

## Comovement Between Emerging and Developed Stock Markets: An Investigation Through Cointegration Analysis

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**Abstract:** Globalization has amplified interest of academics and investors to the subject of co movement among the stock markets of the world. This study investigates the co movement of Pakistan's Equity Market with the markets of India, China, Indonesia, Singapore, Taiwan, Malaysia, Japan, USA and UK by using co integration test on monthly stock prices from the period of July 1998 to June 2008. The results reveal that there is no co movement of Pakistan's equity market with the markets of UK, USA, Taiwan, Malaysia and Singapore. Therefore, investors can reduce risk through investment in these countries. Whereas the stock prices of Pakistan equity market move together with the stock prices of India, China, Japan and Indonesia so there is no chance of risk minimization for investors through international portfolio in these countries. Furthermore the role of stock exchange structure is not found in the co movement of Pakistan stock market with the selected stock markets.

**Key words:** Co movement • Diversification • Co integration analysis • Stock Market

### INTRODUCTION

Co movement is explicitly defined as a pattern of positive correlation [1]. However, positive correlation is unclear term and can portray many types of relationships. More precisely, comovement depicts a phenomenon of an asset price moving with another asset price. Moving with is the movement that is shared by all assets or movement that all assets have in common [2]. Growing globalization among economies of the world has increased attention of academics and investors to the subject of comovement among the stock markets around the globe [3]. In today's rapid moving finance world, there are abundant factors integrating financial markets to each other. The existence of robust trading and economic links, the escalation in liberalization activities of governments, the expansion of international finance and trade, swift developments in trading systems and telecommunication, and the establishment of common trading blocs such as European Union, NAFTA, SAARC and ASEAN are some factors contributing to financial integration [4]. Similarly, [5] reported positive impact of financial and trade liberalization reforms on the degree of cross country equity market linkages. Likewise, [6] claimed that the

presence of strong policy coordination and economic ties between related countries can indirectly connect their stock indices over time.

It is evident from the literature that, not only the developed countries but also the financial markets of developing countries become interrelated [7]. However, the intensity of interdependence among equity markets varies in developed and developing economies. The body of empirical evidence suggests significant comovement among equity markets of major developed countries [8-10]. In contrast, linkages among emerging markets and other developed markets appear to be relatively weak [11, 12]. Conversely, [13] reported that comovement is increasing between emerging and developed stock markets. To study comovement is of value to different role players. As International portfolio investments can influence the exchange rate and could lead to appreciation of local currency so comovement among markets has considerable value for multinational companies in making financial policies. Additionally, foreign portfolio investments are subject to sudden withdrawals and hence these have the potential for destabilizing an economy thus increasing international portfolio investment has important implications for macroeconomic policies as well.

Furthermore, According to portfolio diversification theories [14, 15] if stock markets are interlinked then there is no long run benefit of diversification for international investor and vice versa. Therefore, it is vital for global portfolio managers and international investors to examine the dependencies among international equity markets. Finally, to study comovement among stock markets would be useful for policy makers in a sense if stock markets are found to be closely linked then there is a danger that shocks in one market may spill over to other markets thus require closer cooperation among the authorities of these countries, whose equity markets are closely linked.

Though there is vast literature available addressing the issue of stock market integration around the globe yet there is little research done on this subject in Pakistani stock market which has performed exemplary during the period under study. Therefore, the objective of this study to investigate co movement of Pakistan's stock market with the selected stock markets of India, China, Indonesia, Singapore, Taiwan, Malaysia, Japan, USA and UK by using the most recent data from July 1998 to June 2008. It is important to note that all the selected stock markets are demutualized except the markets of Pakistan and Taiwan. According to [16] demutualization is the process of converting a non-profit, mutually owned organization to a for-profit, investor-owned corporation. In extensive literature review no study is found that examined the role of stock exchange structure (demutualized/ not demutualized) in co movement. This study is also analyzing the role of structure of the stock exchanges in the co movement. Moreover, this study aims to test the interdependence among selected stock markets by using cointegration (or VAR) techniques.

