Journal of Management Science Research Review
https://jmsrr.com/index.php/Journal/about

Volume 4 Issue No 4 (2025)

Online ISSN: 3006-2047
Print ISSN: 3006-2039

Capital Market Co-Integration of Pakistan and its Trading Partners: An Empirical Analysis

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Abstract
In the ever-globalizing economy, the investors continuously look elsewhere outside their local markets to diversify their portfolios and to reduce risk. One of the main factors in such international diversification is the extent of integration of the capital markets, the extent to which there is a long-term relationship between the capital markets can restrict the potentials of diversifying investments across the international borders.

This paper empirically examines whether the stock market of Pakistan, the PSX-100 index, and the capital market of ten major trading partners of Pakistan, which include the United States, China, the United Kingdom, Germany, India, Hong Kong, South Korea, Japan, Malaysia, and Singapore, are long-run co-integrated. The study applies the strict econometric tools, the Augmented Dickey-Fuller test of stationarity and the Johansen co-integration test of relationships in the long-term equilibrium using daily stock index data between May 2014 and May 2024.

The results also display a very important discovery: there is no statistically significant co-integrating long-run relation between the Pakistani equity market and any of the ten trading partners of the country throughout the research period. This lack of a long-term stable relationship implies that this Pakistani market is independent of these major economies in the long run. Based on this result, the study offers solid evidence that, international investors can effectively diversify their risks by investing in Pakistani equities in their portfolios in addition to assets of these developed and emerging markets. These findings suggest to the portfolio managers and policymakers

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Online ISSN: 3006-2047
Print ISSN: 3006-2039

how the capital market of Pakistan has rare and potentially lucrative opportunities when it comes to global investment strategies.

Keywords: Capital Market Integration, Portfolio Diversification, Johansen Co-Integration, Pakistan Stock Exchange, International Finance.

Introduction:

To reduce risk and obtain a reasonable rate of returns, investors usually have a well-diversified portfolio and search uncorrelated securities (Marcus & Bodie, Essentials of Investments). It has prompted most investors to move on to foreign markets and make investments outside of their national borders in order to enjoy superior risk-adjusted returns and exploit the high rates of returns available in the emerging markets. This has happened due to globalization of capital flows as developed countries loosened their capital controls in the 1990s and then the emerging countries began doing the same Yang, J., Moosa, K., & Pointer, L. (2003). Globalization has also made institutional and individual investors to access international securities markets easier by improving the communication and connectivity.

This means that the growing mobility of investors is an indicator of shift towards the more economically integrated world with integration of financial markets playing important role in coordinating the economies. Sustainable economic growth wants countries to have the resources needed and enjoy the benefits of being integrated into financial markets and this causes economic convergence Akozy, M., Akin, F., & Zeytunlu, N. (2011). Financial integration entails investors having sustainable growth and high profits.

The capital markets integration will also ensure that resources and opportunities are distributed equally to foreign investors. Market integration is, however, impeded by barriers to market integration expressed in the form of information availability, foreign ownership, exchange rate risks, legal and tax differences and home bias Errunza, V., & Losq, E. (1985). The elimination of these barriers will allow investors to determine the most lucrative places and ease the process of integrating the securities markets, thereby reducing the amount of time it takes to globalize the markets.

Capital market integration studies have been carried out in other regions such as the European Union, Latin America, or East Asia Akozy, M., Akin, F., & Zeytunlu, N. (2011). Pakistan has a major market share in the global market and little empirical research has been done on its stock exchange in South Asia. According to Aazim, M. (2012, June 12), the key partners of Pakistan to trade with are the United States, the United Kingdom, China, Germany, Malaysia, India, Japan, Hong Kong, Singapore, and Korea because they have the largest volumes of trade and stock market index data available.

