

The Linkages of the South Asian Stock Market Movements Before, During and After 2007–2009 Crisis.

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ABSTRACT: *This paper examines whether there are co-integration, granger-causality and impulse-response among 4 countries stock exchanges in South Asian, and also considering their interactions with Singapore and the United Kingdom before, during and after the financial crisis in 2007-2009. The data reveal that global financial crisis has strengthened the linkages among South Asians tock exchanges, this seen before crisis only India has influenced other South Asian countries, but after crisis not only in India, but also other countries. United Kingdom has no influenced before, during and after global financial crisis. Singapore, after crisis influenced Sri Lanka, not before.*

KEYWORDS: *Stock market interdependencies, Global financial crisis, Var analysis, Co-integration, South Asian*

I. INTRODUCTION

The Global economy is faced with a very difficult situation with the occurrence of a high-risk housing credit crisis (subprime mortgage) in the United States which developed into a global financial crisis, and this continues to develop into an economic crisis that is sweeping across the world (Kim, Chen ; 2008). The global economic downturn is much deeper than expected, and the recovery will be gradual and uncertain. The impact of the global financial crisis for developing countries is felt because as a developing country to increase it economic activities carry out export trade activities to developed countries. Developed countries that are affected by the global crisis will reduce imports from other countries, this has resulted in developing countries experiencing economic decline due to reduced export activity.

The strong intensity of the global financial crisis affected Asian countries, which were considered relatively sterile from the impact of the crisis, ultimately difficult to survive and also affected by the crisis. This is empirically proven by the stock market in India, Bombay Stock Exchange (BSE) is influenced by the Financial Times Stock Exchange, (London, UK), the result is that there has been a significant increase in the average correlation coefficient between the exchanges BSE against the FTSE exchange in the crisis period compared to the pre-crisis period, this proves the existence of transmission between the UK and Indian markets (Dash& Mallick; 2010).

The UK has had a strong influence on Asian financial markets overtime. However, regional financial integration might be an appealing alternative to globalized finance with its associated contagion risks: since the Asian region as a whole runs a large current account surplus, which means that regional saving exceeds regional investment, higher regional integration might be preferable to riskier global exposure to address the borrowing needs of individual Asian countries (see Devereux, Lane, Park, & Wei, 2011). This study aims to see how contagion transmits from the UK stock market and Singapore stock market to the stock markets in South Asia, India, Bangladesh, Pakistan, Sri Lanka.

The global financial crisis is generally considered the worst financial crisis and the largest economic downturn since the great depression of 1929-1939.

It has focused the attention pf academics and policy makers who want to better understand financial market contagion. One question is whether the apparent market Tran's mission of the GFC from the UK and Singapore to other countries is actually contagion.

Therefore, this study compares empirically the co-movements among south Asian stock markets for the period before, during and after the crisis. In addition to interest from policy makers and investment practitioners, stock market integration so carries interest from an academic perspective. Decoupling and re-coupling during financial crises is typified by the decoupling hypothesis that, in 2007, held that Latin American and Asian economies,

especially emerging ones, had broadened and deepened to the point that they no longer depended on the United States economy for growth, leaving them insulated from also down there, even a fully fledged recession. This study is able to shed some light on the decoupling re coupling debate.

To investigating there are three key features in our modeling strategy. One is examining the co-movement of stock markets in a multivariate VAR framework, so we meticulously account for the structural breaks that the global financial crisis may have engendered. A second feature is we use Sims likelihood-ratio test to correctly specify our various VAR models as the lag length is a crucial parameter. A third feature is we implement cointegration tests to examine the long-run equilibrium relationships if any among the stock markets in our sample. We use daily data in both local currency and USD terms and to figure out their short term causal linkages, we employ generalized rather than traditional orthogonalized impulse response analysis.

Overall the empirical results in this study is to answer the following questions: (1) does the financial crisis change the independencies among South Asian stock market, as well as their linkages with the UK and Singapore stock market (2) which markets are influential in South Asian before, during, and after crisis? (3) were South Asian stock markets decoupled from or coupled with the UK and Singapore stock market during the financial crisis?