**Literature Review:** Over the past few decades, the comovement among national stock markets has dominated both academic and practitioner literature. A number of researches have been conducted to investigate the interdependence among stock indices across a number of different stock markets and over a range of different time horizon. Previous empirical studies of interrelationship of the major world stock indices have not revealed consistent results. The results vary, depending on the sample period chosen, the choice of markets, the frequency of observations (daily, weekly or monthly) and different methodologies employed to inspect the interdependence of equity markets [17]. Among those studies, [18] investigated the dynamic linkages and interdependence between the emerging stock market of Sri Lanka and its major trading partners like India,

Singapore, Taiwan, Japan, Hong Kong, South Korea, and the US. Vector autoregression technique was applied and no significant comovement found between the market of Sri Lanka and its trading partners. However, [17] inspected the dynamic interdependence of the major equity markets in Latin America (Chile, Colombia, Argentina, Brazil, Venezuela and Mexico) by using data from 1995 to 2000. Cointegration analysis and error correction vector autoregressions techniques revealed only one cointegrating vector which appeared to explain the dependencies in the prices.

[12] investigated the interdependence of the equity market in Pakistan with seven major equity markets of UK, USA, France, Japan, Germany, Singapore and Hong Kong. The integration was examined through Engle and Granger cointegration technique using weekly stock price indices from January 1988 to December 1993. The analysis revealed little support of integration of the Pakistani equity market with selected international markets. This made Pakistan equity market as an attractive tool of diversification for international investors. Whereas, [19] examined the linkages between stock price indices of the South Asian countries-Pakistan, India, Sri Lanka and Bangladesh and developed countries like United States and United Kingdom by using Johansen bivariate and multivariate cointegration analysis for monthly data ranging from January 1994 to December 1999. The results provided the evidence of no cointegration among the South Asian equity market indices for the entire period but found cointegration for the pre nuclear test period (i.e. from January 1994 to April 1998). However, The South Asian equity markets were not cointegrated with the equity markets of the United Kingdom and of United States. This implied that there was a potential for risk minimization by investing in the equity market of either the U.K or the U.S. and any one of the South Asian equity market. [20] used monthly data from December 1987 to December 1997 and found no evidence of longrun relationship among five ASEAN countries; the Philippines, Singapore Indonesia, Malaysia, and Thailand. Similarly, [21] investigated the price linkages among Asian stock markets in the period of January 1988 to February 2000. Six emerging markets (Taiwan, Indonesia, Malaysia, Korea, the Philippines and Thailand) and three developed markets (Singapore, Hong Kong and Japan) were included in the analysis. The results of multivariate cointegration analysis revealed that lower causal relationships exist between emerging and developed stock markets. Therefore, opportunities for international diversification in Asian stock markets still prevail.

[22] used selected daily data ranging from January 1995 to 23 November 2001 and examined the dynamic linkages between the equity markets of Pakistan, Bangladesh, Sri Lanka and India. Using a temporal Granger causality approach within a multivariate cointegration framework the results revealed that in the long run, stock prices in India, Sri Lanka and Bangladesh, Granger cause stock prices in Pakistan. In the short run there was unidirectional Granger causality running from stock prices in Pakistan to Sri Lanka and India and from stock prices in Sri Lanka to India. [23] inspected comovement among seven developed markets of Australia, Canada, Hong Kong, Japan, New Zealand, Singapore and the United States and eleven emerging markets of China, Chile, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Russia, Taiwan and Thailand in Asia Pacific. The test of Johansen Multivariate cointegration, Granger causality and generalised variance decomposition on weekly data ranging from November 1995 to October 2000 indicated that there was a stationary long run relationship and significant short run causal linkages among the APEC equity markets. So, there was no potential for international portfolio diversification. However, [24] examined the integration across the stock markets of India, Sri Lanka, and Pakistan, after liberalization policies started in the early 1990s. The multivariate cointegration provided no evidence of any longrun relation across these markets mean that these markets were not dependent on each another.

