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Integration of Stock Markets - A Study of India, Pakistan and China

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ABSTRACT

This study has endeavored to find out associations between three Asian economies namely India (NSE Nifty), Pakistan (KSE) and China (SS). The long-run and short-run relationship have been studied using daily data for a period ranging January 2009 to December 2018. The empirical results suggest the existence of single cointegrating vector between India and Pakistan, however no long run relationship has been found between 'India and China' and 'China and Pakistan'. Further, the Granger Causality test has also found short-run unilateral relationship from India to Pakistan.

Keywords: Asian Market; ADF Unit Root Test; JJ Cointegration test; Granger Causality test.

INTRODUCTION

Efficient stock markets are essential to the financial stability and economic development of any economy as they help to save, facilitate investment, capital mobilization, market development and economic growth. An inefficient, underdeveloped and segmented market however may not be able to efficiently allocate the financial resources across economy due to poor infrastructure, inept technology, lack of proper policies, etc. To eliminate these issues liberalization and globalization policies have been adopted by many economies. Globalization and liberalization resulted in removal of trade barriers, capital controls, etc. Relaxation of these controls resulted in cost free mobilization of capital across borders, larger basket of securities, diversified portfolio which intensified investor's interest. Globalization of markets led to increasing the degree of financial linkages within as well as across boundaries. Since 1990s the financial integration have spread and increased manifold across the Asian economies and other parts of the world. India is among the early beneficiaries with China and Pakistan not missing behind.

Stock market integration basically means the process which helps the markets to become closely linked or integrated with other markets without any administrative or economic barriers etc. Markets are integrated because of 'The Law of One Price' i.e. the returns of assets are identical

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Volume 07 Issue 6
June 2019

regardless of the domicile of the investor or the issuer (Pagano, 2007). Other theories supporting market integration include single set of rules, equal access to financial instruments and services, free flow of information, etc. Stock market integration is known to have numerous benefits to the individual investors, corporates, financial institutions, economies and world market as a whole, however its impression is commonly considered as mixed. Notwithstanding the benefits of integration, stock market integration also possess some degree of risk and cost associated with it. Stock market integration is a multifaceted notion which should be addressed carefully as it has multidimensional consequences which may affect the integration and financial development of the economies.

Stock market integration hypothesis helps to analyze the benefits of international portfolio diversification. Investors allocating their funds to various economies would like to gain the best return for their investments. Understanding the relationship among various stock markets i.e. the extent to which the prices move together benefits the investor to know the best available spot to diversify the portfolio and get maximum returns with the same amount of risk. With conflicting inferences of the previous studies, further understandings should be attainable through an examination of markets. Present study examines the stock market linkages between three neighboring Asian economies, viz. India, Pakistan and China.

LITERATURE REVIEW

Stock market integration has gained huge popularity because of its unprecedented benefits for investors, economies as well as the whole economic world. This popularity resulted in various studies at various levels contributing a lot to this theme. Many earlier studies discussed the concepts, channels, benefits, threat and importance of stock market integration to a particular region or to the world economy. [See Pagano(2007), Ho(2009), Pretorius(2002), Tayebi and Fakhr (2009), Elekdag et. al. (2012), Tamir (1972), park (1999), Brooks et. al. (2003)]

Mukherjee studied the stock market integration under three approaches namely contagion, economic integration, and stock market characteristics and concluded that stock markets around the world are either integrated regionally or globally. Further, he revealed that more studies were focused towards developed economies. The study found that although the economies are independent before crisis, they become integrated of some level after the crisis. Park(1999) studied the integration on an international level and found that integration has been rising with recent developments, with developed countries being the highly cointegrated. However, India was found to be less active in the whole process. Hooy and Goh (2007) investigated the determinants of stock market integration- market attributes, economic fundamentals and world information across 26 stock markets and discovered that market integration was unfavorably affected by three key events namely the 1997's Asian financial crisis, the 2001's world recession, and the 2004's oil price hike. The study further submits that economic trading block explain the level of integration with EU being the highly integrated block and AFTA being the less integrated block. Lothian(2001) studied stock market integration over three centuries and the

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June 2019

degree of integration over various sub-periods. The study found varying degrees of integration over the eighteenth, nineteenth and early part of twentieth century.

