.0000
SSE COMP	-1.456705	0.5556	-46.78081***	0.0001
S & P 500	-1.870101	0.3468	-53.57043***	0.0001

Source : Author's calculation

Note: Price = Market index; ? Price = First difference of log prices**;**
*MacKinnon (1996) one-sided p-values; *** indicates significant at 1% level

The results of ADF unit root test suggest that the time series data in our consideration for all the stock market indices are non-stationary in the level, but stationary at their first difference of natural log series i.e. in case of return series. Hence all the analysis in the next part of the paper is based on the return series of different selected stock markets.

Johansen Co integration Test

Table - 2
Result of Co-integration Test

	Trace statistics	5% critical value	Max-eigen value	5% critical value
Panel A: Pre-Crisis Sub sample (Lag 1 to 13)				
r = 0	575.6753	125.6154	121.2847	46.23142
r ≤ 1	454.3906	95.75366	100.3550	40.07757
r ≤ 2	354.0356	69.81889	97.79960	33.87687
r ≤ 3	256.2360	47.85613	87.36579	27.58434
r ≤ 4	168.8702	29.79707	65.03458	21.13162
r ≤ 5	103.8356	15.49471	53.65472	14.26460
r ≤ 6	50.18087	3.841466	50.18087	3.841466
	Trace statistics	5% critical value	Max-eigen value	5% critical value
Panel B: Crisis Sub sample (Lag 1 to 9)				
r = 0	203.5946	125.6154	30.52013**	46.23142
r ≤ 1	142.1538	95.75366	25.67427**	40.07757
r ≤ 2	99.43586	69.81889	15.54010**	33.87687
r ≤ 3	68.91572	47.85613	14.17780**	27.58434
r ≤ 4	43.24145	29.79707	**15.54010****	21.13162
r ≤ 5	27.70135	15.49471	**14.17780****	14.26460
r ≤ 6	13.52356	3.841466	13.52356	3.841466
	Trace statistics	5% critical value	Max-eigen value	5% critical value
Panel C: Post-Crisis Sub sample (Lag 1 to 11)				
r = 0	452.5045	125.6154	93.91502	46.23142
r ≤ 1	358.5895	95.75366	81.50893	40.07757
r ≤ 2	277.0806	69.81889	71.23513	33.87687
r ≤ 3	205.8455	47.85613	58.51088	27.58434
r ≤ 4	147.3346	29.79707	55.88397	21.13162
r ≤ 5	91.45062	15.49471	49.06529	14.26460
r ≤ 6	42.38533	3.841466	42.38533	3.841466

Source : Author's calculation

The results of Johansen's cointegration test show that the long run equilibrium relationship among the Asian Stock Markets is absent. The equilibrium is also absent between the Asian markets and the U S market. Equilibrium relationship is absent in pre as well as post crisis period. The stock markets are thus segmented by national borders. But it is only for the crisis period, where equilibrium was established in shorter duration and the markets remained

unable to maintain equilibrium when crisis was over. Thus the integration is not complete and they may have integrated in the economic sense. In crisis period we observe two cointegrating vectors in Max-eigen value statistic. Thus the stochastic shocks in different stock markets of Asia and also of U S followed some common pattern in the crisis period.