[3] investigated the comovement of Bangladesh stock market with USA, Japan and India by employing JJ test of cointegration, Vector Error Correction Model and Impulse Response Function on the daily data ranging from January 1990 to December 2000. The results revealed co integration, thus no diversification benefit was possible from cross border investments. Whereas, Impulse response analysis showed that shocks to the US, India and market had strong, weak and no impact on the Bangladesh market respectively. Similarly, [7] used JJ cointegration, Vector Error Correction Model, Granger Causality test to examine the co movement of stock prices among the markets of Turkey, Russia and Hungary by using the daily data from January 2000 to October 2008. The findings demonstrated that cointegration existed among stock indices of countries. Furthermore, Granger Causality test revealed that there was bidirectional causality for the Turkish and Russian stock indices, whereas, Hungarian stock market Granger cause to Turkish stock market but not vice versa. Like wise, [25]

employed Cointegration tests and Granger causality tests to study the dynamic linkage among the ASEAN - 5 emerging stock markets namely Malaysia, Indonesia, Thailand, Philippines and Singapore by using daily data from January 1988 to December 2006 which was further sub divided into pre crisis period from January 1988 to December 1996 and post crisis period from January 1998 to December 2006. The results demonstrated that stock markets in the ASEAN region were co integrated both during pre and post 1997 financial crisis. However, the markets were moving towards a greater integration, particularly during the post 1997 financial crisis.

[26] used monthly data from January 1973 to December 2007 and investigated comovement of stock market returns between Germany, Japan, United Kingdom and United States. They used special type of test i.e wavelet analysis which incorporated time-frequency simultaneously. Noteworthy finding of this paper was that the strength of the comovement of international stock returns depends on the frequency. As they found that comovement between markets was stronger at the lower frequencies i.e in longterm benefits of international diversification was less important. They also found that the strength of comovement varied across countries as well as sectors. [27] examined equity market integration between the emerging equity market of Indonesia and its key trading partners the US, Japan, China and Singapore by using autoregressive distributed lag (ARDL) approach on weekly stock price data ranging from July 1998 to December 2007. The results provided the evidence of cointegration among Indonesian equity market and its major trading partners. Thus, there was limited opportunity for international portfolio diversification in those markets. Furthermore, any development in the US, Japan, China and Singapore markets should be considered by the Indonesian government for making stock market policy. [4] examined the linkages among the stock markets of the BRICA countries (Brazil, China, Russia, India and Argentina) and their relations with the US stock market on daily data from January 2002 to February 2009. They employed the vector autoregression techniques which showed the significant effect of US market on all BRICA countries in the same trading day.

## **MATERIAL AND METHOD**

**Data Description:** The study encompassed monthly stock prices for the period of July 1998 to June 2008 consisted of 120 observations extracted from the websites of stock markets and Yahoo Finance.

Table 1: Description of Indices

Country	Stock Market	Index	Nature	Structure
Pakistan	Karachi Stock Exchange	KSE-100 Index	Value Weighted	Limited by Guarantee
India	Bombay Stock Exchange	BSE Sensex	Value Weighted	Demutualized
China	Hong Kong stock exchange	Hang Seng Index	Market capitalization weighted	Demutualized
UK	London Stock Exchange	FTSE 100	Free float market capitalization	Demutualized
USA	New York stock exchange	SandP 500	Value weighted	Demutualized
Indonesia	Jakarta stock exchange	Jakarta composite index	Value weighted	Demutualized
Singapore	Singapore exchange	Straits times index	Value weighted	Demutualized
Taiwan	Taiwan stock exchange	Taiwan weighted index	Value weighted	Private Corporation
Malaysia	Kuala Lumpur Stock Exchange	Kuala Lumpur Composite Index (KLCI)	Capitalization Weighted	Demutualized
Japan	Tokyo Stock Exchange	Nikkei 225	Price Weighted	Demutualized

The indices used for stock markets of Pakistan, India, China, Indonesia, Singapore, Taiwan, Malaysia, Japan, USA and UK were KSE 100 index, BSE Sensex index, Hang Seng Index, Jakarta composite index, Straits times index, Taiwan weighted Index, Kuala Lumpur Composite Index (KLCI), Nikkei 225, S&P 500 and FTSE 100 index respectively (Table 1). Monthly data was chosen to avoid false correlation problem often found in quarterly and annual data while not compromising on the available degrees of freedom required in selecting appropriate lag structures [28] whereas daily data was also deemed to contain too much noise and is affected by the day of the week effect [29].

