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Testing the Financial Cointegration of Equity Markets:Analysis of Developed and Developing Economies

Abdul Qadeer[*Ψ]
Faculty member (Visiting) at Hailey College of Banking & Finance, University of the Punjab Lahore Pakistan
[*] Faculty member (Visiting) at National University of Modern Languages, Lahore Pakistan
[Ψ] Faculty member (Visiting) at University of Central Punjab, Lahore Pakistan
Email for Corresponding: dr.aqkhan@live.com

Abstract
This study explored the financial co-integration of equity markets of developed and developing countries for the period of January 2001 to October 2011. Ten equity markets were included in this study i.e. Pakistan, Australia, France, Germany, United Kingdom, Japan, United State of America, Canada, India and Hong Kong. Multivariate Co-integration with weekly based data was used for analysis. Results found from the study that the KSE offers over all highest return of 46% weekly at appropriate risk tolerance level. The equity markets of Australia, France, Germany, United Kingdom, Japan, United State of America, Canada, India and Hong Kong show less return on high risk or above average risk level as compare to equity market of Pakistan which shows the good economic conditions of the country if other things remaining the same. Equity market of Pakistan is not co integrated with all other stock markets except the equity market of TSX. The Non-cointegration of markets shows that there exist the chances of portfolio diversification. Investors from these countries can be benefited from the diversification of their own structured portfolios on the basis of their own ranked risk profile and risk appetite of investment horizon. Behavioral biases and framing their investing decisions under different risk and return trade off pattern in different environment should be considered for taking the maximum edge from portfolio diversification. According to both multivariate co integration analysis Max-Eigen value statistics and multivariate co-integration analysis trace statistics there are 5 co integrating equations at the 0.05 level that shows there exist five common patterns in our selected series of equity markets and shows there exist long run relationship. Impulse response analysis and variance decomposition analysis shows that KSE and BOMBAY stock market are seems to some extent out of organism as most of these markets shocks are explained by these own innovations.
Keywords: co-integration, equity markets, multivariate co-integration analysis

Introduction

The interdependence of developed and developing markets becomes critical after the crash of October 1987 which affects the correlated stock price across international equity markets. Information technology and state-of-the art risk management system becomes central part of their strategy to compete competitors in market. Before 1950, there was less competition as well as little bit concept of globalization. After 1980, globalization directed the businesses into new context and horizon. Financial world is reshaping according to its risk profile, risk appetite and demanding requirement to their specific objective. Traditional heuristics, regulatory barriers and different conventional decision making aspects should be eliminated as market is shifting to many of behavioral, political, demographical aspects of investment. Forthcoming is digitized and globally integrated financial markets and there is a need of business leveraging for long period return and remain the main advantage of business differentiation. The developing markets have stamina to divert the direction of global fund managers due to the great opportunity for Portfolio diversification. Globally portfolio diversification has many relevant benefits and costs that can be considered by international portfolio investor. In homogeneity, if the financial firms are considering and incorporating purely new resources they would be required to answer the standards of international marketplace. In last twenty five years, being globalized was the most prominent feature for the corporations in financial world. With the help of being globalized and integrated of financial world, domestic/international investors and decision makers are ambitious by considering the competitive edge of efficiency promoting aspects of market interaction. Undesirable real shocks can be affected in equity markets but up to date monitoring, evaluation and controlling of that market integration is necessary. Taking right decision is most important for the investment perspective by avoiding all behavioral and decision making biases (Thaler, 1994). But this can be interrupted by information flow in the market. Intra and interdependence of financial markets and its different integrated aspects has rapidly increased the research interest of research scholars by exploring globalized international equity markets linkage. The globalization of economic activities, information flow in market associated with transaction costs diverts the attention of all investors to explore emerging and developed markets. In this respect, the sub-continent region is very important due to its cultural, ideological and political uniqueness as compare to other countries. So, countries must invest in other countries with the special consideration of its market co integration. If market is co integrated the benefit and chances and potential for

diversification does not exists by structuring a portfolio and vice versa. If markets are not co integrated, this will cause the ultimate benefit to both countries for portfolio diversification by considering behavioral and decision making biases. Since, the independence there exit no trade or investment agreement between Pakistan and India to permit neighbor country investment. This paper is also the effort to diagnose the market linkage with Pakistan and India and try to boost up the investment environment in the infrastructure and all development zones of each other.