In the Asian context Wong et. al. (2004) studied co-movement between major developed stock markets and emerging Asian stock markets. The study found cointegrating relationship of Singapore and Taiwan with Japan, Hong Kong with the United States and the United Kingdom. However, no cointegrating relationship was found among other countries. Further, a change in degree of integration overtime was demonstrated from the study. Patel (2013) investigated cointegrating relationship among India and selected Asian economies and disclosed a causal relationship running from Sri Lanka, Korea, Singapore and China to India and another from India to Pakistan. Palamalai et. al. (2013) investigated stock market integration among major stock markets of emerging Asia-Pacific economies. The study revealed that there exists a long run cointegrating relationship among these markets however in the short run diversification benefits can be exploited by investors. Subhani et al. (2011) investigated stock market integration among south Asian economies and found Karachi Stock Exchange to be integrated with Dhaka stock exchange, while no cointegration has been found with other indices. Yang et. al. (2002) studied the U.S., Japanese, and ten Asian emerging stock markets with special consideration to the 1997 financial crisis. They found a strong relationship among the selected stock markets over the crisis period and post crisis period. The previous studies relating to stock market integration among stock markets of the world are well recognized, however provided the assorted results. The present study attempts to examine the interdependence among selected Asian stock markets.

RESEARCH METHODOLOGY

- **DATA**

  Date used in this study are daily closing stock market indices for India, Pakistan and China. The daily stock price indices comprised of NSE NIFTY for India, KSE-100 for Pakistan, SSE COMPOSITE INDEX for China. The sample data covers the period from January 2009 through December 2018.

- **METHODOLOGY**

ADF Unit Root Test: Testing the incidence of unit root in the time series is imperative as most of the time the data is not stationary, and using a non-stationary data to forecast may lead to inaccurate situations like spurious regression. Thus, to confirm the stationarity of the variables, ADF test have been applied. The complete model with deterministic terms is given in equation

$$\Delta Y_t = \alpha_0 + \beta_t + \delta Y_{t-1} + \theta \sum_{j=1}^{P} \Delta Y_{t-j} + \varepsilon_t$$

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Volume 07 Issue 6
June 2019

Where, Y_t represents dependent variable, p is the number of lags. Hypothesis of the 'the series has a unit root' $(\delta = 0)$ is tested against the alternative hypothesis of 'the series s stationary'.

Johansen and Juselius's (JJ) Cointegration Test: A linear combination of two or more non stationary variable may be stationary (Engle and Granger, 1987). When such linear combination exists and the variables are integrated of same order, then the variables are said to be cointegrated. To test the existence of long run relationship among the selected stock markets JJ Cointegration test has been applied.

Granger Causality Test: The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another, and was first proposed in 1969. A variable X is causal to variable Y if X is the cause of Y or Y is the cause of X. Therefore, to know the short run causal relationship Granger Causality test has been applied. Granger Causality test used following bivariate regression model to find out direction of causality. Where, α_0 and ω_0 represent the constant, n is the number of lags, ε_t is the error term.

$$Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{j=1}^{n} \beta_j X_{t-1} + \epsilon_t$$
$$X_t = \omega_0 + \sum_{i=1}^{m} \gamma_i Y_{t-i} + \sum_{j=1}^{n} \theta_j X_{t-1} + \epsilon_t$$

EMPERICAL RESULTS

The ADF test to examine the stationarity of the data has been conducted at level and at first difference and the results are documented in table 1. The output of ADF test reveals that all the variables are non-stationary at level and stationary at first difference. Thus these variables are integrated of same order i.e. CNX NIFTY, KS11, and TWII integrated of order I(1).