Due to different stock exchange holidays, missing observations was the relevant difficulty which arised in examining stock market comovement across countries. To overcome this problem, this study adopted the method of Occam's razor by simply filling in with the price of previous day [25, 30, 31]. The justification of this method was that closed stock market did not generate any information on bank holidays. Since no fresh information publicized, the information of previous day carried over to the succeeding day.

**Procedure:** After getting monthly closing stock prices of the selected stock market indices for the period of July 1998 to June 2008, descriptive analyses were performed to find out the temporal/stochastic properties of the data. All the series of data were then expressed in logarithmic form. The returns for the period of July 1998 to June 2008 were calculated as the logarithmic difference between the two consecutive prices. Most financial time series found to be non-stationary. The problem with non stationary time series was that any statistical inference obtained from running the regression was dubious [32]. A number of alternatives tests were available for testing whether a series was stationary or not, Dickey and Fuller, the Augmented Dickey and Fuller (ADF), [33, 34] and the Philips-Perron (PP) test developed by [35] and [36]. The

ADF statistics preferred over PP test because it considered superior for time series with autoregressive structure and more reliable, since it ensured white noise residuals in the regression [28]. The appropriate number of lags selected using [37] Information Criteria (SIC). As SIC widely used in the literature and had almost become a standard tool for selecting lag structure.

As a first step variables were tested for unit root to establish the order of integration by employing Augmented Dickey Fuller Statistics. ADF test, with and without trend, was applied on all the stock indices both at log level and first difference. All data series having unit root at their log level i.e. non-stationary. However, ADF statistics were significant for all variables at first difference i. e. first differenced variables were stationary. It was concluded that all time series under study were integrated to the order  $I(1)$ . Once the order of integration was established for each variable, the next step was to evaluate the cointegration properties of the data series. Although all the stock market indices were individually non-stationary, their linear combination could be stationary. As all the variables were integrated of the same order i.e.  $I(1)$ , cointegration test was applied to measure the long run relationship. To test for cointegration, [38] and [39] approach was employed based on two statistics- the trace statistics and eigenvalue. The third and last step of the analytical framework was based on Granger causality test that was applied on the series of integration  $I(1)$ . It was used to measure the short run relationship among the stock markets. The test was employed on the data series at their first difference.

## RESULTS AND DISCUSSIONS

This chapter is divided in to four sections. Section 01 presents descriptive statistics which are used to analyze the stochastic properties of the time series data. Section 02 presents the results of unit root test (ADF) which is

Table 2: Descriptive Statistics at log level

Market	Mean	Standard Deviation	Skewness	Kurtosis	J-B	Prob.
Pakistan	8.180679	0.940926	0.098696	1.466593	11.95151	0.002540
India	8.661632	0.586814	0.660628	2.105482	12.72939	0.001721
China	9.544517	0.302278	0.412838	2.854394	3.514714	0.172500
UK	8.590999	0.167502	-0.662028	2.335019	10.97662	0.004135
USA	7.100008	0.151599	-0.598200	2.747729	7.475077	0.023813
Indonesia	6.631128	0.630713	0.597385	2.100945	11.17888	0.003737
Singapore	7.601083	0.304865	0.029909	2.827589	0.166519	0.920112
Taiwan	8.764843	0.223642	-0.144844	2.462754	1.862759	0.394010
Malaysia	6.704776	0.286712	-0.280360	3.892851	5.557942	0.062102
Japan	9.492859	0.236310	-0.264648	2.045703	5.954184	0.050941