Granger Causality test

Table - 3
Results of Causality Test

GRANGER CAUSALITY : PRE-CRISIS PERIOD:							
Cause →							
Effect ↓	**BSE 30**	**FTSE MALYSIA**	**HANG SENG**	**KOSPI**	**NIKKEI225**	**SSE COMPO**	**S & P 500**
BSE 30	NA	1.72025 (0.1795)	0.62677 (0.5345)	0.71408 (0.4899)	0.21376 (0.8076)	0.40117 (0.6696)	**48.8413 (4.E-21)**
FBSE MALYSIA	**6.24389 (0.0020)**	NA	1.19639 (0.3027)	0.40588 (0.6665)	1.24810 (0.2874)	1.87282 (0.1542)	**80.8007 (1.E-33)**
HANG SENG	**3.36623 (0.0349)**	**3.96342 (0.0193)**	NA	1.00018 (0.3681)	2.68879 (0.0684)	1.58888 (0.2046)	**114.248 (5.E-46)**
KOSPI	**5.21450 (0.0056)**	1.44971 (0.2351)	2.56591 (0.0773)	NA	**5.31865 (0.0050)**	0.41078 (0.6632)	**66.0949 (7.E-28)**
NIKKEI225	**7.65037 (0.0005)**	2.59448 (0.0751)	**10.4813 (3.E-05)**	1.38680 (0.2503)	NA	1.10650 (0.3311)	**147.631 (8.E-58)**
SSE COMPOSITE	**4.45554 (0.0118)**	2.56714 (0.0772)	**6.90810 (0.0010)**	1.12442 (0.3252)	1.12442 (0.3252)	NA	**15.0855 (3.E-07)**
S & P 500	2.55972 (0.0778)	0.81294 (0.4438)	0.97061 (0.3792)	**6.51065 (0.0015)**	**6.72868 (0.0012)**	0.98106 (0.3752)	NA

GRANGER CAUSALITY : CRISIS PERIOD:							
Cause →							
Effect ↓	**BSE 30**	**FTSE MALYSIA**	**HANG SENG**	**KOSPI**	**NIKKEI225**	**SSE COMPO**	**S & P 500**
BSE 30	NA	2.94801 (0.0547)	2.85427 (0.0600)	2.75244 (0.0662)	1.33726 (0.2649)	0.16261 (0.8500)	**6.19310 (0.0025)**
FTSE MALYSIA	2.66614 (0.0720)	NA	2.35995 (0.0971)	1.81597 (0.1654)	**3.87931 (0.0222)**	0.65590 (0.5201)	**6.70358 (0.0015)**
HANG SENG	1.87407 (0.1562)	3.00571 (0.0518)	NA	0.12305 (0.8843)	1.59898 (0.2047)	0.12054 (0.8865)	**16.5692 (2.E-07)**
KOSPI	**3.10293 (0.0471)**	1.55621 (0.2135)	1.10479 (0.3333)	NA	1.59531 (0.2054)	0.04468 (0.9563)	**9.28595 (0.0001)**
NIKKEI225	**7.33155 (0.0008)**	1.14413 (0.3206)	**5.91326 (0.0032)**	**9.11210 (0.0002)**	NA	0.72777 (0.4843)	**32.5945 (6.E-13)**
SSE COMPOSITE	1.59781 (0.2049)	2.27655 (0.1053)	1.36270 (0.2583)	0.25950 (0.7717)	0.91129 (0.4037)	NA	**7.38040 (0.0008)**
S & P 500	0.22729 (0.7969)	**5.62084 (0.0042)**	1.27253 (0.2824)	**4.17465 (0.0167)**	1.01523 (0.3642)	0.24206 (0.7852)	NA

GRANGER CAUSALITY : POST-CRISIS PERIOD:							
Cause →							
Effect ↓	BSE 30	FTSE MALYSIA	HANG SENG	KOSPI	NIKKEI225	SSE COMPO	S & P 500
BSE 30	N A	0.06764 (0.9346)	0.63773 (0.5288)	0.19601 (0.8221)	0.48404 (0.6165)	2.73515 (0.0656)	**25.0633 (3.E-11)**
FTSE MALYSIA	**12.5882 (4.E-06)**	N A	**10.7968 (2.E-05)**	**14.0984 (1.E-06)**	**6.19496 (0.0022)**	1.07552 (0.3417)	**23.7870 (1.E-10)**
HANG SENG	**8.19304 (0.0003)**	0.81349 (0.4437)	N A	2.32200 (0.0988)	0.64881 (0.5230)	0.69508 (0.4994)	**96.8823 (6.E-38)**
KOSPI	**14.2314 (9.E-07)**	0.80573 (0.4472)	**4.37107 (0.0130)**	N A	0.61381 (0.5416)	0.87157 (0.4187)	**103.429 (4.E-40)**
NIKKEI225	**3.16018 (0.0430)**	1.47402 (0.2297)	2.24081 (0.1071)	1.20189 (0.3012)	N A	2.90782 (0.0552)	**80.7983 (2.E-32)**
SSE COMPO	1.21414 (0.2976)	0.18495 (0.8312)	0.08320 (0.9202)	2.13246 (0.1193)	1.24684 (0.2880)	N A	**10.8602 (2.E-05)**
S & P 500	0.17938 (0.8358)	0.88837 (0.4118)	2.44220 (0.0877)	2.13838 (0.1186)	1.26861 (0.2819)	2.41995 (0.0897)	N A