The remainder of this paper is organized as follows. Section 2 presents the related literature. Section 3 describes the data Section 4 then discusses the empirical results. Finally, section 5 summarizes the findings and presents conclusions.

II. LITERATURE REVIEW

Economic integration of an individual country into the world typically involves both trade and financial links. At time of financial crises, reversal of capital flows from one country may lead to a similar withdrawal from other countries; a phenomenon known as contagion. Development depends on the degree of financial market integration. The higher the degree of integration and the more extensive the contagious effects. Thus, it can be announced that financial markets facilitate the transmission of real or general shocks, but they do not cause them. Some observers such as Corsetti, Paolo Pesenti, and Nouriel Roubini (1999) argue that contagion is the result of sudden changes in market expectations and confidence, a development that began to developing international markets in late 2007. There are plenty of studies have been analyze on the integration of stock markets during the 1997-1998 Asian financial crisis, in particular the effects that this crisis has had on Asian stock market co-movement. For example, Ghosh et al. (1999) using daily data reported evidence of pair-wise Cointegration amongst the USA (and Japan) and some but not all the Asia-Pacific stock markets within the time frame of 1996-1997. Sheng and Tu (2000), again using daily data in local currencies, find no co-integration vectors prior to the crisis but one vector of a cointegrating relationship between the US and selected Asian Markets. Tan and Tse (2002) use daily data in local currencies over 1988-2000 in a nine-variable VAR to examine the linkage among US, Japan, and seven Asian stock markets. By truncating the data at the end of 1996, they find that markets appear to be more integrated after the crisis than before, and that Asian markets are most heavily influenced by the US but that the influence of Japan is increasing. Lastly, Yang et al. (2003) investigate the long-run equilibrium relationships and short-term causal linkages among stock markets The USA, Japan, and ten Asian economies from January 1995 to mid-May 2001, using data frame 1997-1998 Asian financial crisis. They found evidence of two interrelating relationships before and after the crisis. Like Tan and Tse (2002), Yang et al. Determining the Asian stock market in general in general have become more integrated after the crisis.

Next, in this study we use daily data to implement more powerful tests of cross-country co movements. The reason is that weekly, monthly or quarterly data may obscure interactions among stock markets that last for only a few days (Karolyi and Stulz, 1996 ; Eun and Shim, 1989).

Whereas most articles examining Asian stock market integration are conducted in local currencies, we used at in local currency as well as US dollar terms. Local currency data abstain from the effects of exchange rate changes, which may be a non-trivial concern for international investors. Bessler and Yang (2003), for example, find that exchange rates adjustments can affect long-run Cointegration relationships but do not significantly affect the short run dynamic causal linkage pattern of stock markets.

Finally, to obtain more accurate results, we use a long time frame, from 7 August 2005 to 2 April 2013. This is related to the compilation of occurrences, different sample periods can result in contradictory findings. We split the sample into three sub-samples to gather possible time - The integration of varied stock markets in South Asia before, during, and after the 2007-2009 global financial crises. We define the starting point of the crisis on August 7, 2005 when equity markets initially fell and the US central banks started intervening for the first time to provide liquidity to financial markets. The first Subsample covers the period from 7 August 2005, to 2 April 2007, which is the pre-crisis period. We define the end of the crisis as 2 April 2009, the compilation of the G20 Summit

was held in London and the global economy is changing from this point. The definition of this crisis period is a consistent with previous studies, eg, Dooley and Hutchison (2009), Cheung et al. (2010), Chudik and Fratzscher (2011), Bekaert et al. (2012), etc. For example, Bekaert et al. (2012) calculated the world market turnover from the circulation of 2007 to the beginning of 2009, and found out how the market turnover from 50% from peak to trough occurred within 18 months. We determine the starting point of the crisis as 7 August 2007, so the second sub sample covers the period 7 August 2007 to 2 April 2009. The post-crisis period then starts on 3 April 2009, covering a four-year window. However, to calculate the pure post-crisis period, we further divide the four-year window into two sub-periods, as done by Yang et al. (2003), Huyghebaert and Wang (2010), among others. One is the transition period from 3 April 2009, to 2 April 2011, while the other, from 3 April 2011, to 2 April 2013, should be a genuine post-crisis period.