It is important to study the co-movement of the stock markets between these countries, as they are potential locations of the international portfolio diversification. As postulated in the portfolio theory, the extent of the linkages between the assets or markets reflects the rewards of diversification. Also, when a dependency is

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established between the stock market of Pakistan and its trading partners, a shocks in other markets can impact on Pakistan King, M., & Wadwhani, S. (1990). This requires enhanced collaboration of the Pakistani government and its trading partners. Moreover, no non-US stock market integration studies exist, and the present research will fill this gap.

This paper will discuss the co-movement of the Pakistani stock market with ten major exchanges and the Pakistan and its capital market co-movement with its trading partners. It aims at determining which of these markets is a dominant source of stochastic patterns and appropriate information to others The study will also test the long term correlation between integration of stock market and these countries where the trading is possible. The objectives that are specific are to evaluate the co-movement of the Pakistani stock market with its trading partners and explore some ways Pakistan Stock Exchange can be diversified in terms of portfolio investment).

Literature review

This research study investigates the co-integration of capital markets, highlighting the awareness of financial experts regarding opportunities for expansion and risk limitation. It examines the long and short-run relationships among stock market indices of Germany, Japan, the US, and the UK using daily stock data from 1984 to 1991, revealing that during the short run of the October 1987 crash, other markets were influenced by the US market, while in the long run, the US market led the others Hassan, M. K., & Naka, A. (1996).

Another study analyzed the co-integration of stock exchanges in Hong Kong, Japan, Australia, the UK, Germany, France, Switzerland, the US, and Canada from June 1997 to June 1999, finding a consistent long-run effect of the US on other markets Bessler , D. A., & Yang, J. (2003). Additionally, European equity market integration from 1985 to 2002 identified Frankfurt as the dominant market, particularly during the 1997-98 period Aggarwal, R., Lucey, B. M., & Muckley, C. (2003).

Research on the relationship among stock markets in Australia, Hong Kong, Taiwan, Singapore, the USA, UK, Korea, and Japan from 1974 to 1995 found no relationship between Australia and the other markets Roca, E. D. (1999). A study from January 1977 to December 1985 revealed significant relationships among the HK & USA and TN & JP markets, while most Asian markets were interconnected, excluding the Philippines and Thailand Bailey, W., & Stulz, R. M. (1990).

Further studies explored the relationships among G7 nations and the Istanbul Stock Exchange, noting a lack of connection with MENA countries, while establishing a relationship between G7 nations and Turkey (Erdal & Gunduz, 2001). An analysis of European and Turkish markets from November 2000 to February 2009 indicated a strong correlation during normal economic activity and a stronger interrelation during economic downturns Gklezakou,T. & Mylonakis, J. (2009).

The study also examined the co-integration of Turkey's stock market with European Union markets from 2001 to 2005, finding no long-term integration with the UK, Germany, and France, but co-integration with Greece Kucukcolak, N. (2008). Research on Turkey's stock market and the US from 1988 to 2010 demonstrated

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significant connections and volatility spillovers from NASDAQ to the Istanbul Stock Exchange Ergun, U., & Noor, A. (2010)

Using data from May 2005 to January 2011, another study found no union between EU and Arab countries' markets Atyah,M,H. & Rashed,W,A.(2012). A survey of South Asian stock markets from 1994 to 1999 indicated no long-term relationship with the UK and US markets, suggesting portfolio diversification opportunities.

Further analysis of South Asian exchanges from January 1994 to November 2002 showed no long-term coordination among the largest exchanges Nath, G. C., & Verma, S. (2003). A study on Malaysia's stock market from July 1998 to July 2007 found a strong co-integration relationship Karim, Z. A., & Karim, B. A. (2007).

A study of the Pakistan, Sri Lanka, and Indian market between July 1997 and December 2003 showed that the US, the United Kingdom and Japan influenced the Indian market, whereas Sri Lanka and Pakistan had no relationship with the main market Lamba, A. S. (2005). They established long-term correlations between the Karachi stock market and other markets in the world, but found no coordination with various key markets.

Finally, a 1999-2009 study of markets in South Asia showed no long-term or short-term relationship between the Colombo, Dhaka, Karachi, and Bombay stock exchange, Sulaiman, D. M. (2011).