Table 3: Descriptive statistics at log difference

	Mean	Standard Deviation	Skewness	Kurtosis	J-B	Prob.
Pakistan	0.021731	0.091425	-0.29429	3.786301	4.783262	0.09148
India	0.012043	0.074752	-0.49332	2.836313	4.959605	0.08376
China	0.008607	0.069089	0.236268	3.803608	4.309167	0.115951
UK	-0.00031	0.040572	-0.80657	3.68245	15.21191	0.000497
USA	0.001117	0.043784	-0.64987	3.87563	12.17794	0.002268
Indonesia	0.013314	0.084059	-0.5465	5.179211	29.47044	0
Singapore	0.008561	0.067934	-0.24117	5.941647	44.0595	0
Taiwan	-0.00014	0.076786	-0.00495	3.431373	0.923147	0.630291
Malaysia	0.009082	0.071174	0.216745	6.848632	74.37441	0
Japan	-0.00164	0.054634	-0.35141	2.534116	3.525362	0.171584

employed to investigate the stationarity of time series data. Section 03 demonstrates the results of Johansen and Juselius Cointegration test. Finally, section 04 displays the results of Granger causality test.

**Descriptive Statistics:** Logarithmic transformation of all the original time series is performed and descriptive statistics of logged data is presented in table 2 in terms of mean, standard deviation, skewness and kurtosis etc. The skewness values for all the series indicate that stock indices of Pakistan, India, China, Indonesia and Singapore are positively skewed whereas the indices of UK, USA, Taiwan, Malaysia and Japan are negatively skewed. The kurtosis values in table reveal that all the indices are platykurtic with lower than normal kurtosis except Malaysia. However, since the values of skewness and kurtosis are not significantly different from zero and three respectively, the departures from normal distribution may not seriously affect the test of cointegration.

Table 3 presents summary of descriptive statistics of the stock returns i.e. stock prices in first difference for the selected stock markets. During 10 year period among the equity markets which earned positive return Pakistan's equity market earned highest average monthly return of 0.2173, followed by Indonesia 0.013314, India 0.012043,

Malaysia 0.009082, China 0.008607, Singapore 0.008561 and USA 0.001117. However among the markets that earned negative average monthly return Japan equity market reported the lowest -0.001636, followed by Taiwan -0.000144 and UK -0.000310. Additionally, the result that the Pakistan market had the highest returns among all the stock market conforms to the theory of finance (riskier the market, higher would be the returns). This evidence is supported by standard deviation, where the Pakistan equity market recorded the highest i.e. 0.91425. Additionally, the skewness values in the table explores that all the stock indices are negatively skewed except China and Malaysia. Whereas, the kurtosis values depicts that all the stock indices are leptokurtic with more than normal kurtosis except India and Japan.

**Unit Root Test:** The results of ADF test appear in Table 4. It is clear that stock prices are non stationary in log level as ADF statistics is not significant for stock prices of all the indices. However, ADF statistics are significant for the first difference of all stock indices at 5 % level of significance. The results are insensitive for both the models; with constant & with constant and trend. The results indicates that all indices are integrated of order one, I (1).

Table 4: ADF Statistics

Indices	Level		First difference	
	With constant without trend	With constant with trend	With constant without trend	With constant with trend
Pakistan	-0.658466	-1.667479	-5.674483**	-5.653285**
India	-1.773405	-1.360335	-4.848662**	-5.023328**
China	-1.381882	-1.620376	-4.540114**	-4.514739**
Uk	-1.262635	-1.287796	-4.350319**	-4.383390**
USA	-1.410839	-1.410903	-4.435020**	-4.414856**
Indonesia	-2.149969	-1.236703	-4.372207**	-4.608865**
Singapore	-0.885071	-1.563802	-4.140661**	-4.138672**
Taiwan	-1.908973	-1.724080	-4.672275**	-4.735077**
Malaysia	-0.584191	-1.660105	-4.838025**	-4.828060**
Japan	-1.359535	-1.342708	-3.918005**	-3.936824**

Note: Critical value at 5 % with intercept is -2.8865 and Critical value at 5 % with intercept and trend is -3.4494. \*\*indicates stationary of data at 5% critical value

Table 5: Result of Co integration Tests

Indices	Eigen	Trace
Pakistan-India	0.120412	22.19810**
Pakistan-China	0.103459	17.26438**
Pakistan-UK	0.091565	13.55241
Pakistan-USA	0.097506	13.87981
Pakistan-Indonesia	0.165459	29.62082**
Pakistan-Singapore	0.099311	14.37389
Pakistan-Taiwan	0.072742	12.32897
Pakistan-Malaysia	0.079239	13.08237
Pakistan-Japan	0.107908	15.47049**

Note: Critical value at 5% is 15.41, \*\* means significant at 5%

Therefore, we can progress to the cointegration analysis because all the indices are integrated in the same order as essential for cointegration. Since all stock indices are stationary at first difference; we now proceed to test for cointegration, aiming at investigating whether there exists long run relationship of Pakistan equity market with the selected markets.