The main reason was political barrier like disputed Kashmir and other violations by each other, numerous military conflicts fought and terrorism which played as bottleneck to economically co integration of both countries. This paper is also the effort to provide the insight of two economies in a sense of their domestic and cross nation investment along with the study of other countries with the stock market of Pakistan. Financial co-integration of these equity markets can provide a careful inspection thought regarding investment. But there is the possibility that if equity markets of developing and developed markets are not co-integrated financially or economically then the perceived advantages of international portfolio diversification can be analyzed according to their satisfied up to the best of their knowledge.

Literature Review

Kasa (1992) explored the stochastic effect in the equity markets of heterogeneous countries for the period of 1974 to 1990. Johansen co integration techniques were used to identify the effects with monthly and quarterly data. Results shows that there exist on one co integrating vector that push these markets and found the presence of long term relationship between the equity of markets of Germany, Japan, Canada, US and UK. MacDonald and Allen (1995) explored the international equity diversification for Australian investors for the period 1970 to 1992. As the findings of Kasa (1992), results show that there is the existence of co integration among studied sample set. Roca (1999) studied the long run relationship among stock markets of Japan, Korea, United States of America, United Kingdom, Singapore, Taiwan, Australia and Hong Kong. Johansen co integration analysis and granger causality was used to test the co integration and results revealed that no co integration exists between Australia and other markets and Australian equity market is found significantly influenced by U.S. and U.K. markets. Naeem (2000) explored the effects of equity markets in South Asia, United States and United Kingdom for the period of January 1994 to December 1999. Bivariate and multivariate co integration analysis was used and results shows that no long term relationship exists among these markets for the study period but before nuclear test co integration is observed. Narayan et al. (2004) examined long run relationship of Bangladesh, India, Pakistan and Sri Lankan equity market. Results found that in long run equity market of Bangladesh, India and Sri Lanka Granger-cause stock prices in Pakistan but in short run there is unidirectional Granger causality in Pakistan to India, stock prices in Sri Lanka to India and from stock prices in Pakistan to Sri Lanka. Aggarwal et al. (2005) studied the integration of three stock markets before and after the 1993 passage of NAFTA. Results found that equity prices in the three countries are co integrated only for the post period and stock prices of United States of America are more integrated with both Canadian and Mexican stock prices also. Lamba (2005) studied the relationship of South Asian equity markets and the developed equity markets for the period July 1997 to December 2003. Results reveal that Indian market is affected by US, UK and Japan and equity market of Pakistani and Sri Lanka found relatively independent. Glezakos et. al (2007) explored the relationship of Greek stock exchange ten major countries. Result shows that prominence exists of the US equity market and strong influence of DAX and FTSE found on all other stock markets for the studied period. Hassan et al. (2009) examined the long run relationship between developing and developed stock markets for the period of 2000 to 2006. Johansen and Juselius multivariate Cointegration analysis shows that equity markets are integrated and there exist a long term relationship for the sample period. Results also found that funds managers of United Kingdom, Germany, Canada, Italy and Australia are able to exist in the circle of portfolio diversification by investing Pakistani equity market. Impulse response and variance decomposition analysis shows that Pakistani equity market is independent as its shock is explained by its own innovations.

Data Description and Methodology

This study explored the relationship among equity markets of developed and developing countries for the period of January 2001 to October 2011. Ten equity markets were included in this study i.e. Pakistan, Australia, France, Germany, United Kingdom, Japan, United State of America, Canada, India and Hong Kong. Multivariate Co-integration analysis was used for data analysis. Weekly prices of all equity markets have been taken from yahoo finance. Continuously compounded return was calculated as:

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

Whereas: R_t is Return on day t; P_t is Index closing value on day t; P_{t-1} is Index closing value on day $_{t-1}$ and ln stands for Natural log. In this paper descriptive statistics, correlation matrix, unit root analysis, Multivariate Co-integration Analysis *Trace Statistic,* Multivariate Co-Integration Analysis *Max-Eigen Value Statistics,* Bivariate cointegration analysis, Granger causality test, impulse response test and variance decomposition analysis were