This research literature indicates that past studies have overly concentrated on exclusive territorial research on either developing or developed countries which has resulted in no long term peace relationships analyses between pakistan and its key trading allies. The paper stands out because it uses the most recent information to compare the performance of countries and stocks during the global financial crisis between January 2006 and May 2012. Unlike most studies that rely on monthly values, this research employs daily stock market index values for each country, based on the belief that information flows rapidly and markets respond quickly to disclosed information, as noted by Cerny and Koblas (2008), who found that it takes only one hour for information flow to be reflected in the stock markets of different countries. The following section will outline the methodology adopted to achieve the study's objectives.

Methodology

Data

All data was sourced from http://www.bloomberg.com, and official websites of selected stock exchanges. The stock records data spans from May 1, 2014, to May 31, 2024.

Pakistan capital market

The PSX 100 index is used as an alternative indicator of Pakistani capital markets

US capital market

The S & P 500 index is used as an alternative to the US capital markets.

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UK capital market
FTSE 100 index is used as an alternative proxy for the capital market of UK.

China capital market
Shanghai Composite Index is used as an alternative proxy for the capital market of China.

Korea capital market
KOSP index is used as an alternative indicator for the capital market of Korea.

Hong Kong capital market
Hang Sang index is used as an alternative indicator for the capital market of Hong Kong.

India capital market
BSE index is used as an alternative indicator for the capital market of India.

Germany capital market
DEX index is used as an alternative indicator for the capital market of Germany.

Malaysia capital market
FTSE Bursa index is used as an alternative indicator for the capital market of Malaysia.

Singapore capital market
Straits time index is used as an alternative indicator for the capital market of Singapore.

Japan capital market
Nikkei 225 Index is used as an alternative indicator for the capital market of Japan.

Unit Root Test
The study aims to examine co-ordination between time arrangement factors by examining unit root issues and non-stationary or stationary schedules. The enhanced ADF unit root test was used, with spontaneous error terms and steady changes. The extended Dickey-Fuller test is expected to undergo rigorous testing due to its strict presumption. The Enhanced ADF test is also used to test concomitant speculation.

Co Integration Analysis
Co integration requires all circumstances to be non-stationary and expects direct mix of two times arrangement to be stationary. The study will use Johansen Co's joining strategy, which is recommended by Johansen and Juselius (1990). The Trace Test insights will be used to determine the number of co-coordinating factors. The study

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will continue until invalid speculation cannot be rejected, focusing on the hidden nature of information destroyed.

Empirical Results

Exact follow-up was obtained by taking advantage of standardized information for all capital markets indices and recording all capital market records with the help of the measurable bundle Eviews 5.

Descriptive Statistics

Table 1 shows the descriptive statistics of daily data for all 10 indices in the study.

Table 01: Descriptive Statistics

Countries	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera p-value
China	7.629456	7.589354	0.395266	0.487871	2.586788	0.000
Pakistan	8.648869	8.961435	0.807129	-0.67764	1.949288	0.000
US	7.067373	7.082477	0.160313	-0.55790 9	2.82158	0.000
India	9.021497	9.128674	0.663597	-0.17694	1.471041	0.000
Singapore	7.714296	7.726643	0.285009	-0.14793 2	1.906646	0.000
Germany	8.57106	8.639073	0.271122	-0.65326 2	2.703102	0.000
Korea	7.0178	7.088546	0.433482	-0.18300 2	1.679575	0.000
Malaysia	6.881168	6.825075	0.288234	0.105376	1.852834	0.000
Japan	9.373527	9.319441	0.243317	0.36308	2.069275	0.000
Hong Kong	9.67769	9.65977	0.299198	-0.12100 7	2.010887	0.000
UK	8.560043	8.583786	0.156877	-0.48528 3	2.241256	0.000