**Co integration Test:** Results of pair wise Johansen and Juselius cointegration tests based on two statistics-the trace statistics and eigenvalue are reported in Table 5.

The results reveal that there is no co integration between Pakistan Stock Market and the stock markets of UK, USA, Singapore, Taiwan and Malaysia as trace statistics do not exceeds the critical value at the significance level of 5%. This indicates that there is potential of international portfolio diversification in the stock market of Pakistan for the investors of UK, USA, Singapore, Taiwan and Malaysia. Furthermore, the investors of Pakistan can also minimize the risk through international portfolio diversification in these equity markets. These results are consistent with the study of [12] that also do not find any co movement of Pakistan's equity market with other markets. [19] also claimed that there are chances of international portfolio diversification

in Pakistan. Other studies which provided the evidence of no cointegration among equity markets of the world include [18, 21 and 24]. However the stock market of Pakistan is cointegrated with the equity markets of India, China, Indonesia and Japan as trace statistics exceeds the critical value at 5 % significance value. This means that the investors of Pakistan can not minimize risk with the investment in the markets of India, China, Indonesia and Japan. Similarly the investors of these countries also can not achieve international portfolio diversification with the investment in Pakistan's Equity Market.

Pakistan stock market which is not demutualized has comovement with the demutualized stock markets of Indonesia, China, Indonesia and Japan. Furthermore, the Pakistan stock market has no comovement with other demutualized stock markets of UK, USA, Singapore, and Malaysia. The stock markets of Pakistan and Taiwan are only stock markets in the study that are not demutualized and the results reveal no co movement among these two markets as. So, it is clear that there is no role of structure of stock exchanges in the comovement of stock markets. If the structure had a role in the co movement then the Pakistan stock market should not have co movement with the demutualized stock markets or it should have comovement with non demutualized stock markets.

Table 6: Result from Bivariate Granger-Causality Tests

Null Hypothesis	F-statistics	P value
India dose not Granger Cause Pakistan	0.37018	0.69145
Pakistan does not Granger Cause India	2.39470	0.09586*
China dose not Granger Cause Pakistan	1.50183	0.22717
Pakistan does not Granger Cause China	0.77272	0.46420
UK dose not Granger Cause PAK	0.02999	0.97046
PAK does not Granger Cause UK	0.82307	0.44172
USA dose not Granger Cause PAK	0.69833	0.49957
PAK does not Granger Cause USA	1.29027	0.27926
Indonesia dose not Granger Cause PAK	0.49826	0.60893
PAK does not Granger Cause Indonesia	0.48361	0.61783
Singapore dose not Granger Cause PAK	0.62078	0.53936
PAK does not Granger Cause Singapore	0.59333	0.55421
Taiwan dose not Granger Cause PAK	5.80659	0.00399**
PAK does not Granger Cause Taiwan	1.17410	0.31287
Malaysia dose not Granger Cause PAK	2.67136	0.07356*
PAK does not Granger Cause Malaysia	4.39346	0.01456
Japan dose not Granger Cause PAK	3.34751	0.03872**
PAK does not Granger Cause Japan	1.39110	0.25307

Note: \* shows the significance at 10%, whereas \*\* indicates the significance at 5%

**Granger Causality Test:** After determining the appropriate lag length, Granger causality test is applied to find whether the stock indeces have a significant effect on each other in the bivariate VAR model. Granger causality test results are presented in Table 6 based on F-statistics and P value.

