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Are the Major South Asian Equity Markets Co-Integrated?

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Abstract

Seemingly unrelated variables are quite often having relations with each other and this peculiar relation has always won the intentional and unintentional attention of many scientists and researchers. This paper is an attempt to investigate and interrogate the co-movements or the relations among the seemingly unrelated stock markets of South Asian countries, which includes Karachi Stock Exchange (Pakistan), Bombay Stock Exchange (India), Dhaka Stock Exchange (Bangladesh) and Nepal Stock Exchange (Nepal). The daily co-movement of the four well-known Indices comprising of KSE-100, BSE Sensex, DSE Composite Index, and NSE Index is examined by using the Johansen co-integration analysis for the period of May-1995 to May-2011. We found the linkage of stock prices of Karachi Stock Exchange with the stock prices of Dhaka stock exchange, while KSE is not co-integrated with the rest of outlined equity markets in terms of stock price indices.

Keywords: Co-integration, Equity/ Stock Markets, Market Trend, Stock Prices.

JEL Classification: M21, E01, E02, G12, G15, R53

1. Introduction

This paper aims to study the relationship/ co-integration among the major equity markets of South Asia. Quite many attempts have been observed to investigate the same for the different equity markets of world. Portfolio diversification models (Markowitz, 1952; Sharpe, 1964; Lintner, 1965) have formulated on the principle of strong interdependence of various markets, that if the co-movement of stock markets is similar then there would not be any long term gain for international investors in portfolio diversification. Therefore, it is essential for both investors and academicians to be acquainted with the trend of various stock markets. The issue is also necessary for policymakers to argue that if equity markets appear to be closely related, so there is a chance that any uncertainty in one market can be spread to other markets. Bonfiglioli and Favero (2005) analyzed the co-movement in the stock markets of U.S and Germany, after applying co-integration analysis they found that the interdependence between the two stock markets cannot be rejected. Corhay and Urbain (1993) applied both static regression and Vector Auto Regression based maximum likelihood to study the possibility of associations in the various European equity markets, authors revealed and found the presence of co-integration between the share prices of various European equity markets.

The purpose and objective of this research paper is to analyze and investigate the trend of major south Asian stock markets which includes Karachi, Bombay, Dhaka, and Nepal Stock Exchanges by keeping an eye on their share prices and the possible commonalties among them.

2. Literature Review

As addressed already that many attempts have been made in addressing the linkages between the movements of different stock market indices. The purpose has been investigated for numbers of equity market via numbers of econometrical analysis for finding and understanding the co- movements among the various behaviors and factors of various equity markets. The Bonfiglioli and Favero (2005) presented a methodology to confirm the interdependence and co-movements between equity markets mainly comprising on US and German capital markets. They evaluated the relative significance of interdependence via an explicit structural model through applying co-integration analysis to disentangle long-term equilibrium from short-run dynamics. Authors developed long-term equilibrium by examining distinct probable design and supporting the hypothesis of co-integration between the (log of) US long-term interest rates and earning price ratio. Within such outline of study, they discovered that the proposition of short-run interdependence between the two equity markets cannot be rejected. Vector Error Correction Model was used as a baseline to judge the relative significance of interdependence and short-run behaviors of the two equity markets.

Their structural model demonstrates that the impact of variations of US stock market on the German stock market is confined by a non-linear pattern. Normal variations in the US stock market have virtually no impact on the German market, whereas impact becomes considerable and significant for irregular variations and such non-linearity evidently translated the short-run interdependence of these equity markets but only in the periods of havoc. Their findings were verified by Rigobon (2003) who used the Instrumental Variable methodology to conclude the short run interdependence between the US and German capital/ equity markets. The research of Karolyi and Stulz (1996) interrogates the characteristics of cross-country co-movements of stock returns. Authors concluded that no macroeconomic announcements along with interest rate shocks significantly have an impact on co-movements between US and Japanese Stock returns. Conversely, the co-movements of stock returns on Monday have been observed to be higher as compared to other day's co-movements for most of the European equity markets (Karolyi & Stulz, 1996). While, Karolyi and Stulz (1996) also found that co-movements between US and Japanese equity markets are on a higher side when simultaneous absolute returns of national market indices have been seen on a higher side. For instance, the correlations and covariance recorded in daytime between Japanese and US stock returns are high when S&P index has an increasing absolute return.

