



RESEARCH PAPER

Co integration among Major South Asian and Developed Stock Market Indexes and their Association ship with KSE 100 Index

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ABSTRACT

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The main motive of current study is to examine the association ship among South Asian markets, Developed stock markets and their influence on KSE 100index. The equity market integration becomes a study of interest from last few years. The Globalization and decentralization has increased the interdependence between stock markets. International investors' and portfolio managers always look for the opportunity of diversification. Johansen test for co-integration approach to measure long association ship was employed. The findings reveal that the South Asian equity indices have no long run association ship. Similarly, there is no interlink age among the Developed market indices. South Asian markets have no influence on KSE 100 index. However, developed stock exchanges have an influence on KSE 100 index. On the basis of our finding we recommend that investors can achieve the benefit of diversification across investing in south Asian markets or across investing in Developed markets. But developed markets have an influence on KSE 100 index, so simultaneously investing in KSE 100 index and developed markets one's cannot achieve the benefit of diversification

Introduction

The equity market is a secondary platform where shares are bought and sold for listed companies. Stock market plays an important role for companies in fund raising. Due to globalization international markets are interconnected with one another. In which information flood of one market may have impact upon other markets because of incorporation. The equity

market plays an important role in the development of any economy. The equity markets solve the problem of liquidity and provide wider opportunity of investments (Tahir et al., 2013). With every passing day world is converging into a global village so distance is being shrinking between countries for profit purposes and to enhance the affluence of shareholders. Trade globalization leads to a new way for foreign and domestic investors. Globalization also provides opportunity for developing countries to invest into a growing equity market. Globalization also add some advantage into financial market like smooth flow in capital and increasing flow of information and also dropping operation cost. The World Trade Organization (WTO) is one of the nominated institutes for promotion of globalization in financial market. Globalizations minimize unsystematic risk and improving financial conditions as well. Therefore by viewing at glance upon past two decades it is seen that the interrelation among stock markets has been improved notably (Mansoor et al., 2014).

This globalization undergoes many changes in the financial markets. One of the biggest benefits this globalization provides to investors is international diversification opportunity. Investors can invest simultaneously across different markets in the world. They may invest in various equity markets in order to earn maximum profit and reduce the portfolio investment risk (Shezad et al., 2014). The stock market integration always remains the hot debate for Portfolio managers and for institutional investors. Because they are always look for the opportunity of diversification. If the stock markets returns move in same direction then in that case the opportunity of diversification will be diminished. But if the stock markets are not interrelated then investor can hedge unsystematic risk by investing across economies. So it is essential to understand the dynamics of equity markets and relationship between them. The word "co-integration" means long run equilibrium relationship. Let us explain this if we have two time series X and Y. Both have independent path but the distance between them is constant over time then such time series is co-integrated. Co-integration has very important implications for portfolio management and for financial theory. Co-integrated equity markets do not hold the efficient market hypothesis because one country stock market influences the other country stock market.

Asset management companies and equity investment companies are always looking for the opportunities of diversification. For the purpose of investment in different stock markets there exist no visible signs for international investors which may guide them. The important question which is always raised by international investors whether international

stock markets are integrated or not? This is the main problem which should be answered. Therefore, the current study aims to examine the inter linkage between equity markets. These are some notable studies that have been done on this particular area; (Mansoor et al., 2014), (Ali et al., 2014), (Tahir et al., 2013), (Kapoor, 2013), (Hussain.Y.R et al., 2012), (Patel, 2012), (David, 2011), (Salim et al., 2010), (Siddiqui, 2009), (Islami, 2007), (Evans et al., 2006), (Lamba, 2005) and (Narayan et al., 2004). But unfortunately there is no prior research that broadly investigates the influence of international equity markets on KSE 100 index (Pakistan). So this study aims to fulfill this prevailing gap in the literature.