There in no short run relationship of Pakistan's equity market with the stock markets of China, UK, USA, Indonesia and Singapore. This implies that any change in Pakistan stock market does not cause a change in the equity markets of China, UK, USA, Indonesia and Singapore or any change in the equity markets of these countries do not lead to change in Pakistan's equity market. There is unidirectional causality running from Japan, Taiwan and Malaysia to the stock market of Pakistan. This implies that any change in the stock prices of Japan, Taiwan and Malaysia granger cause the stock prices of Pakistan. Therefore any development in these countries should be considered by the stakeholders of Pakistani market. There is also unidirectional causality running from the stock prices of Pakistan to India which means that any change in Pakistan's stock prices affect the stock prices of India in the short run.

## CONCLUSION AND RECOMMENDATIONS

This study empirically investigates the co movement of Pakistan's equity market with nine selected international stock markets (i.e. India, China, Malaysia,

Taiwan, UK, USA, Indonesia, Singapore and Japan). Based on the results on monthly stock indices it is found that among all the selected indices of different countries, Pakistan's equity market earned highest average monthly return with highest standard deviation. It is also evident from the results that there is no integration of the Pakistani stock market with the markets of UK, USA, Taiwan, Malaysia and Singapore. This situation implies that stock market of Pakistan provides as an attractive diversification opportunity for international portfolio managers of these countries. However the stock market of Pakistan is integrated with India, Japan, China and Indonesia, so, the stock market of Pakistan does not qualify as a diversification opportunity for international portfolio managers of these countries. It is also concluded that there is short run relationship between stock markets of Japan, Taiwan and Malaysia and the stock market of Pakistan. So, any development in these three countries should be considered for policy making about stock market of Pakistan. Furthermore, the structure of stock exchange has no role in the comovement of Pakistan stock market with the selected markets of the world.

It is also clear that the results of cointegration vary due to selection of frequency of observations daily, weekly or monthly. So, the potential area for further research on the issue of comovement is to use high frequency data (daily, weekly). The other avenue for future research is to study spillover/contagion effect by means of volatility models.