They also revealed that this empirical consistency cannot be explained by the fact that if returns are mutually normally distributed and co-move positively, conditioning on a huge unqualified return does not necessarily portray the same for the qualified returns. Furthermore, it was also observed that correlations and co-movements between these two equity markets are found at increasing trend at the time when these both markets moved more. According to Corhay and Urbain (1993), long-term relationship between time series variables are mainly analyzed by applying co-integration technique which is proved to be successful in analyzing the objective. They both used static regression and Vector Auto Regression based maximum likelihood approach to reveal the presence of co-integration between the share price series of various European equity markets. Surprisingly, evidence was found in both the static OLS and VAR based MLE approaches which state that, while there is a long-term relationship seems to be present among European share prices, the Italian share prices show a different behavior having no long-term relationship.

As per the study of Nath and Verma (2003), there has been a wide investigation on the co-movement between the equity markets of the urbanized countries. In this study, the authors investigated the interdependence of the major three equity markets of South Asia. The daily stock market data from January 1994 to November 2002 was used in the investigation. The stock market indices which were taken for the research were India (NSE NIFTY), Singapore (STI) and Taiwan (Taiex). Bi-variate and multivariate co-integration analysis were employed to model the association among these stock markets. It was found that there was no co-integration among the indices for the whole period and consequently no long term equilibrium. Mild causality was observed for some years however, most of the time, there has been no link among these markets. Kasibhatla, Stewart, Sen and Malindretos (2006) examined the short-term and long-term relationships within main West European equity markets comprised upon price indices of London (FTSE100), Frankfurt (DAX30) and Paris (CAC40). Long-term co-movements in the price indices were witnessed when co-integration was applied via error correction models (ECM) approach. Empirical findings of the analysis found the existence of one co integrating vector and two common stochastic trends.

Taylor and Tonks (1989) interrogated sterling deflated stock price indices on monthly basis from 1973 to mid-1986 and used the two-step Johansen co-integration model to analyze whether is there any long-term linkage of UK equity market with equity markets of US, Japan, Netherlands and Germany. They revealed the co integrating linkage between UK market and each of the remaining five markets. Taylor and Tonks (1989) presented an argument in this connection that the presence of co-integration implied an infringement of the market efficiency. Although, Fraser and Oyefeso (2005) advised that co-integration evidence should not inevitably be involved in gauging market inefficiency.

Kasa (1992) presented one co integrating linkage between the U.S. equity markets with the four European equity markets. Correspondingly, Corhay and Urbain (1993) supported evidence of cointegration amongst various European stock markets from 1970 to 1980. Rocca (1999) examined the co-movement of weekly price indices of eight countries and did not find cointegration of Australian equity market with the seven other stock markets. Chan, Gup, and Pan (1992) found no evidence of co-integration between various European stock markets and also between those countries which are the members of European Economic Commission (EEC), particularly after the slump of 1987. Moreover Pynnonen and Knif (1998) also found insignificant connection among Scandinavian equity markets. While, Corhay et al (1995) found evidence of one co integrating vector between five main Pacific-Basin markets (namely, Australia, Japan, Hong Kong, Singapore and Malaysia).

3. Research Methodology

3.1 Data Description

The primary focus of this paper is to investigate the commonalities in the trends of major equity markets of south Asian regions. The data used in this connection, is comprised upon the daily stock prices of KSE-100, BSE Sensex, DSE Composite, and Nepal SE indices for the May 1995 to May 2011.

3.2 Econometrical Frame work

The concept of co-integration in time series econometrics is so to speak as a common stochastic trend between or among two or more time series. Two or more variables/ series are said to be co integrated, if individually each series is non stationary (has one or more unit roots) at level or at same order. Therefore, to explore the co-integration among the out lined stock prices, the stationary/ non stationary in the stock prices of each equity markets is investigated first, through ADF unit root test (1979) at level and 1st difference for the various lags of stock prices, and then Johansen co-integration test is used to investigate, find and verify the co-integration among the stock prices of these outlined equity markets.