III. DATA

The data set comprises daily market price index retrieved from data stream for 4 South Asian countries i.e Bangladesh, India, Pakistan, Sri Lanka. Besides, we also collect data on United Kingdom composite index, and Singapore composite index. The reason for selecting South Asian is emerging Asian economies have played a vital role in catering to the effects of financial crisis. Over the years, the emerging Asian financial markets have proved to be the new driver so changes in the world. India one of the emerging countries which has the capacity to transform the global economy in the twenty-first century (Engardio, 2007). Since 1980, South Asia’s growth benefitted from prudent macroeconomic management, but when during the crisis as noted South Asia’s macroeconomic balances had already worsened consider a blowing to the term of trade shocks (world bank, October 21, 2008). The sample period from August 7, 2005 to April 2, 2013 (before crisis from August 7, 2005 to August 6 2007, crisis Period from August 7 2007 to April 2 2009, and after crisis from April 3 2011 to April 2 2013) local currency and US Dollar currency. Our sample includes 4032 observations for each series. We use natural logarithm of the daily closing values.

Table 1 Descriptive Statistic

Table 1 presents statistic descriptive for the daily stock market returns in local currency before crisis, crisis and after crisis periods expressed in local currencies. Daily returns computed as the natural logarithm. Volatility represented by standard deviation.

Descriptive Statistics Price Level						
	IND	PAK	BAN	SRI	STI	FTSE
Mean	21042,97	396,97	419,38	528,28	2937,86	6156,18
Median	18978,32	389,12	441,59	586,45	3050,62	6174,57
Max	40267,62	654,09	779,08	812,77	3831,19	7877,45
Min	6102,74	113,71	113,79	147,09	1456,95	3512,09
Std Dev	8655,02	106,21	152,98	161,71	438,40	873,41

Table 1 presents the summary statistics descriptive for the daily stock market returns in local currencies. We employ the unit root test, Augmented Dickey–Fuller (ADF) to check stationary, not reported. The results indicate that all indices are non-stationary in the level, but all indices have been determined to have stationary in their first difference.

IV. EMPIRICAL RESULTS FROM THE MULTIVARIATE VECTOR AUTOREGRESSIONAL ANALYSIS

First, we examine the long-run relationship by means of co-integration tests. Then Granger Causality test to decide on stock market interdependencies. At the end of this study, we conduct generalized impulse response analysis to have the short-term causal relationship among the sample.

4.1. Long-run equilibrium: Co-Integration test results

The co-integration analysis we follow Johansen test, which is based on a VAR frame work (Johansen, 1991). The VAR model can be written as follow:

$$\Delta X_t = \Gamma_0 + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{k-1} \Delta X_{t-k+1} + \pi X_{t-1} + \varepsilon_t$$

Where,

$\pi = \alpha * \beta'$, the elements of the matrix are the short-term adjustment parameters to the long-run relationships reflected in the matrix. Before implementing the tests, we need to specify the lag length and select the optimal number of the lag length with maximum 15days. As a result, the optimum 2 lags length for before and after crisis, and 3 lags for during crisis period, for local and US Currency. We selected the optimum length suggested by the Akaike and Schwarz information criteria. Table 2 reports the co-integration test result from Johansen test for local and US Currency in different sub periods. The co-integration based on 6-dimensional VAR model.

The results appear in table 2 before crisis λ trace statistic suggest the reason eco-integration for local currency and λ max statistic suggest one co-integration for local and US dollar currency. During crisis period the co-integration disappear, and after crisis period the co-integration become stronger, which is the λ trace results suggest there are two co-integration for local and US dollar currency, and λ max suggest there still one co-integration. Pure after crisis periods the co-integration disappear again either local or US dollar currency.

We there for conclude that although stock prices during crisis there is still co-integration,

It could be influenced by the financial crisis, stock markets in South Asian, Singapore and UK stock markets share no long-run commons to chiasitic trends in the after-crisis timeframe.