used to test the long run relationship among countries. For the purpose of co-integration analysis, stationary of series at same level is prerequisite for the said test by applying unit root analysis. Unit root is AR (1) process that means autoregressive at first lag and this test is used for testing the stationarity of data. If data is stationarity then the mean and variance will be constant. But for non stationarity variables or series mean will not exist and variance of long term will be time specific. In stationarity series shocks are temporary in nature but in non stationary series shocks are permanent in nature. So, stationary at same order of all variables or series is necessary for the purpose of applying cointegration analysis. Stationaity can be checked through unit root test under different assumption methods. Augmented Dickey-Fuller Test works under very rigid assumption that variables are Identical Independent Distributed and Phillips-Perron Test relaxes the assumption of ADF with flexible one and quoted there can exist weak form dependency between the variables. If series or variables are stationary at same level then Ordinary Least Square is applied. If all series or variable are stationary at level then Johansen (1988; 1991) and Juselius (1990) is applied in Eviews for further testing. If some of the series or variables are not integrated at same order, then ARDL (Autoregressive Distributive Lag) approach will be used in Microfit. Lag Structure is determined for the application of cointegration. There are number of criteria i.e. Akaike Information Criterion (AIC), Schwarz Information Criteria (SIC), Posterior Information Criterion (PIC), and Keating's (1995) application of the AIC and SIC criterion (KAIC and KSIC). In this paper, Akaike Information Criterion (AIC) is used for lag length selection. If series are co-integrated in long-term, then Granger causality must exist in at least one direction which is a result of the relationship described by the Error Correction Model. Error Correction Model (ECM) determines the short and long term relationship between the series of different countries. Granger-causality test is used to study the lead lag relationship. Variance decomposition analysis provide information about the breakdown of the increase or decrease in the value of one variable for a specific period arising from increase or decrease in the same variable in addition to other variables in its lag period. Impulse response tells about the effects of shocks on the adjustment path of the variables. Both calculations are important in assessing how shocks to economic variables or series have a continuous effect through a system.

Results and Findings

Descriptive statistics for ten stock indices returns are given below in Table 1. Where distribution of mean, standard deviation, skewness, minimum, maximum and kurtosis are shown. As shown in table 1, Karachi Stock Exchange offers the weekly highest return at affordable and reasonable risk level as compare to AORD (Australia), Bombay Stock Exchange (India) and Hong Kong Stock Exchange where less return were generated at high risk. Stock markets of all ten countries show positive returns for the period of study. Lowest weekly return was observed in stock market of Hong Kong. Stock market of AORD (Australia), Bombay Stock Exchange (India) and Hong Kong are negatively skewed and these markets have lowest loss as compare to other markets. Whereas KSE (Pakistan), FTSE (United Kingdom), CAC (France), DAX (Germany) Nikkei Japan, TSX (Canada) and S & P (United States of America) has minimum zero loss for the study period.

Table 1: Descriptive Statistics

	KSE	AORD	CAC	DAX	FTSE	NIKKEI	SP	TSX	BOMBAY	HK
Mean	0.0046	0.0005	0.0015	0.0021	0.0011	0.0016	0.0014	0.0016	0.0025	0.0004
Median	0.0019	0.0032	0.0008	0.0011	0.0006	0.0009	0.0007	0.0009	0.0059	0.0019
Std. Dev.	0.0073	0.0225	0.0027	0.0033	0.0016	0.0025	0.0040	0.0023	0.0348	0.0329
Skewness	3.8190	-1.3373	10.1095	5.1760	3.7262	5.7988	12.5572	5.9978	-0.5167	-0.2430
Kurtosis	24.690	10.941	163.149	41.191	22.029	59.306	200.551	61.493	5.428	5.523
Maximum	0.0731	0.0810	0.0484	0.0360	0.0144	0.0334	0.0729	0.0312	0.1317	0.1172
Minimum	0.0000	-0.1771	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.1738	-0.1782
Obs.	566	566	566	566	566	566	566	566	566	566

As shown in Table 2, series are not stationary at level. Yet all series are significantly stationary of first difference on both Augmented Dickey Fuller and Philip Peron tests.