Source : Author's calculation

The outcomes of Granger Causality test show the causal relationship and the interdependencies of different markets. The return of U S S & P 500 has significantly affected the returns of all selected Asian markets in pre-crisis, crisis and post-crisis period. Two way interdependencies have been observed between S & P 500 and Kospi, and between S & P 500 and Nikkei 225. Return of Hang Seng has affected two Asian markets, Japan's Nikkie 225 and China's SSE Composite in pre-crisis period. However, China's SSE Composite has not affected any of the Asian stock markets in spite of its notable growth over the selected period. As regards to Indian market the return of Indian BSE 30 has affected the return of all other Asian stock markets during the pre-crisis period but unable to affect U S S & P 500. This shows that the Indian stock market is strong enough to affect other markets of Asia.

In crisis period some significant changes are observed as per our natural expectation. Unlike pre-crisis period, the return of FTSE Malaysia has affected the return of S & P 500 and both the markets, Malaysia and U S, become interdependent to each other in crisis period. Return of Nikkei 225 has been affected by return of Hang Seng and Kospi, and it has affected the return of FTSE Malaysia in the crisis period. As regards to impact of Indian market, the returns of FTSE Malaysia, Hang Seng and SSE Composite remained independent from Indian market in the crisis period. Two stock markets of Asia viz. Kospi and Nikkei 225 were affected from the returns of BSE 30.

In post crisis period the return of Indian market regained its strength and started affecting the Asian markets except china's SSE Composite. Return of FTSE Malaysia is affected by the returns of all the Asian markets except China's SSE Composite. At the same time the return of Kospi is affected by return of Hang Seng in post-crisis period.

Impulse Response Analysis considering one unit innovation in each market:

Table - 4

Results of Impulse Response Analysis

Pre-Crisis Period:								
	Day	**BSE30**	**FTSEMLYS**	**HGSG**	**KOSPI**	**NIKKEI225**	**SSECOMPO**	**S&P500**
Response of BSE 30	1	1.000000	0.081999	-0.257726	0.014869	-0.115075	0.005349	0.671225
	2	0.373971	-0.038471	-0.187741	-0.027091	-0.049154	0.027318	0.303286
	3	0.441636	0.094354	-0.115590	-0.012875	-0.063040	0.021452	0.306757
Response of FTSE MLYS	1	0.024243	1.000000	-0.000935	-0.022036	-0.102027	-0.003636	0.365168
	2	-0.006075	0.361131	-0.055885	0.029789	-0.003502	0.027044	0.072877
	3	0.014989	0.364959	-0.034853	-0.015119	-0.036028	-0.000991	0.128813
Response of Hang Seng	1	-0.010027	0.069740	1.000000	0.012067	-0.261886	-0.021578	0.831141
	2	0.008524	-0.151317	0.180907	0.066762	-0.073821	0.016124	0.303973
	3	0.003722	0.132155	0.167869	-0.040338	-0.092221	0.024490	0.329891
Response of KOSPI	1	0.036627	0.027863	-0.131783	1.000000	-0.301773	-0.008398	0.667567
	2	-0.038814	-0.082488	-0.180409	0.367172	-0.074562	0.033168	0.307084
	3	0.026341	0.097064	-0.098349	0.498665	-0.112317	0.012755	0.315688
Response of NIKKEI 225	1	-0.001369	0.001196	-0.067903	-0.041254	1.000000	-0.002242	0.807524
	2	-0.020475	-0.075122	-0.200204	0.066288	0.083933	0.023092	0.322518
	3	0.020361	0.081653	-0.097834	-0.043549	0.364338	0.018860	0.326688
Response of SSE COMPO	1	0.023861	-0.023249	0.119696	-0.119039	-0.032645	1.000000	0.275648
	2	0.022403	-0.101477	-0.183149	0.080991	0.062583	0.246672	0.128529
	3	0.009424	0.025331	0.039569	-0.048102	-0.040864	0.442505	0.040336
Response of S & P 500	1	0.012311	-0.094647	0.030271	0.113077	0.097919	-0.014199	1.000000
	2	0.037321	-0.045078	0.021732	0.084270	0.109479	0.006110	-0.024673
	3	-0.008247	-0.055978	0.128830	0.021762	0.061905	-0.025375	0.102581