Overall, our results show that the strengthened integration among South Asian markets during the global financial crisis was only temporarily, as the long-run equilibrium relationship disappeared again in the after-crisis period. Our results do not suggest that the global financial crisis has enhanced the foundation of co-movement of stock markets in South Asia. As the global financial crisis started, no markets, including South Asian stock markets, could be invulnerable to such a crisis. Based on Bekaert et al. (2005) and Pukthuanthong and Roll (2009) show the stock market returns are influenced by a set of common factors. Wu et al. 2013 find that for any two stock market prices to be co integrated, they must also be governed by the same stochastic trend and be perturbed by the common/correlated shocks. Synchronized policy steps taken to reduce the likelihood of future catastrophe can be another potential reason for co-integration during the crisis and transition periods (before and after the crisis). These steps can help South Asian countries recover from the crisis in the short run, but do not imply sharing the same long-term equilibrium relationship, which is infect what Panel confirms.

Table 2 Co-integration test results for both local and US dollars currency.

Sub periods analysis implemented by means of Johansen test, based on a six dimensional vector auto regression model. We select the optimal number of lags for each local and US dollar currency using likelihood-ratio test with 15 days as maximum. Panels A – D report the co-integration results test for the before (Jan 2005 to August 06 2007), during (August 07 2007 to April 02 2009), after crisis periods (April 03 2009 to April 01 2011) and pure after crisis (April 04 2011 to April 02 2013).

H0	Trace Statistic			Max Statistic			
	Local Currency	US Dollar	5%Critical Value	Local Currency	US Dollar	5%Critical Value	
Panel A Before Crisis Local Currency Lags 2 and Us Dollar Lags 2							
r=0	96.3388	86.9512	95.7537	44.7331	43.9300	40.0776	
r≤1	51.6057	43.0212	69.8189	24.7157	22.2827	33.8769	
r≤2	26.8901	20.7385	47.8561	14.5307	9.9034	27.5843	
r<3	12.3594	10.8351	29.7971	8.7610	8.0741	21.1316	
r<4	3.5984	2.7610	15.4947	2.7887	2.5958	14.2646	
r<5	0.8097	0.1651	3.8415	0.8097	0.1651	3.8415	
Panel B crisis local Currency lags 3 and Us Dollar 3							
r=0	88.6602	83.4125	95.7537	35.8575	30.8463	40.0776	
r≤1	52.8027	52.5662	69.8189	18.0932	21.2395	33.8769	
r≤2	34.7095		31.3267	47.8561	14.1042	15.7750	27.5843
r<3	20.6053		15.5517	29.7971	13.2539	10.6032	21.1316
r<4	7.3514		4.9485	15.4947	7.3511	4.8267	14.2646
r<5	0.0003		0.1218	3.8415	0.0003	0.1218	3.8415
Panel C After Crisis Local Currency lags 2 and USD lags 2							
r=0	113.1535	119.3136	95.7537	42.9551	47.6030	40.0776	

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r _{≤1}	70.1983	71.7106	69.8189	27.3036	28.8139	33.8769
r _{≤2}	42.8948	42.8967	47.8561	21.5705	20.8903	27.5843
r _{<3}	21.3243	22.0064	29.7971	12.0055	12.9931	21.1316
r _{<4}	9.3187	9.0133	15.4947	5.9674	5.8983	14.2646
r _{<5}	3.3513	3.1150	3.8415	3.3513	3.1150	3.8415
Panel D Pure After Crisis Local Currency lags 2 and lags 2						
r=0	92.8974	86.6889	95.7537	37.7370	39.0717	40.0776
r _{≤1}	55.1604	47.6172	69.8189	19.6779	17.8086	33.8769
r _{≤2}	35.4824	29.8087	47.8561	17.2873	15.2207	27.5843
r _{<3}	18.1952	14.5880	29.7971	10.4019	9.1802	21.1316
r _{<4}	7.7932	5.4078	15.4947	7.5569	4.5476	14.2646
r _{<5}	0.2363	0.8602	3.8415	0.2363	0.8602	3.8415

4. 2. Granger Causality Tests

After implementing co-integration test, then we examine multivariate Granger Causality tests each period for the entire sample of South Asian stock markets and also incorporate Singapore and UK stock markets for their influence. Granger causality tests still based on VAR model and divided into before, during and after financial crisis 2007 – 2009. First, we determine lag length with 15 days maximum.

Table 3 Granger causality test results for both local and US dollars currency.