Table 2: Unit Root Analysis

	Augmented Dickey Fuller		Philip Peron	
Series	Level	1st Difference	Level	1st Difference
KSE	1.099993	-4.385775	1.196608	-22.76401
AORD	-1.420227	-23.45888	-1.461588	-23.47545
CAC40	1.25552	-26.26825	2.419914	-25.51006
DAX	0.023143	-7.622602	-1.256093	-24.58829
FTSE	-0.281563	-19.04391	-2.05984	-20.35739
Nikkei	1.073196	-6.974319	1.083965	-22.41077
S&P	-0.250657	-8.081102	-1.764824	-22.17211
TSX	0.865626	-16.74087	-0.3684	-21.5119
India	-0.915497	-14.17898	-0.866028	-23.98858
Hong Kong	-1.308339	-23.53786	-1.445452	-23.61072
Critical Values				
1% level	-3.441819	-3.441819	-3.441695	-3.441695
5% level	-2.866491	-2.866491	-2.866437	-2.866437
10% level	-2.569467	-2.569467	-2.569437	-2.569437

This is the point where decision about further analysis is taken. If series are stationary on different levels, then we move toward ARDL (Autoregressive Distributive Lag) approach otherwise cointegration analysis is used. Here, all requirements for the application of Co-integration analysis were completely met so before applying multivariate cointegration analysis the decision about lag length criteria is taken. There are different criterions for lag length selection as shown in Table 3, but in this paper Akaike Information Criteria is taken. According to Akaike Information Criteria lag 1 is highlighted by Eviews. Therefore, all further analysis will be on lag one.

Table 3: Lag-Length Criteria

Lag	Akaike Information Criteria	Schwartz Information Criteria	Hannan-Quinn Information Criteria
0	139.6748	139.7522	139.705
1*	93.03537*	93.88667*	93.36781*
2	93.07696	94.70217	93.71161
3	93.07228	95.4714	94.00915
4	93.09281	96.26583	94.33189
5	93.19982	97.14676	94.74112
6	93.2682	97.98904	95.11171
7	93.38173	98.87648	95.52746
8	93.48282	99.75148	95.93077

Table 4 provides the results of multivariate co-integration analysis. As shown in table 4, trace statistics indicates 5 cointegration equations at the 0.05 level that shows there are five common patterns in our selected model.

Table 4: Multivariate Co-integration Analysis *Trace Statistics*

Series	Hypothesis	Eigenvalue	Trace Statistics	Critical Value 5%	Prob.**	Remarks
KSE 100	r = 0 *	0.220961	509.0384	239.2354	0.0000	
AORD	r ≤ 1 *	0.169826	367.961	197.3709	0.0000	
CAC 40	r ≤ 2 *	0.152214	262.8035	159.5297	0.0000	
DAX	r ≤ 3 *	0.105277	169.5068	125.6154	0.0000	Trace test indicates 5 cointegration equations at the 0.05 level
FTSE 100	r ≤ 4 *	0.064001	106.6554	95.75366	0.0072	
Nikkei 225	r ≤ 5	0.046376	69.28605	69.81889	0.0551	
S&P 500	r ≤ 6	0.033658	42.45654	47.85613	0.1463	
TSX	r ≤ 7	0.016916	23.11216	29.79707	0.2406	
BSE	r ≤ 8	0.016697	13.47286	15.49471	0.0986	
HK Index	r ≤ 9 *	0.006983	3.959395	3.841466	0.0466	

Multivariate Co integration analysis *Max-Eigen Value Statistics* also used to test the null hypothesis that there are at most r co integrating vectors against the alternative of r + 1 co integrating vectors. Table 5 shows the result of Max-eigenvalue test. It also confirms the presence of 5 co integrating equation(s) at $\alpha = 0.05$.

Table 5: Multivariate Co-Integration Analysis *Max-Eigen Value Statistics*

Series	Hypothesis	Eigenvalue	Max-Eigen Statistics	Critical Value 5%	Prob.**	Remarks
KSE 100	r = 0 *	0.220961	141.0774	64.50472	0.0000	Max-eigenvalue test indicates 5 cointegrating equations at the 0.05 level
AORD	r ≤ 1 *	0.169826	105.1575	58.43354	0.0000	
CAC 40	r ≤ 2 *	0.152214	93.29665	52.36261	0.0000	
DAX	r ≤ 3 *	0.105277	62.85145	46.23142	0.0004	
FTSE 100	r ≤ 4	0.064001	37.36934	40.07757	0.0979	
Nikkei 225	r ≤ 5	0.046376	26.82951	33.87687	0.2726	
S&P 500	r ≤ 6	0.033658	19.34438	27.58434	0.3884	
TSX	r ≤ 7	0.016916	9.639299	21.13162	0.7777	
BSE	r ≤ 8	0.016697	9.51347	14.2646	0.2459	
HK Index	r ≤ 9 *	0.006983	3.959395	3.841466	0.0466	

Bivariate cointegration analysis shows the pair wise co integration behavior of equity markets with each other under the study sample. The Table 6 describes the results of the pair wise cointegration tests for the entire sample period. As shown in Table 6 KSE is not co integrated with equity market of AORD, CAC, DAX, FTSE, Hong Kong, BSE, Nikkei and S & P whereas markets are found integrated with only TSX. As equity market is not co integrated with all except TSX so these markets have an edge to get portfolio diversification by investing in the Karachi stock market.