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The stock indices show positive mean returns from 2014-2024, indicating upward trends across global markets. Japan has the highest mean, indicating strong market performance and consistent growth. Pakistan has the largest standard deviation, indicating substantial volatility and market uncertainty. Most indices are negatively skewed, with occasional extreme negative returns more common than large positive ones. Some markets show positive skewness, implying occasional spikes in returns. Kurtosis values are below 3, suggesting platykurtic distributions, suggesting fewer extreme shocks during the ten-year period. The Jarque-Bera test rejects normality for all indices, indicating non-normal return distributions. The Pakistani capital market demonstrates high volatility, non-normal return distribution, and negative skewness, common in emerging markets. Developed markets, such as the US, UK, Germany, and Japan, show lower variability and more stable distributions

Unit root test:

Table: 02. ADF Statistics

Indices	**t-Statistics**	**Prob.***
Pakistan	-0.99147	0.7638
US	-1.84709	0.3612
China	-1.15608	0.6941
UK	-1.78508	0.3847
Germany	-1.57331	0.4389
Hong Kong	-1.51747	0.5279
India	-0.96459	0.7265
Japan	-1.45719	0.5707
Korea	-1.30967	0.5857
Malaysia	-1.69341	0.4329
Singapore	-1.347	0.6135
1% level	-3.43473	
5% level	-2.86259	
10%level	-2.56317	
*Mackinnon (1996) one sided p-values.		

Table 2 indicates Eviews comes about for A-D-F test

The non-stationarity implies that stock market indices are influenced by long-term trends and persistent shocks meaning that today's prices depend heavily on yesterday's prices.

This finding supports the Efficient Market Hypothesis (EMH), under which price changes are unpredictable and follow a stochastic process.

After first differencing (not shown but implied), the indices are expected to become stationary a necessary condition before conducting Johansen co-integration analysis.

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In econometric terms:

$$Y_t \sim I(1) \forall\ t \in \{PSX, S\&P\ 500, FTSE\ 100, \ldots\}$$

Thus, each market series is integrated of order one, making them appropriate candidates for testing long-run relationships.

Co integration analysis

All **trace statistics** for Pakistan's pairwise combinations with its 10 trading partners are **below the 5% critical values**, indicating **no rejection of the null hypothesis of no co-integration (r = 0)**.

Table No: 03 Johansen Co integration Test (Trace Statistics) Bivariate Co integration

Johansen Co integration Test				
Pair wise co-integration	**Hypothesized No. of CE(s)**	**Trace Statistic(Q)**	**Critical value at 5%**	**Conclusion**
PAK VS US	r=0	9.087903	15.49481	**No Co integration**
	r<1	1.355432	3.841498	
PAK VS CHINA	r=0	5.558122	15.49493	**No Co integration**
	r<1	1.497558	3.841439	
PAK UK	r=0	9.198715	15.49417	**No Co integration**
	r<1	1.456703	3.841497	
PAK VS GERMANY	r=0	11.45537	15.49417	**No Co integration**
	r<1	2.320617	3.841449	
PAK VS HONG KONG	r=0	13.38385	15.49478	**No Co integration**
	r<1	1.471187	3.841487	
PAK VS INDIA	r=0	11.63647	15.49491	**No Co integration**
	r<1	1.008179	3.841487	
PAK VS JAPAN	r=0	8.954357	15.49448	**No Co integration**
	r<1	2.031293	3.841492	
PAK VS KOREA	r=0	10.82701	15.49491	**No Co integration**
	r<1	0.645867	3.841478	
PAK VS MALAYSIA	r=0	9.7685957	15.49443	**No Co integration**
	r<1	0.691721	3.841488	
PAK VS SINGAPORE	r=0	8.451698	15.49461	**No Co integration**
	r<1	0.817085	3.841434	

Pakistan's stock market lacks co-integration with its trading partners, indicating a weak relationship and no long-term equilibrium. This is consistent with previous South Asian studies showing limited price movement transmission from developed to emerging Asian markets. Pakistan's stock market behaves independently of global market trends, possibly due to capital controls, low foreign participation, exchange-

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rate volatility, political instability, and regulatory and liquidity constraints. Such absence of co-integration implies that international investors have a great potential of diversification, but also indicates to policy-makers that they need to further enhance financial openness, increase information transparency, and that regulation must be aligned with international standards in order to make international investors more confident. Non-integration is financial segmentation whereby the equity market of Pakistan is not entirely relaying or absorbing global shocks leading to less inflow of funds and slow assimilation into the global financial networks. In order to increase the co-integration as well as the efficiency of the market in future, it is suggested to increase financial liberalization, stability in the policies, and enhanced depth of the market.