We select the optimal number of lags for each local and US dollar currency using likelihood-ratio test with 15 days as maximum. Panels A–C report the granger causality results test for the before (Jan 07 2005 to August 06 2007), during (August 07 2007 to April 02 2009), after crisis periods (April 03 2009 to April 02 2013).

Granger Causality												
Panel A: Before Crisis												
Cause	IND		PAK		BAN		SRI		STI		FTSE	
	Local	USD	Local	USD	Local	USD	Local	USD	Local	USD	Local	USD
IND			0.52	2.93	0.17	7.28	1.96	4.90	1.67	0.91	0.34	2.54
			0.47	0.23	0.68	0.03	0.16	0.09	0.20	0.63	0.56	0.28
PAK	0.65	0.61			0.69	4.59	0.26	0.34	0.71	0.81	0.47	0.52
	0.42	0.74			0.41	0.10	0.61	0.84	0.40	0.67	0.49	0.77
BAN	7.36	5.69	0.17	0.81			0.01	0.46	1.18	1.83	0.03	0.74
	0.01	0.06	0.68	0.67			0.92	0.80	0.28	0.40	0.87	0.69
SRI	3.16	0.56	0.48	2.77	0.04	0.41			3.67	2.86	0.19	0.55
	0.08	0.76	0.49	0.25	0.84	0.82			0.06	0.24	0.66	0.76
STI	4.41	8.29	0.00	0.25	0.00	2.04	0.50	4.20			0.23	3.70
	0.04	0.02	0.97	0.88	0.95	0.36	0.48	0.12			0.63	0.16
FTSE	9.30	63.92	2.29	12.97	2.16	2.89	5.05	1.27	49.52	131.37		
	0.00	0.00	0.13	0.00	0.14	0.24	0.02	0.53	0.00	0.00		
Panel B: During Crisis												
Cause	IND		PAK		BAN		SRI		STI		FTSE	
	Local	USD	Local	USD	Local	USD	Local	USD	Local	USD	Local	USD
IND			3.42	0.30	2.14	2.47	1.11	7.22	4.99	0.77	2.27	0.62
			0.18	0.86	0.34	0.29	0.57	0.03	0.08	0.68	0.32	0.73
PAK	0.01	1.43			7.04	2.89	0.09	0.69	0.18	7.86	3.99	5.08
BAN	0.99	0.49			0.03	0.24	0.96	0.71	0.92	0.02	0.14	0.08
SRI	0.04	2.27	0.84	1.47			7.36	6.38	1.11	2.03	0.73	1.71
STI	0.98	0.32	0.66	0.48			0.03	0.04	0.57	0.36	0.69	0.42
FTSE	1.73	2.54	11.89	12.41	3.21	4.83			6.40	4.70	4.41	0.17
	0.42	0.28	0.00	0.00	0.20	0.09			0.04	0.10	0.11	0.92
	4.51	0.92	3.93	0.45	0.06	4.03	0.97	1.20			2.12	0.02
	0.10	0.63	0.14	0.80	0.97	0.13	0.62	0.55			0.35	0.99
	3.45	14.48	2.79	3.18	0.22	8.53	4.60	13.89	27.32	62.08		
	0.18	0.00	0.25	0.20	0.89	0.01	0.10	0.00	0.00	0.00		

Panel C: After Crisis

Cause Local	IND		PAK		BAN		SRI		STI		FTSE		
	USD	Local	USD	Local	USD	Local	USD	Local	USD	Local	USD	Local	
	7.74	1.15	0.03	0.12	0.05	0.79	3.60	7.84	0.98	1.45	0.35	3.78	0.88
	0.02	0.56			0.67	0.17	0.02	0.61	0.48	0.84	0.15	0.64	
	1.54	2.04	0.93	0.55			3.64	2.77	2.80	1.59	0.36	1.12	
	0.46	0.36	0.63	0.76			0.16	0.25	0.25	0.45	0.83	0.57	
	6.92	3.73	1.98	3.06	0.30	3.74			7.85	14.73	4.01	2.13	
	0.03	0.16	0.37	0.22	0.86	0.15			0.02	0.00	0.13	0.34	
	3.55	1.88	2.45	1.05	1.59	0.76	2.86	0.91			1.45	1.94	
	0.17	0.39	0.29	0.59	0.45	0.68	0.24	0.63			0.48	0.38	
	6.31	7.22	14.51	13.87	0.42	11.80	6.63	0.58	22.54	33.00			
	0.04	0.03	0.00	0.00	0.81	0.00	0.04	0.75	0.00	0.00			