## REFERENCES

1. Barberis, N., A. Shleifer and J. Wurgler, 2002. Comovement,. NBER Working, pp: 8884.
2. Baur, D., 2004. What is co-movement. European Commission, Joint Research Center, Ispra (VA), Italy
3. Hoque, H.A., 2007. Co-movement of Bangladesh stock market with other markets Cointegration and error correction approach. *Managerial Finance*, 33(10): 810-820.
4. Aktan, B., P.E. Mandaci, B.S. Kopurlu and B. Ersener, 2009. Behaviour of emerging stock markets in the global financial meltdown: Evidence from bric-a. *African Journal of Business Management*, 3 (7), 396-404.
5. Beine, M. and B. Candelon, 2007. Liberalization and stock market comovement between emerging markets. *CESIFO Working*, pp: 131 .
6. Gelos, G. and R. Sahay, 2000. Financial market spillovers in transition economics. Working paper, International Monetary Fund .
7. Aktar, I., 2009. Is there any comovement between stock markets of Turkey, Russia and Hungary? *International Research J. Finance and Economics*, (26): 193-200.
8. Meric, I. and G. Meric, 1989. Potential gains from international portfolio diversification and inter-temporal stability and seasonality in international stock market relationships. *J. Banking and Finance*, 13: 627-40.
9. Ben Zion, U., J. Choi and S. Hasuer, 1996. The price linkages between country funds and national stock markets: evidence from cointegration and causality tests of German, Japan and Uk funds. *J. Business Finance and Accounting*, 23: 1005-17.
10. Floros, C., 2005. Price Linkages Between the US, Japan and UK Stock Markets. *Financial Markets and Portfolio Management*, 19(02): 169-178.
11. Bakaert, G. and C. Harvey, 1997. Emerging equity market volatility. *J. Financial Economics*, 43: 403-44.
12. Husain, F. and R. Saidi, 2000. The integration of the Pakistani Equity Market with international equity markets: An investigation. *J. International Development*, 12: 207-218.
13. Wong, W.P., R.D. Terrell and K. Lim, 2004. The Relationship Between Stock Markets of Major Developed Countries And Asian Emerging Markets. *J. Appl. Mathematics and Decision Sci.*, 8(4): 201-18.
14. Markowitz, H., 1952. Portfolio Selection. *J. Finance*, 7: 77-91.
15. Lintner, J., 1965. Security Prices, risk and maximum gains from diversification. *J. Finance*, 20: 587-616.
16. Aggarwal, R., 2002. Demutualization and corporate governance of stock exchanges. *J. Appl. Corporate Finance*, 15(01): 105-13.
17. Chen, G.M., M. Firth and O.M. Rui, 2002. Stock market linkages: Evidence from Latin America. *J. Banking and Finance*, 26: 1113-41.
18. Elyasiani, E.P., 1998. Interdependence and dynamic linkages between stock markets of SriLanka and its trading partners. *J. Multinational Financial Management*, 8: 89-101.
19. Naeem, M., 2002. Stock Market Linkages:Evidence from South Asia. The 2002 South and Southeast Asia regional meetings of the econometric society at Lahore University of Management Sciences.
20. Hee Ng, T., 2002. Stock Market Linkages in South-East Asia. *Asian Economic J.*, 16(4): 353-77.
21. Worthington, A., M. Katsuura and H. Higgs, 2003. Price Linkages in Asian Equity Markets: Evidence Bordering the Asian Economic, Currency and Financial Crises. *Asia-Pacific Financial Markets*, 10: 29-44.
22. Narayan, P., R. Smyth and M. Nandha, 2004. Interdependence and dynamic linkages between the emerging stock markets of South Asia. *Accounting and Finance*, 44: 419-439.
23. Worthington, A. and H. Higgs, 2004. Comovements in Asia-Pacific Equity Markets: Developing Patterns in APEC. *Asia-Pacific J. Economics and Business*, 8(1): 79-93.
24. Gunasinghe, W., 2005. Behaviour of Stock Markets in South Asia . *South Asia Economic J.*, 06(02): 165-191.
25. Majid, S., A. Meera, M. Omar and H.A. Aziz, 2009. Dynamic linkages among ASEAN-5 emerging stock markets. *International J. Emerging Markets*, 04(02): 160-184.
26. Rua, A. and L. Nunes, 2009. International comovement of stock market returns: A wavelet analysis. *J. Empirical Finance*, 1-8.
27. Karim, B.A., M.A. Majid and S. Karim, 2009. Financial Integration between Indonesia and its major trading partners. *Munich Personal RePEc Archive*, pp: 17277.
28. Patra, T. and S. Poshakwale, 2006. Economic variables and stock market returns: evidence from the Athens stock exchange. *Appl. Financial Economics*, 16: 993-1005.
29. Roca, E., 1999. Short-term and long-term price linkages between the equity markets of Australia and its major trading partners. *Appl. Financial Economics*, 9: 501-511.



30. Hirayama, K. and Y. Tsutsui, 1998. Threshold effect in international linkage of stock prices. *Japan and the World Economy*, 10: 441-53.
31. Jeon, B. and G. Furstenberg, 1990. Growing international co-movement in stock indices. *Quarterly Review of Economics and Finance*, 30: 15-30.
32. Liu, M. and M. Shrestha, 2008. Analysis of the long-term relationship between macroeconomic variables and the Chinese stock market using heteroscedastic cointegration. *Managerial Finance*, 34: 744-755.
33. Dickey, D. and W.A. Fuller, 1979. Distributions of the estimators for autoregressive time series with a unit root. *J. The American Statistical Association*, 74: 423-431.
34. Dickey, D.A. and W.A. Fuller, 1981. Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49: 1057-1072.
35. Phillips, P.C., 1987. time series regression with a unit root. *Econometrica*, 55: 277-301.
36. Phillips, P.C. and P. Perron, 1988. Testing for a unit root in time series regression. *Biometrika*, 75: 335-46.
37. Schwarz, G., 1978. Estimating the dimension of a model. *Annals of Statistics*, 06: 461-464.
38. Johansen, J., 1988. *Statistical Analysis of Cointegrating Vectors*. *J. Economic Dynamics and Control*, 12: 231-54.
39. Johansen, S. and K. Juselius, 1990. Maximum Likelihood Estimation and Inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52: 169-220.