Discussion, Conclusion and Recommendation

Conclusion:

The objective of the study was to examine how the Pakistani capital market (PSX-100 index) could integrate with the equity markets of its key trading partners in the long-run such as the United States, China, the UK, Germany, India, Hong Kong, South Korea, Japan, Malaysia and Singapore. This analysis applied Augmented Dickey-Fuller (ADF) and Johansen Co-integration tests to identify the movement of these markets either together or separately in the long-run and the implication of financial integration and the possibility of low diversification.

Descriptive statistics demonstrated that there are specific behavioral differences in developed and emerging markets. Economies that were developed displayed reduced standard deviations indicating that they had more stable and efficient financial systems whereas Pakistan had the highest volatility indicating high frequency of price fluctuations, low liquidity in the market as well as high sensitivity to shocks in the domestic economy. The presence of overall economic growth in the various markets was confirmed by positive means, and negative skewness in most of the indices showed that downside risks were present.

The results of the ADF test showed that each of the stock indices is non-level. It is an indication that the equity market of Pakistan is volatile than its developed counterparts, perhaps because of information asymmetry, speculative trading and macro economical instability.

The Johansen Trace statistics confirmed that no co-integration existed between the stock market in Pakistan and ten trading partners, which means that there was no long-term equilibrium between Pakistan and its trading partners. There are both positive and negative implications of this outcome to the international investors and policy makers.

In a macro-financial sense, the findings indicate that the capital market in Pakistan is still fragmented indicating a low level of trans-boundary capital flow. It will also be more responsive to domestic fundamentals as opposed to external shocks whereas global indices of developed economies are more interconnected and responsive to global macroeconomic indicators.

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Discussion:

There was a study on capital market co-integration between Pakistan and its top ten trade partners in the period 2014-2024 that indicated that the stock market of Pakistan had no long-term equilibrium relationship with the stock markets of the latter. The research revealed high volatility and negative skew, which are the features of the emerging market and exposure to the domestic risk factors. The ADF tests verified that all the series are order one integrated and this suggests efficient but unpredictable financial markets. The outcome of the Johansen test revealed that Pakistan did not share any statistical evidence of co-integration with any of its partner markets and therefore the behavior of the market cannot be segmented and the stochastic trends are not independent. Lack of co-integration implies that international investors have diversification prospects. The article supports the hypothesis of segmentation in international finance and implies that emerging markets tend to go separately because of institutional inefficiencies, information barriers, and regulatory discrepancy.

Recommendation:

The financial openness and regulatory framework of Pakistan is suggested to improve the foreign portfolio investment. The nation must open up its capital account and should liberalize the process of repatriation as well as facilitate cross listing of securities. Corporate governance codes should be enhanced by regulatory institutions and, it should compel financial disclosures and mechanisms to protect investors. Market making mechanisms, derivative and bond market development and lower transaction costs should enhance market liquidity and depth. The FinTech platform, algorithmic trading, and blockchain-based settlement systems should promote technological integration. The volatility experienced in the exchange rates ought to be addressed by coordination between the monetary and fiscal authorities. Cross-border capital agreements should be encouraged due to the promotion of regional and bilateral financial cooperation. The macroeconomic stability should be sustainable so that it attracts the inflow of foreign capital and minimizes market fluctuations. Future prospects involve applying multivariate co-integration and Granger causality models, applying high frequency data to determine the short-term contagion effects during financial crises, and adding structural break tests to determine regime changes which could change how integration works.

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