Table 6: Bivariate Co-Integration Analysis

Series	Hypothesis	Eigenvalue	Trace Statistics	Critical Value 5%	Prob.**	Remarks
KSE 100 - AORD	r = 0	0.026051	16.49406	15.49471	0.0353	
	r ≤ 1	0.002792	1.579847	3.841466	0.2088	No Cointegration
KSE 100 - CAC	r = 0	0.032672	19.16534	15.49471	0.0133	
	r ≤ 1	0.000703	0.39759	3.841466	0.5283	No Cointegration
KSE 100 - DAX	r = 0	0.049506	28.68946	15.49471	0.0003	
	r ≤ 1	4.21E-06	0.002381	3.841466	0.9589	No Cointegration
KSE 100 - FTSE	r = 0	0.057629	34.01063	15.49471	0.0000	
	r ≤ 1	0.000839	0.474148	3.841466	0.4911	No Cointegration
KSE 100 – HK Index	r = 0	0.045585	27.31908	15.49471	0.0005	
	r ≤ 1	0.001694	0.957827	3.841466	0.3277	No Cointegration
KSE 100 - BSE	r = 0	0.037067	22.58748	15.49471	0.0036	
	r ≤ 1	0.002204	1.246501	3.841466	0.2642	No Cointegration
KSE 100 - Nikkei	r = 0	0.076262	45.69235	15.49471	0.0000	
	r ≤ 1	0.001543	0.872506	3.841466	0.3503	No Cointegration
KSE 100 - S&P	r = 0	0.091126	54.56497	15.49471	0.0000	
	r ≤ 1	0.001025	0.579642	3.841466	0.4465	No Cointegration
KSE 100 - TSX	r = 0	0.034203	23.22861	15.49471	0.0028	
	r ≤ 1	0.006291	3.565666	3.841466	0.0590	Cointegration

As shown in Table 7 of Bidirectional Granger Causality, all series are significant with P-value of less than 5% which shows there exist bidirectional granger causality between each series. All are the given below hypothesis are null hypothesis, as the P-value is significant range of 5% then all the null hypothesis are rejected and alternative hypothesis are accepted. So, DAX Granger Cause KSE and KSE Granger Cause which means DAX will lead and KSE will follow alternatively as the other null hypothesis has been rejected so KSE will lead and DAX will follow. FTSE & CAC and NIKKEI & CAC both also lead and follow for given period of time as there exist bidirectional granger causality relationship.

Table 7 (a): Bidirectional Granger Causality

Null Hypothesis:	Obs.	F-Statistic	Prob.
DAX does not Granger Cause KSE	564	5.46350	0.0045
KSE does not Granger Cause DAX		2.85730	0.0583
FTSE does not Granger Cause CAC	564	7.71972	0.0005
CAC does not Granger Cause FTSE		3.03275	0.049
NIKKEI does not Granger Cause CAC	564	2.99233	0.051
CAC does not Granger Cause NIKKEI		6.85105	0.0011

As shown in Table 8, series having star sign (*) are significant with P-value of less than 5% which shows there exist unidirectional granger causality between series. Given below (*) hypothesis are null hypothesis, as the P-value is significant range of 5% then the null hypothesis rejected and alternative hypothesis are accepted. So, AORD Granger Cause Bombay but Bombay does not granger cause AORD that means AORD will lead and

Bombay will follow AORD. Bombay granger cause FTSE but FTSE does not granger cause Bombay which shows Bombay will lead the series and FTSE will follow. Hongkong will lead and Bombay will follow as there exist unidirectional granger causality relationship. CAC will lead and DAX will follow the series for given studied period. NIKKEI granger cause FTSE whereas FTSE granger cause TSX for reported period.