Literature Review

Globalization has played a very important role in financial market integration. After globalization and deregulations the international markets become integrated. Narayan et al. (2004) studied the interdependence among the emerging equity markets of the Asian region. They employed the Granger test for causality and found that major Asian stock indices have an influence on the KSE 100 index. They also found that unidirectional causality exists among Asian exchanges. Ying (2004) also examined the interlinkage among world stock indices. They employed the Johansen test for Co-integration and found that the Chinese equity market has a long run association with the international equity markets but is more integrated with its regional countries. By employing ECM and VAR, he found the causal relations among these economies. The unidirectional relation was found from the Hong Kong stock market to the China Stock market. Lamba (2005) investigates the short and long run relationships between South Asian and developed equity markets. He applied the VECM model and found that the Indian equity index is influenced by the world developed markets indices such as the US, France and the United Kingdom. Evans and Millan (2006) examined the long run association among 33 equity indices. They employed the multivariate GARCH model and found that correlations exist between the S&P 500 index and other 32 countries' indices. The results also showed that there are more opportunities for portfolio managers to obtain diversified portfolios globally.

Heilmann (2010) also investigates the linkages between Asian equity market indices and the S&P 500 index by using weekly data from January 1995 to August 2010. Estimating the Co-integration framework, the author found no evidence of long run association between indices. Hussain et al. (2012) study the association between the KSE 100 index and East Asian equity indices. They employed the Granger integration approach. Their finding

indicates that KSE 100 index has no association ship with any of indices of East Asian countries. Kapoor et al. (2013) “examined the interdependence of South Asian countries using monthly index prices starting from the period of March 2007 to April 2012”. They employed Johansen test for long run association ship. They found that stock indices of India, Sri Lanka, Pakistan and Nepal are moved in same direction because of same political and economic environment. Ali et al. (2013) explored the integration between South Asian equity markets using monthly data from 1999 to 2009. They employed VECM model and found that there is no long run association ship among south Asian indices. However, unidirectional causality runs in short run from CSE index to DSE index, KSE 100 index to BSE and BSE index to CSE. Shahzad et al. (2014) analyzed the relationship between Developed, Emerging and South Asian equity markets. The time span of their study was from 1998 to 2013. They employed variance decomposing analysis (VDA) and VECM model. The found that developed stock markets have put pressure on emerging and South Asian markets. South Asian and emerging markets do not affect the S&P 500 and Indian stock market in short run. From this study it is clear that foreign investors can diversify their portfolio by investing in South Asian markets (due to their less strong relationship with emerging and developed stock markets).

Material and Methods

Data

This study uses the monthly index figures from June 2005 consisted of 180 observations. Majority of data were collected from yahoo finance. Yahoo Finance is one of the largest data provider website and considers a popular financial website that provides market information of many listed firms across world. Only the data of CSE 30 Index Bangladesh was collected from their stock exchange website because it was not available on yahoo finance. The stocks Indexes include in our sample are considered the most representative stock indexes in the region which represents the performance of the whole region. The four major stock indexes which are representative of the South Asian countries are BSE SENSEX (India), KSE 100 Index (Pakistan), CSE All Shares (Sri Lanka), and CSE 30 Index (Bangladesh). And stock indexes which are the representative of the developed world included in our sample are; S&P (USA), FTSE (UK), Nikkei 225 (Japan) and CAC40 Index (France).

Empirical Methodology

The first step of conducting time series analysis is to examine the stationarity of data. The term stationary means the time series in which mean, variance and auto covariance are constant over time. The problem with non stationarity is data we cannot generalize the finding to other time period. To examine the stationarity of data we used Augmented Dickey fuller test (ADF) that is widely employed by the academic researchers. The ADF test is estimated as follow:

$$\Delta Y_t = \alpha_1 + \alpha_2 t + \beta Y_{t-1} + \alpha_1 \sum_{i=1}^n \Delta Y_{t-i} + \varepsilon_t \quad (3.1)$$

Test for Long run Association ship

The term co integration means long run association ship. The concept of co integration was first introduced by the two prominent scholars Engle and Granger (1987). However Johansen test of co integration is widely employed by the academic researchers because it allows more than one co integrating relationship. Johansen test is estimated by two approaches: (1) Trace approach and (2) maximum Eigenvalue approach. In both approaches the H_0 is that there is no long run association ship. Main difference between two approaches is in the formation of alternative hypothesis. In trace approach the alternative hypothesis is that the number of co integrating relationship is at least one. However in max eigenvalue approach the H_1 is that the number of co integrating relationships are $k_0 + 1$ instead $k > k_0$. The specification of VAR model is given below in the equation:

$$y_t = \Gamma_1 y_{t-1} + \Gamma_2 y_{t-2} + \dots + \Gamma_p y_{t-p} + \varepsilon_t \quad (3.2)$$

In equation (3.2) y_t is $n \times 1$ that presented the index of different stock market of the selected countries at level of logarithmic, ε_t is a $n \times 1$ vector of residual.