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As Thornton and Batten (1984) the results of Granger-causality test were extremely sensitive to the lag condition. (Broca to and Smith, 1989; Chung and Liu, 1994; Click and Plummer, 2005) granger causality tests are very sensitive to the number of lags chosen.

Table 3 reports the findings before crisis period, the granger causality test suggests India dominate the granger causality among South Asian stock market in the sample. India has granger causality with Bangladesh (local currency) and with Singapore and United Kingdom for both local and US currency. Bangladesh also has granger causality with India for US currency. During the crisis, our results suggest that the linkages among South Asian stock markets are not largely affected by the changes of exchange rate. There are several policies related to exchanged-rate and financial sector in South Asia to reduce contagion effects of crisis (World Bank, 2008).

After crisis, the interaction between South Asian stock markets becomes stronger for local currency, except Bangladesh in US currency. Pakistan has mutual causal relationship with India. The results are consistent with Anjum Siddiqui, 2015. In his book suggest that the raise mutual causal relationship between the military expenditure of India and Pakistan due to the hostility between India and Pakistan. In the context it's link ages with the United Kingdom, the United Kingdom granger caused by each country in South Asian for both local and US currency, except Bangladesh for US currency and Sri-lanka for local currency only. Singapore stock price exchanges keep remain before, during and after crisis it granger cause to the United Kingdom for local and US currency. To conclude, among all South Asian stock exchange, India still dominate before and after financial crisis happened. It's not surprising since India is the largest economy in South Asia (World Bank 2008).

4. 3. Short-term relationship: Impulse response analysis

We investigate the short-term relationship among South Asian stock markets by implementing generalized impulse response analysis for each period that has been mentioned before. This generalized impulse response tests are constructed by 6-dimensional VEC model. Table 4 report our findings reveal Singapore reacts to innovations in India by 0 and

0.005 Before and after crisis, respectively. We also observe the impacts of India stock market on other South Asian markets are increasing overtime, especially after crisis. Sri-lanka stock market to an innovation in India increase from 0.0000 before crisis, 0.0010 during crisis and increase to 0.0032 after crisis. Interestingly, India and Pakistan before and during crisis have no linkage, but after crisis they influence each other with response to innovations 0.001 after crisis. The results are consistent with Granger causality tests before, Bangladesh before crisis have influenced India before crisis and disappear while crisis period and become stronger while crisis over. India stock market to an innovation in Bangladesh 0.0007, -0.0002, and 0.0016 before, during and after crisis, respectively.

Table 4 Impulse Response tests results for local currency

We select the optimal number of lags for each local and US dollar currency using likelihood-ratio test with 15 days as maximum. Result tests for the before (Jan 2005 to August 06 2007), during (August 07 2007 to April 02 2009), after crisis periods (April 03 2009 to April 02 2013).