Table 7 (b): Unidirectional Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
BOMBAY does not Granger Cause AORD	564	1.61439	0.1999
AORD does not Granger Cause BOMBAY		4.05199	0.0179*
FTSE does not Granger Cause BOMBAY	564	1.25795	0.2850
BOMBAY does not Granger Cause FTSE		4.65596	0.0099*
HONKONG does not Granger Cause BMBAY	564	8.19412	0.0003*
BOMBY does not Granger Cause HONKONG		1.62995	0.1969
DAX does not Granger Cause CAC	564	2.12009	0.1210
CAC does not Granger Cause DAX		5.66769	0.0037*
NIKKEI does not Granger Cause FTSE	564	5.62832	0.0038*
FTSE does not Granger Cause NIKKEI		1.39341	0.2491
TSX does not Granger Cause FTSE	564	1.30250	0.2727
FTSE does not Granger Cause TSX		3.20005	0.0415*

As given in Table 8, Impulse response analysis of vector autoregressive system is used to test the dynamic response from the series. The function of impulse response finds the effect of one period over all shocks to one innovation on present and next period effect of the endogenous variables. Impulse response shows that KSE's shocks are explained by its own innovations but others equity markets are showing little impact of the equity market of Pakistan.

Table 8: Impulse Response Analysis

Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.