Results and Discussion

Table 1
Descriptive Statistic Of Monthly Stock Indexes

	PAK	IND	SRI	BLD	USA	JAPAN	UK	FRAN
Mean	0.011	0.012	0.014	0.01	0.004	0.004	0.002	0.002
Median	0.02	0.013	0.015	-0.003	0.011	0.006	0.007	0.008
Maximum	0.18	0.24	0.21	0.168	0.102	0.120	0.081	0.118
Minimum	-0.44	-0.27	-0.17	-0.14	-0.18	-0.27	-0.13	-0.14
Std. Dev.	0.07	0.07	0.06	0.06	0.04	0.05	0.04	0.04

Skewness	-2.34	-0.58	0.22	0.31	-1.07	-1.06	-0.71	-0.69
Kurtosis	14.2	5.40	3.71	2.75	5.73	6.10	3.88	3.46
JarqueBera	737	35.81	3.62	2.31	60.9	70.93	14.23	10.66
Obs.	180	180	180	180	180	180	180	180

Table no.1 represents the descriptive statistic. Interestingly it is observed that South Asian Stock Exchanges Srilanka, India, Pakistan, and Bangladesh have higher average Index value in contrast with Developed equity indices during our sample period. BSE Sensex India has highest average return whereas; FTSE UK and CAC France has lowest average return. However if you look at the Standard deviation you will found that South Asian Stock Indexes has higher average standard deviation as compared to world developed stock Indexes. Also BSE Sensex has the highest standard deviation and FTSE and CAC France has lower average standard deviation. So this is consistent with our theory of finance that higher risk higher returns. The kurtosis has positive values which mean that the data has peaked distribution but they are not normally distributed. This is also confirming from Jarque-Bera statistic because the J-B statistic is zero.

Table No 2
The Augmented Dickey Fuller Test

Stock Markets	Constant	Constant & Trend	Constant	Constant & Trend
BSE Sensex India	-2.44	-2.98	-9.82	-9.83
KSE Pakistan	-0.44	-1.28	-9.55	-9.52
CSE Sri Lanka	-1.01	-1.40	-9.13	-9.09
CSE Bangladesh	-1.53	-0.91	-7.33	-7.44
S&P USA	-0.66	-1.02	-8.94	-8.98
NIKKEI Japan	-0.71	-0.60	-8.84	-8.86
FTSE UK	-1.76	-1.87	-10.6	-10.6
CAC France	-1.24	-1.15	-9.06	-9.05

Note: * Indicates that null hypothesis is Rejected at 1% critical value based on Mackinnon (1991). Critical values when including only intercept: 1%: -3.44; 5%: -2.86; 10%: -2.57. Critical values when including both intercept and trend: 1%: -3.98; 5%: -3.42; 10%: -3.13.

Null hypothesis H₀: Equity indices have unit root.

Alt hypothesis H₁: Equity indices have no unit root.

Table no. 2: Presents the findings of Augmented Dickey fuller test. The ADF test is commonly used for examining the stationary property of time series data. Both models are employed i.e. (constant and constant with trend). It is found that equity indices are non-stationary at level. The ADF test statistics are smaller than the test critical values at one percent, five percent and ten percent probability level. So we accept the H₀ that equity indices are not stationary at level. However equity indices

become stationary after taking the first difference of the indices. The Augmented dickey fuller test statistics are greater than the test critical values at given probability level. Thus, we conclude that equity indices are non-stationary at level but after taking the first difference of the equity indices it becomes stationary.