4. Findings and Results

4.1 Findings of ADF-Unit Root Test:

The first step in investigating co-integration is to test the presence of unit root in the each individual series. For this purpose the ADF unit root test is applied to find the stationary/ non stationary at same order and 1st difference in all out line series of stock prices. Table 1 reports the findings of ADF unit root test where for each series log Polynomial at same order and then at first difference is taken to render the residuals approximate white noise. The Ljung- Box Q statistics is used to test the autocorrelation where it is found that all of the series has zero autocorrelations. It is revealed in the ADF unit root test that all of series has non stationarity at level which implies the presence of unit root in each out lined series at the same order, as for all variables/ series examined, the absolute values of calculated t-statistics are lower than the all three MacKinnon critical values. Consequently the null hypothesis i.e. presence of non stationary in each series could not be rejected at same order. While, at 1st difference and it is found that the all of the series are stationary.

4.2 Findings of Johansen Co-integration Test:

Since, the presence of non stationarity at same order in the series of stock prices of all equity markets are observed, therefore, Johansen co-integration test is applied to investigate the co-integrating properties of stock prices of all outlined equity markets. For interrogating the co-movements, we first tested and investigated the nos. of co-integrating equation by applying the Johansen multivariate co-integration on the share prices of all stated equity markets as shown in Table 2, then thereafter, co-integrations of the stock prices of KSE 100 index with the stock prices of all equity markets, i.e. BSE Sensex, DSE Composite index, and NSE index on one on one basis are investigated by using Johansen bi-variate co-integration as explained and reported in Table 3.

Multivariate co-integration in Table 2, reports that there is one co integrating equation found significant as the trace statistics (T-Stat) > Mackinnon Critical Values at 5% therefore, we failed to accept the null hypothesis that there is no co integrating equation and co-movements between these outlined equity markets from south Asian region. When investigating bi-variate co-integration between the stock prices of KSE 100-Index & rest of equity markets on 1 on 1 basis, the results reveals that the absolute values of calculated t-statistics is found above to the conventional Mackinnon critical value at 5% for the co- movements of stock prices of KSE100 index with Dhaka Stock Exchange hence, these two equity market are so to speak as co-integrated. While the co-movements of KSE 100-index with Bombay stock Exchange-Sensex and with Nepal Stock Exchange in terms of their stock prices are found insignificant (i.e. T-Stats < Mackinnon Critical Values at 1% and 5% both). That is, there is no evidence of co-integration or common stochastic trends among the stock prices of all outlined equity markets except of the equity markets of Karachi-Pakistan and Dhaka-Bangladesh, which affirms the findings of many previous researches for the different equity markets. The result further confirms that the movement in equity market of Pakistan (i.e KSE-100 Index) does have a long run explanatory power in predicting the movements in the equity market of Dhaka only from the major south Asian region.

5. Conclusion and Discussion

This paper concludes that all of the outlined stock markets have unit roots or non stationarity at same order while, they are co integrated as the whole with each other, but one on one exclusive co-movements of Pakistani Market (KSE-100 index) with the Indian Bombay Sensex and Nepal equity market are found missing and not present. Similar to these findings Karolyi and Stulz (1996) also interrogated and confirmed the weaker co-movements between the major stock markets of Europe as the whole from 1990-1994. Syriopoulos (2004) investigated the emerging central European equity markets containing Poland, Hungary, Czech Republic, and Slovakia, and found their linkages with the U.S. and German equity market but in contrast, Nath and Verma (2003), convincingly concluded that there is no co-integration among the indices of NSE NIFTY (India), STI (Singapore) and (TAIEX) Taiwan and consequently no long term equilibrium. Mild causality was observed for some years however, most of the time, there has been found no link among these markets. Pan, Liu and Roth (1999); Corhay and Urbain (1993) also found no evidence of co-integration between/ among the equity markets of Australia, Japan, Hong Kong, Singapore and Malaysia, Pynnonen and Knif (1998) concluded the insignificant connection among Scandinavian equity markets but the finding of this paper and other researches reviewed above portrays a dilemma on the co-integrating attributes of equity markets from one corner of the world to another. This mixed and now and then paradoxical situation can not precisely draw a concluding line on the co-movements of world equity markets but leave a debate to interrogate the common dynamics which are primarily required to operate the each equity markets of world.

6. References

Bonfiglioli, & Favero, C. (2005). Explaining co-movements between Stocks Markets: the case study of Germany and U.S. Journal of International Money and Finance, 24, 1299-1316.

Chan, K., B., Gup, & Pan, M. (1992). An Empirical Analysis of Stock Prices in Major Asian Markets and the United Stated. The Financial Review, 27, 289-307.

Corhay, A., & Urbain, J., P. (1993). Common stochastic trends in European stock markets.