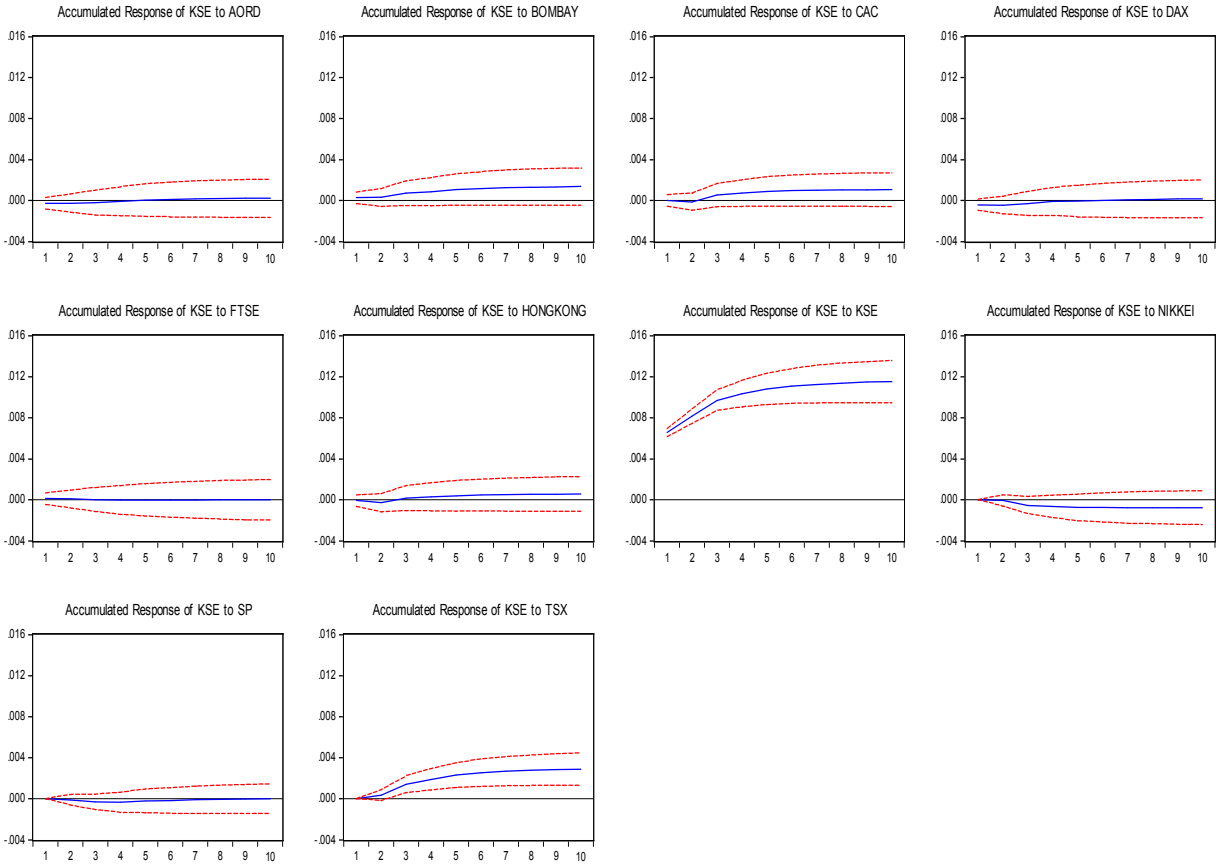

Table 9 (a): Variance Decomposition Analysis of KSE

Period	S.E.	AORD	BOM	CAC	DAX	FTSE	HK	KSE	NIKKEI	SP	TSX
1	0.0227	0.1563	0.1811	0.0002	0.3990	0.0327	0.0134	99.2173	0.0000	0.0000	0.0000
2	0.0228	0.1471	0.1718	0.0370	0.3766	0.0328	0.1148	98.8309	0.0078	0.0284	0.2528
3	0.0229	0.1396	0.4952	0.8768	0.3920	0.0412	0.5211	94.4739	0.4490	0.0989	2.5123
4	0.0229	0.1620	0.5278	0.9342	0.4529	0.0448	0.5429	93.8733	0.4678	0.1017	2.8926
5	0.0229	0.1880	0.6240	0.9822	0.4513	0.0445	0.5557	93.3606	0.4811	0.1294	3.1832
6	0.0229	0.1944	0.6394	0.9941	0.4587	0.0446	0.5661	93.2238	0.4796	0.1331	3.2663
7	0.0229	0.2015	0.6522	0.9949	0.4639	0.0445	0.5681	93.1382	0.4796	0.1464	3.3107
8	0.0229	0.2031	0.6549	0.9969	0.4679	0.0445	0.5702	93.1079	0.4794	0.1486	3.3265
9	0.0229	0.2042	0.6568	0.9968	0.4698	0.0445	0.5707	93.0906	0.4794	0.1515	3.3357
10	0.0229	0.2044	0.6573	0.9972	0.4710	0.0446	0.5712	93.0835	0.4793	0.1521	3.3394

Variance Decomposition analysis as shown in Table 9 (a) and 9 (b) shows the degree of what extent shocks are explained by other equity markets. KSE and Bombay market seems to be out from organism as most shocks of both equity markets are explained by their own innovations. All other equity markets having effective explanatory power on both KSE and Bombay for studied period of time. There exist significant affect on one another equity markets.

Table 9 (b): Variance Decomposition Analysis of BOMBAY

Period	S.E.	AORD	BOM	CAC	DAX	FTSE	HK	KSE	NIKKEI	SP	TSX
1	0.034	31.674	68.326	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.035	31.150	66.320	0.018	0.053	0.002	1.3193	0.3197	0.4786	0.0075	0.3327
3	0.035	32.749	63.944	0.045	0.201	0.381	1.3488	0.3392	0.6554	0.0177	0.3190
4	0.035	32.715	63.884	0.050	0.213	0.392	1.3531	0.3467	0.6568	0.0189	0.3713
5	0.035	32.702	63.818	0.050	0.237	0.438	1.3509	0.3489	0.6563	0.0270	0.3712
6	0.035	32.698	63.806	0.050	0.240	0.441	1.3524	0.3490	0.6569	0.0270	0.3810
7	0.035	32.695	63.795	0.051	0.244	0.445	1.3522	0.3504	0.6567	0.0297	0.3811
8	0.035	32.694	63.793	0.051	0.245	0.446	1.3522	0.3510	0.6568	0.0298	0.3813
9	0.035	32.693	63.792	0.051	0.245	0.447	1.3522	0.3514	0.6569	0.0303	0.3815
10	0.035	32.693	63.791	0.051	0.245	0.447	1.3522	0.3517	0.6569	0.0304	0.3814

Conclusion

Equity market of Pakistan offers over all highest return of 46% for one period of time i.e. weekly at appropriate risk tolerance level. Others equity markets show less return on high risk or above average risk level as compare to KSE 100 Index of Pakistan that shows the good economic conditions of the country if other things remaining the same. Equity market of Pakistan is not co integrated with all studied stock markets except the equity market of TSX. Non cointegration of markets shows that there exist the chances of portfolio diversification. Investors from these countries can be benefited from the diversification of their own structured portfolios on the basis of their own risk profile and risk appetite. Behavioral biases and framing their investing decisions under different risk and return trade off pattern in different environment should be considered for taking the maximum edge from portfolio diversification. According to both multivariate co integration analysis max-eigen value statistics and multivariate co-integration analysis trace statistics there are 5 co integrating equations at the 0.05 level that shows there exist five common patterns in our selected series of equity markets and shows there exist long run relationship. Impulse response analysis and variance decomposition analysis shows that KSE and BOMBAY stock market are seems to some extent out of organism as most of these markets shocks are explained by these own innovations.

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