**Table No 3
Long Run Association Ship Test Results(Trace Statistic)**

Stock Markets	Hypothesis		Trace Statistic	Critical valu	Prob**
South Asian Markets	Null	$r = 0$	61.09	63.87	0.08
	Alt	$r \geq 1$			
Developed Markets	Null	$r = 0$	60.12	63.87	0.09
	Alt	$r \geq 1$			
South Asian and Developed Markets	Null	$r = 0$	211.3	187.4	0.0017*
	Alt	$r \geq 1$			
South Asian Market wit KSE	Null	$r = 0$	62.10	64.96	0.12
	Alt	$r \geq 1$			
Developed Market wit KSE	Null	$r = 0$	107.4	88.80	0.0012*
	Alt	$r \geq 1$			

Note:* donates rejection of null hypothesis at 0.05% probability level. Whereas “ r” represents no. of co-integration equations. ** Mackinnon-Haug- Michelis(1999) p-values.

Table no. 3: Presents the findings of the Johansen test for long run association ship. The criterion is that if the Trace statistic value is greater than critical value or if the probability is less than 5% than we can reject the null hypothesis that there is no co-integration between stock indices. Our results indicate that there is no long run association ship between south Asian equity indices (India, Sri Lanka, Pakistan and Bangladesh). Because trace statistic (61.09) is smaller than the test critical values, also p value is greater than 5 percent level. So, null hypothesis is accepted. This indicates that south Asian equity markets provide the opportunity of diversification. Asset management companies and equity investments companies can diversify their risk by investing across these markets. Similarly it is found that there is no long run association ship among developed markets (USA, France, Japan and UK). The p value is greater than 5 percent level. Thus, we H_0 is accepted. The developed markets also provide the opportunity of diversification for international investors. However, our results reveal that the south Asian equity indices have long run association ship with developed markets. Any event in the developed markets influences the south Asian equity markets. So investing across these markets would not be a good idea. Our results also showed that south Asian markets are not related with KSE 100 Index. So any changes in these markets do not impact the KSE 100 index. However, our result indicates that developed stock markets have an impact on KSE 100 index. Developed markets influence the KSE 100 index in long run. So investor cannot diversify risk by investing in developed markets and KSE 100 index simultaneously.

Table No 4
Long Run Association Ship Test (Max Eigen Value)

Stock Markets	Hypothesis		Max-Eigen Statistic	Critical value	Prob**
South Asian Markets	Null	$r = 0$	26.91	32.11	0.18
	Alt	$r \geq 1$			
Developed Markets	Null	$r = 0$	25.10	32.11	0.28
	Alt	$r \geq 1$			
South Asian and Developed Markets	Null	$r = 0$	68.47	56.70	0.002*
	Alt	$r \geq 1$			
South Asian Markets with KSE	Null	$r = 0$	24.56	28.14	0.14
	Alt	$r \geq 1$			
Developed Market with KSE	Null	$r = 0$	46.70	38.33	0.004*
	Alt	$r \geq 1$			

Note:* denotes rejection of null hypothesis at 0.05% probability level. Whereas “ r ” represents no. of co-integration equations. ** “Mackinnon-Haug- Michelis” (1999) p-values.

Table no 4: Robust our co-integration test results by using Maximum Eigen approach. The criteria to accept or reject the null hypothesis were same as discussed above. The Max Eigen statistic have shown the same result which we have already discuss above. South Asian equity indices (Bangladesh, Sri Lanka, India and Pakistan) have no long run association ship. On the other hand, same result is observed for developed equity indices (France, US, Japan and United kingdom). However, South Asian equity markets have long run association ship with developed equity markets. The south Asian markets have no impact KSE 100 index. However, it is found in long run the developed countries equity indices have an impact on KSE 100 index.

Conclusion

The current study examined the long run association ship among south Asian and developed stock indices and their influence on KSE 100 index. The time span for the study is from 2005 to 2015 covering 15 years. The data of selected stock indexes was collected from yahoo finance. We employed ADF test to examine the stationarity of data. It was found that our data has a unit root problem at level but after taking first difference of the stock indices it becomes stationary. Johansen test was employed for examine the inter linkage among stock indices. Our result indicates that South Asian stock markets are not co integrated. Same results were observed for the developed equity indices. The South Asian markets have no influence on KSE 100 index. However, developed stock exchanges have an influence on KSE 100 index. Any changes in developed markets will show in KSE 100 index in long run.

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