Panel A: Before Crisis

Response by Country	Innovation in Country						
	FTSE	PAK	SRI	STI	BAN	IND	
FTSE	1	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	2	0.0067	0.0002	0.0001	-0.0001	0.0000	-0.0001
	3	0.0065	0.0003	0.0001	-0.0001	0.0000	0.0000
	4	0.0064	0.0003	0.0001	0.0000	0.0000	0.0000
	5	0.0064	0.0003	0.0001	0.0000	-0.0001	0.0001
PAK	1	0.0011	1.0000	0.0000	0.0000	0.0000	0.0000
	2	0.0036	0.0185	-0.0005	-0.0002	0.0005	0.0001
	3	0.0043	0.0182	-0.0006	-0.0006	0.0007	-0.0003
	4	0.0049	0.0179	-0.0006	-0.0009	0.0009	-0.0007
	5	0.0055	0.0177	-0.0007	-0.0011	0.0011	-0.0011
SRI	1	-0.0002	0.0004	1.0000	0.0000	0.0000	0.0000
	2	0.0008	0.0007	0.0131	0.0000	0.0000	0.0006
	3	0.0009	0.0009	0.0136	-0.0001	-0.0001	0.0008
	4	0.0009	0.0009	0.0137	0.0000	-0.0001	0.0008
	5	0.0009	0.0010	0.0138	0.0000	-0.0002	0.0009
STI	1	0.0035	0.0005	0.0005	1.0000	0.0000	0.0000
	2	0.0059	0.0005	0.0010	0.0060	-0.0003	0.0003
	3	0.0057	0.0005	0.0011	0.0061	-0.0002	0.0001
	4	0.0059	0.0005	0.0011	0.0060	-0.0001	0.0000
	5	0.0061	0.0004	0.0011	0.0059	-0.0001	-0.0001
BAN	1	0.0007	0.0015	0.0001	0.0000	1.0000	0.0000
	2	0.0017	0.0009	-0.0001	0.0000	0.0191	-0.0002
	3	0.0013	0.0010	-0.0001	0.0000	0.0191	-0.0002
	4	0.0012	0.0011	-0.0001	0.0001	0.0191	-0.0001
	5	0.0011	0.0011	-0.0001	0.0001	0.0190	-0.0001
IND	1	0.0050	0.0006	0.0002	0.0042	0.0007	1.0000
	2	0.0074	0.0005	0.0010	0.0027	-0.0005	0.0110
	3	0.0078	0.0003	0.0012	0.0025	-0.0002	0.0105
	4	0.0086	0.0000	0.0011	0.0022	0.0000	0.0102
	5	0.0092	-0.0003	0.0011	0.0020	0.0002	0.0098

Panel B: During Crisis

Response by Country	Innovation in Country						
	FTSE	PAK	SRI	STI	BAN	IND	
FTSE	1	1.0000	0.0011	0.0026	0.0120	0.0008	0.0248
	2	0.0183	-0.0004	0.0007	0.0121	0.0008	0.0259
	3	0.0172	-0.0007	0.0009	0.0116	0.0009	0.0251
	4	0.0161	-0.0006	0.0012	0.0111	0.0008	0.0242
	5	0.0152	-0.0004	0.0015	0.0107	0.0007	0.0233
PAK	1	0.0011	1.0000	-0.0009	0.0008	0.0013	0.0025
	2	0.0030	0.0269	-0.0009	0.0023	0.0016	0.0033
	3	0.0028	0.0281	-0.0002	0.0018	0.0017	0.0033
	4	0.0020	0.0278	0.0009	0.0010	0.0014	0.0030
	5	0.0012	0.0272	0.0021	0.0003	0.0011	0.0027
SRI	1	0.0019	-0.0006	1.0000	0.0016	0.0014	0.0010
	2	0.0043	-0.0004	0.0177	0.0032	-0.0003	0.0029
	3	0.0052	-0.0002	0.0175	0.0042	-0.0003	0.0037
	4	0.0060	-0.0001	0.0171	0.0048	-0.0002	0.0041
	5	0.0065	-0.0001	0.0167	0.0053	-0.0001	0.0044
STI	1	0.0114	0.0007	0.0021	1.0000	0.0001	0.0133
	2	0.0153	0.0012	0.0037	0.0193	0.0014	0.0138

	3	0.0147	0.0006	0.0036	0.0188	0.0011	0.0133
	4	0.0147	0.0005	0.0041	0.0181	0.0012	0.0125
	5	0.0146	0.0004	0.0044	0.0174	0.0012	0.0118
BAN	1	0.0005	0.0008	0.0011	0.0000	1.0000	-0.0005
	2	0.0008	-0.0006	0.0015	0.0004	0.0106	0.0000
	3	0.0010	-0.0008	0.0013	0.0006	0.0103	0.0003
	4	0.0013	-0.0007	0.0010	0.0009	0.0101	0.0006
	5	0.0015	-0.0006	0.0007	0.0011	0.0099	0.0009
IND	1	0.0123	0.0029	0.0016	0.0168	-0.0002	1.0000
	2	0.0155	0.0029	0.0013	0.0199	-0.0007	0.0259
	3	0.0159	0.0026	0.0016	0.0192	-0.0004	0.0251
	4	0.0158	0.0023	0.0019	0.0186	-0.0004	0.0242
	5	0.0158	0.0021	0.0023	0.0180	-0.0004	0.0233