Economic Letters, 42(4), 385-390.

Corhay, A., Rad, A. T., & Urbain, J., P. (1995). Long Run Behavior of Pacific Basin

Stock Prices. Applied Financial Economics, 5, 11-18.

Fraser, P., & Oyefeso, O. (2005). US, UK and European Stock Market Integration**.** Journal of Business Finance and Accounting, 32(1-2), 161-181.

Kasa, K. (1992). Common Stochastic trends in International Stock Markets. Journal of Monetary Economics, 29, 95-124.

Karolyi, G., & Stulz, R., M. (1996). An investigation of U.S Japan stock returns comovements. The Journal of Finance, 3, 951-986.

Kasibhatla, K., M., Stewart, D., Sen, S., & Malindretos, J. (2006). Are daily stock price indices of major European stock markets cointegrated?. The American Economist, 50(2), 47-57

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in

Stock Portfolios and Capital Budgets. Review of Economics and Statistics. 47:1, 13-37.

Markowitz, H. (1952). Portfolio Selection. Journal of Finance, 7(1): 77-91.

Nath, G. & Verma, S. (2003) Study of stochastic trend and co- integration in the emerging markets: A case Study of India , Singapore, and Taiwan. Retrieved June 27, 2011 from http://www.nseindia.com.

Pan, M., Liu, Y., & Roth, H. (1999). Common stochastic trends and volatility in Asian Pacific equity markets. Global Finance Journal, 10:161-172.

Pynnonen, S., & Knif, J. (1998). Common Long-term and Short-term Price Memory in Two Scandinavian Stock Markets. Applied Financial Economics, 8, 257–65.

Rigobon, R. (2003). Identification through heteroskedasticity. The Review of Economics and Statistics, 85(4): 777-792.

Rocca, E., D. (1999). Short-term and long-term price linkages between the stock markets of Australia and its major trading partners. Applied Financial Economics. 9,501-511.

Sharpe, W. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance, 19 (3): 425-442.

Syriopoulos, T. (2004). Modeling Long Run Dynamics in Transitional European Equity Markets, European Review of Economics and Finance, 3(4): 37-56.

Taylor, M.P., & Tonks, I. (1989). The internationalization of equity markets and elimination of UK Exchange control. The Review of Economics and Statistics, 71, 332 - 336.

Table1: Augmented Dickey-Fuller (ADF) Unit Root Test:

VARIABLES / SERIES	ADF TEST WITH INTERCEPT & TREND AT SAME ORDER			ADF TEST WITH INTERCEPT & TREND AT 1ST DIFFERENCE		
	ADF COEF	T-STAT	P-VALUE	ADF COEF	T-STAT	P-VALUE
Stock Prices of KSE 100-Index	-0.000226	-0.53938	0.8810	-0.864638	-50.54710	0.0001
Stock Prices of BSE Sensex	-4.45 E-05	-0.08453	0.9943	-0.925497	-54.18894	0.0000
Stock Prices of DSE Composite	-0.001420	-0.82841	0.8101	-1.080524	-24.39047	0.0000
Stock Prices of Nepal SExchange	-0.000172	-0.33944	0.9188	-0.940423	-56.62769	0.0000
***Mackinnon Critical Values (5008 Observations)**			1% - 3.43 5% - 2.86 10% - 2.56			

Table 2: Johansen Multivariate Co-integration Test among the Stock Prices of KSE 100, BSE Sensex, DSE Composite, and Nepal SE indices

VARIABLES / SERIES	LOG-LIKELIHOOD	T-STATISTICS
Stock Prices of KSE 100, BSE Sensex, DSE, and NSE Indices	-82748.16	50.507080
Mackinnon Critical Values (5008 Observations)	1% 54.46 5% 47.21	

Table 3: Johansen Bi-variate Co-integration Test between the Stock Prices of KSE 100-Index & rest of equity markets on 1 on 1 basis

VARIABLES / SERIES	LOG-LIKELIHOOD	T-STATISTICS
Stock Prices of KSE 100-Index & Bombay Stock Exchange Sensex	-42408.20	11.374460
Stock Prices of KSE 100-Index & Dhaka Stock Exchange Composite	-42899.62	15.620252
Stock Prices of KSE 100-Index & Nepal Stock Exchange	-38299.68	11.228000
Mackinnon Critical Values (5008 Observations)	1% 20.04 5% 15.41	