Source : Author's calculation

Short-term Relationships: Impulse Response Analysis

We have investigated the short-term causal relationships among the selected Asian stock markets over 3 days, with a special attention as to the influence of the 2008 Global financial crisis. For this purpose, we have applied impulse response analyses in the three sub-periods under VECM framework. We explore the effects of a one unit shock rather than a one standard deviation shock, to account for the changing volatility of stock returns over time.

Table - 5
Results of Short-term Relationships: Impulse Response Analysis

Crisis Period:								
	Day	**BSE30**	**FTSEMLYS**	**HGSG**	**KOSPI**	**NIKKEI225**	**SSECOMPO**	**S&P500**
Response of BSE 30	1	1.000000	-0.467775	0.206703	-0.055893	-0.151337	-0.145861	0.225556
	2	0.370592	-0.733540	-0.003352	-0.227715	0.055573	0.070673	0.250846
	3	0.585846	-0.115106	0.141976	0.032569	-0.255792	-0.129368	0.075158
Response of FTSE Malaysia	1	0.018699	1.000000	0.085002	-0.007138	0.037001	0.031161	0.074569
	2	0.076442	0.179739	-0.029504	-0.022043	0.036363	0.028456	0.030654
	3	-0.002445	0.248299	0.041759	-0.005991	-0.037449	-0.009465	0.039555
Response of Hang Seng	1	0.055722	-0.391534	1.000000	-0.099368	-0.109365	-0.054203	0.410040
	2	0.117474	-1.016381	0.444636	-0.078864	-0.094913	0.030639	0.219778
	3	-0.040018	-0.043750	0.538711	-0.113080	-0.197758	-0.080003	0.166899
Response of KOSPI	1	0.138656	-0.369696	0.144179	1.000000	-0.125065	0.000805	0.330223
	2	0.120372	-0.587621	0.064876	0.125769	-0.135992	0.081251	0.138163
	3	-0.030054	-0.098980	0.089151	0.382848	-0.224788	-0.082045	0.250387
Response of NIKKEI 225	1	0.052088	-0.166794	0.115253	0.258362	1.000000	-0.150189	0.597688
	2	-0.032596	-0.029146	0.097412	-0.212461	-0.436094	0.091227	0.390714
	3	-0.069343	-0.283809	0.220286	-0.106957	-0.286732	-0.082977	0.416955
Response of SSE COMPO	1	0.046120	0.269833	-0.004650	-0.100664	-0.147971	1.000000	0.215224
	2	0.090830	-0.238466	-0.076296	0.037444	-0.088395	0.373997	-0.027015
	3	-0.004380	0.047155	0.027003	-0.096183	0.008316	0.467097	0.081069
Response of S & P 500	1	0.069925	-0.767945	0.238328	-0.144559	-0.064122	0.006361	1.000000
	2	0.099952	-0.712317	0.050284	-0.206232	0.157523	0.056155	0.276158
	3	-0.052193	-0.023176	0.036983	0.076034	-0.060022	-0.097210	0.543539
Post Crisis Period:								
	Day	**BSE30**	**FTSEMLYS**	**HGSG**	**KOSPI**	**NIKKEI225**	**SSECOMPO**	**S&P500**
Response of BSE 30	1	1.000000	-0.051372	0.105555	-0.071398	-0.077424	-0.106730	0.264561
	2	0.268545	-0.042958	0.029421	-0.104765	0.002394	0.019679	0.075966
	3	0.425732	-0.060127	0.043108	-0.028970	-0.019141	-0.025557	0.061670
Response of FTSE Malaysia	1	0.015937	1.000000	-0.012899	-0.040471	-0.073868	-0.064409	0.342011
	2	-0.123304	-0.231064	0.212372	-0.174113	-0.052668	-0.073961	0.257325
	3	-0.009186	0.221530	0.095903	-0.106246	-0.068084	-0.025952	0.230325
Response of Hang Seng	1	0.030156	-0.012878	1.000000	-0.147140	-0.073238	-0.084215	0.513820
	2	-0.060192	0.023808	0.283148	-0.069128	0.015671	-0.030231	0.038334
	3	0.038640	-0.036256	0.541011	-0.067183	-0.005557	0.027095	0.112664
Response of KOSPI	1	0.018824	-0.177612	0.080534	1.000000	-0.095985	-0.103165	0.540656
	2	-0.066522	-0.081557	0.147631	0.132780	-0.019951	-0.050461	0.182463
	3	0.012288	-0.129730	0.009836	0.340130	-0.021515	0.008045	0.145256
Response of NIKKEI 225	1	-0.024224	-0.161772	0.017255	-0.194252	1.000000	-0.122347	0.561434
	2	-0.060769	-0.048834	0.177872	-0.064594	0.286495	-0.047299	0.101419
	3	0.010615	-0.127773	-0.027052	-0.111673	0.344673	0.008259	0.164905
Response of SSE COMPO	1	-0.002778	-0.116364	0.046339	-0.145154	-0.113008	1.000000	0.257505
	2	-0.061655	-0.106980	0.027914	-0.033541	-0.029264	0.289837	0.060426
	3	-0.003519	-0.136270	0.061457	-0.092912	-0.032732	0.430118	0.113635
Response of S & P 500	1	0.017306	0.131465	0.024402	-0.092810	0.067185	0.027238	1.000000
	2	0.047252	0.228082	-0.166368	-0.006158	0.055615	0.094946	0.131197
	3	0.034717	0.171149	-0.061460	0.102241	0.052240	0.019920	0.352824