Panel C: After Crisis

Response Country	by	Innovation in Country					
		FTSE	PAK	SRI	STI	BAN	IND
FTSE	1	1.0000	0.0004	0.0008	0.0047	0.0003	0.0043
	2	0.0103	0.0002	0.0017	0.0049	0.0000	0.0046
	3	0.0099	0.0005	0.0019	0.0047	0.0000	0.0044
	4	0.0096	0.0007	0.0019	0.0047	-0.0001	0.0042
	5	0.0092	0.0008	0.0018	0.0046	-0.0001	0.0040
PAK	1	0.0005	1.0000	0.0001	0.0007	-0.0001	0.0011
	2	0.0029	0.0134	0.0006	0.0019	-0.0004	0.0008
	3	0.0033	0.0128	0.0010	0.0023	-0.0005	0.0012
	4	0.0035	0.0123	0.0012	0.0024	-0.0006	0.0014
	5	0.0037	0.0119	0.0013	0.0025	-0.0007	0.0016
SRI	1	0.0011	0.0001	1.0000	0.0002	-0.0008	0.0032
	2	0.0013	0.0005	0.0172	-0.0005	-0.0012	0.0035
	3	0.0018	0.0000	0.0175	-0.0007	-0.0008	0.0036
	4	0.0023	-0.0006	0.0174	-0.0008	-0.0006	0.0036
	5	0.0027	-0.0011	0.0173	-0.0009	-0.0003	0.0037
STI	1	0.0045	0.0005	0.0001	1.0000	0.0003	0.0054
	2	0.0065	0.0007	0.0015	0.0102	-0.0001	0.0064
	3	0.0064	0.0004	0.0019	0.0097	0.0001	0.0063
	4	0.0064	0.0003	0.0021	0.0092	0.0002	0.0062
	5	0.0064	0.0002	0.0021	0.0087	0.0003	0.0060
BAN	1	0.0005	-0.0001	-0.0010	0.0006	1.0000	0.0008
	2	0.0004	0.0008	-0.0011	0.0007	0.0149	0.0011
	3	0.0005	0.0006	-0.0009	0.0006	0.0160	0.0016
	4	0.0004	0.0007	-0.0007	0.0005	0.0153	0.0021
	5	0.0003	0.0007	-0.0005	0.0004	0.0152	0.0025
IND	1	0.0058	0.0011	0.0031	0.0076	0.0016	1.0000
	2	0.0061	0.0014	0.0042	0.0064	0.0002	0.0138
	3	0.0061	0.0009	0.0042	0.0063	0.0004	0.0128
	4	0.0063	0.0003	0.0041	0.0062	0.0005	0.0121
	5	0.0064	-0.0001	0.0041	0.0060	0.0006	0.0114

V. CONCLUSIONS

This paper examines co-integrations, long run and short-term causal relationship among 4 major stock exchanges in South Asian stock exchanges with also considering their interactions with Singapore and The United Kingdom when global financial crisis 2007 – 2009. First, we run co-integrations tests with 6-dimensional VAR model for the sample period before, during, after and pure after the financial crisis. Then we implement granger

causality to test long run relationship and finally we implementing generalized impulses response analysis to check the short-term causal relationship for different periods before, during and after financial global crisis.

Our finding before crisis, stock markets in South Asia generally link age mostly in local currency, during crisis the influence of US currency become stronger. After global financial crisis, each South Asia stock market stand to more integrated in local currency. The influence of India decreases during and after financial crisis. These findings supports World Bank, 2008 data that indicate India is relatively more exposed to the contagion effects of global financial markets, and Bangladesh maintained generally prudent macroeconomic policies therefore the effect of the global financial crisis on the financial sector is likely to be negligible and remains manageable in vies of failing global oil ad food prices. It can be seen from causality effect in India become less strong than before crisis, and Bangladesh remain as before crisis. This investigation may important to investor or risk management to consider of assets allocation to South Asian markets.

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