TABLE 1: ADF UNIT ROOT TEST

Level		**Intercept**		**Trend & Intercept**	
		Level	***1st Diff***	***Level***	***1st Diff***
INDIA	***P-Value***	0.1482	0.0000	0.0418	0.0000
	t- Statistics	(2.377927)	(32.63293)	(3.479746)	(32.65553)

PAKISTAN	***P-Value***	0.1869	0.0000	0.9678	0.0000
	t- Statistics	(2.255492)	(40.30537)	(0.757468)	(40.39782)
CHINA	***P-Value***	0.1462	0.0000	0.5290	0.0000
	t- Statistics	(2.384598)	(43.51814)	(2.128349)	(43.53066)

Further, in order to explore the presence of cointegrating relationship among variables, Johansen Cointegration Test have been applied and the results are summarized in table 2 as under:

TABLE 2: JOHANSEN COINTEGRATION TEST

Unrestricted Co-integration			**Rank Test**			**Max Eigen Value**			
Null Hypothesis		**Eigen Value**	**Trace**	**Critical Value**	**Prob.**	**Eigen Value**	**Max Eigen Value**	**Critical Value**	**Prob.**
IND-PAK	**None**	0.006909	16.52816	15.49471	0.0348	0.006909	13.93332	15.49471	0.0605
	At most 1	0.001410	2.794842	3.841466	0.0946	0.001410	2.794842	3.841466	0.0946
IND-CHI	**None**	0.003369	8.571950	15.49471	0.4064	0.003369	6.688953	15.49471	0.5265
	At most 1	0.000950	1.882997	3.841466	0.1700	0.000950	1.882997	3.841466	0.1700
PAK-CHI	**None**	0.003807	10.18050	15.49471	0.2671	0.003807	7.559864	15.49471	0.4252
	At most 1	0.001321	2.620640	3.841466	0.1055	0.001321	2.620640	3.841466	0.1055

The results of the cointegration test revealed a cointegrating relationship between stock markets of India and Pakistan, however no such relationship has been found among other stock markets. Granger Causality test has been applied to variables in order to know whether changes in one variable causes changes in another. The results are documented in table 3 below. The outcomes of the test reveal that there runs a unidirectional causal relationship from India to Pakistan and a bi-directional causal relationship between India to China. On the other hand, no causal linkages have been found between Pakistan and China.

TABLE 3: GRANGER CAUSALITY TEST

		Null Hypothesis	**F-Statistic**	**Probability**	**Result**
1	H_{01}	IND does not causes PAK	8.32550	0.0003	Reject Null Hypothesis
	H_{02}	PAK does not causes IND	2.71346	0.0666	Cannot reject

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					Null Hypothesis
2	H_{03}	IND does not causes CHI	5.67772	0.0035	Reject Null Hypothesis
	H_{04}	CHI does not causes IND	4.32662	0.0133	Reject Null Hypothesis
3	H_{05}	PAK does not causes CHI	1.62838	0.1965	Cannot reject Null Hypothesis
	H_{06}	CHI does not causes PAK	0.93602	0.3924	Cannot reject Null Hypothesis

CONCLUSION

The stock markets across the world have witnessed a number of reforms which enticed the attentions of investors and academicians towards the subject of market integration. In the past, most of the empirical studies have been conducted considering only the developed markets like U.S., Japan, and U.K. but after the Asian crises, the regional markets of Asian countries and their interdependence attracted the investors and academicians all over the world. The present study has been conducted with the objective of finding the presence of long run relationship among three Asian economies namely India, Pakistan and China for a period ranging from January 2009 to December 2018. ADF Unit root test, Johansen and Juselius's (JJ) Cointegration Test and Granger Causality test have been accommodated to study the relationship. The unit root test indicated that all the variables are non-stationary at level and stationary at first difference thus are integrated of order I(1). The Cointegration test revealed that among the studied markets not all the markets are interdependent with each other. Stock market of India found to be interdependent with stock market of Pakistan indicating. Absence of cointegration in the study period may be because of the fact that many changes in the market conditions have been assimilated over this long period. Finally, the study examined the extent of causality among the markets and found Stock Market of India and Stock Market of Pakistan have a uni-directional relationship indicating influence of stock market of India over Pakistan. Further, results indicated that Stock market of India and China have a bi-directional causal linkages indicating strong influence on one another and a short run relationship. Absence of cointegration among 'India and China' and 'China and Pakistan' indicated the opportunity of portfolio diversification benefits for the investors.

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ISSN: 2235-767X
Volume 07 Issue 6
June 2019

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Volume 07 Issue 6
June 2019

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