Source : Author's calculation

The outcomes reveal that selected stock markets in Asia generally respond to shocks of each other with a moderate degree of efficiency. In short term also the Chinese market remained isolated during the pre-crisis period. It has responded little only with Kospi and Hang Seng. Response of Indian BSE 30 has maximum to Hang Seng in pre-crisis period. In pre-crisis period all the Asian markets has responded significantly to shocks of U S.

In crisis period Indian BSE 30 and U S S & P 500 responded significantly to one unit shock of Malaysian FTSE though the responses were negative. In crisis period the responses of different Asian market were weak for the shocks of U S market and the U S market remains unable to influence to Asian market to the extent as observed in pre-crisis period. In crisis period some sorts of tie up in the Japan, South Koria, China and Hong Kong market have been observed, which sustained to post-crisis period also. In post crisis period the U S market fails to regain its momentum of influencing the Asian markets.

Conclusion

This paper examines the long-run and short-run causal relationship among six Asian stock markets and also considers their interactions with the market leader USA. While examining the cointegrating relationship among the stock markets, we pay special attention to the effects that has engendered by 2008 Global financial crisis.

On a policy level, cointegration suggests less long-run diversification benefit from investing across countries. When the markets are integrated then the regional stock exchanges attract investors to invest their money in regional market to tap the benefits of higher liquidity and lesser transaction costs. But as the Asian markets are not cointegrated it loses such benefits and the markets largely depend on substantial amount of foreign capital inflows. As a result withdrawal of foreign capital by foreign institutional investors (FIIs), especially of USA, from the Asian market leads to sudden market crash.

But even the long run equilibrium relationship is absent among the Asian markets, the short term dynamics of the markets cannot be ignored. The study observed significant amount of responses for one unit of impulse in several Asian markets as well as the U S market.
The macro economic factors that are responsible to the observed behavior of Asia stock markets and the U S market are beyond the scope of this paper and may remains as the scope of further research.

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