STOCK MARKET INTERDEPENDENCE : EVIDENCE FROM INDIAN AND THE SINGAPORE STOCK MARKET

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ABSTRACT   In this research, the researcher is to explore the nature of the association and the possible existence of a short-run and long-run relationship between the stock-market indices of India and the Singapore. The idea behind this combination is to know how the stock markets of these two prominent countries are related to each other. The study employs monthly data from the stock indices, namely NIFTY (India) and SGX (Singapore) composite from September 2012 to December 2015. After testing for the normality of the data distribution and the stationarity of the time series data, this research discovered a strong correlation between the stock market indices of India and the Singapore. The research also attempts to discover the presence of unit root problem among these markets by applying the Augmented Dickey Fuller (ADF) test and Phillips-Perron (PP) test. The result suggests the absence of a non stationary and did not show evidence of random walk. However, the Indian stock market is seen to be a function of its own past lags and the past lags of the Singapore stock index.

1. INTRODUCTION

Globalization has gained momentum over the past two decades. Financial markets are at the forefront of this development. In 2013, the global market capitalization increased significantly to USD 64 trillion (17 per cent growth rate) and the value of share trading increased to USD 55 trillion (12 per cent growth rate). Development in multinational companies, advances in information technology, deregulation of financial systems, growth in international capital flows and abolishment of foreign exchange control have increased cross-country correlation, bringing nations together economically (Tehrani, 2011). The movement towards enhanced earnings and portfolio diversification makes way for a worldwide capital movement in the form of both direct and portfolio investments, which ultimately leads to stock market integration. On the other hand, inter-linkages among stock markets may bring different risks, such as the contagion effect and ripple effects of economic events in distant countries. These were evidenced during the 2008 sub-prime credit market crisis in the USA. It is therefore of great academic and practical importance to understand the linkages between the different world stock markets.

Several researchers have studied the determinants and relationships among various equity markets across the world (Andjelic & Djakovic, 2012; Raja Sethu Durai & Bhaduri, 2011). Many regional studies have been undertaken in the European, Middle-East and Gulf, Asian and African markets. There are also numerous of studies connecting regional and global markets. Even though many studies on stock market integration are available, the researchers have not encountered any relating to the interdependence of the Indian and Singapore stock markets.

This study examines the mutual relation among the two stock markets of India and the Singapore. The research investigates the bilateral associations of these two stock markets because the two markets are crucial developing markets in Asia. Both India and Singapore have been named among the promising emerging economies owing to their constant economic progress over the last few years. During the period under study, the trade volume and capital flows of the above two countries have also increased. This research attempts to explore whether any of these stock market indices help in forecasting the other stock markets in the group and how these two markets relate to each other in both the long and short run.

2. REVIEW OF LITERTURE

In the case of the European markets, Gilmore and McManus (2003) examine the bilateral and multilateral cointegration properties of the German stock market and three other Central European markets. The Johansen cointegration procedure indicates that there is no long-term relationship between the German and Central European markets, either individually or as a group. Chelley-Steeley (2005) and Kearney and Poti (2006) examined the links among the various equity markets in the European markets. They found evidence in favour of a structural break in the process of market integration and established that the markets of Eastern Europe in particular are moving away from market segmentation. Ramaprasad Bhar and Shigeyuki Hamori (2008) investigated the co-movement in four large European equity markets over a sample period of nearly 30 years and found that the overall comovement in the equity markets was well established.

Asian markets have also been studied extensively to discern the relationship and volatility existing between them and developed markets. Rajiv Menon, Subha and Sagaran (2009) considered whether the stock markets in the Indian subcontinent have any link to the major stock markets in China, Singapore, the USA and Hong Kong. The outcome confirmed that the Indian markets are related to some of the markets around the world. Gupta and Agarwal (2011) examined the correlation between the Indian stock market and five other major Asian economies (Japan, Hong Kong, Indonesia, Malaysia and Korea) and found a weak correlation among the stock exchanges. This offers a diversification benefit to institutional and international investors. Sharma and Bodla (2011) studied the links between the stock markets of India, Pakistan and Sri Lanka. The result suggests that the National Stock Exchange (India) Granger affects the Karachi Stock Exchange (Pakistan) and the Colombo Stock Exchange (Sri Lanka).

3. OBJECTIVES OF THE STUDY

The main research questions addressed in this study are as follows ;

- What nature of association exists among the stock market movements of India and the Singapore ?

- Are any stock market indices among the Indian and Singapore markets useful in forecasting the other stock market indices within the group ?

4. DATA BASE AND METHODOLOGY

The secondary market data used in this study consists of daily time

series stock-market indices of the National Stock Exchange-CNX NIFTY 50 (India) and SGX (Singapore). The study is undertaken with the objective of finding whether there is any stationary or non-stationary among the selected stock market indices based on the data of the four years. The study covers the period from September 2012 to December 2015. Descriptive statistics, ADF test and PP test have been employed in this research.

5. RESULTS AND DISCUSSION

The Normality test has been conducted for the NIFTY and SGX stock-market indices. Jarque-Bera statistics are used to test the normality of each data series. Table 1 shows the results, along with the descriptive statistics. The Skewness value 0 and the kurtosis value 3 indicate that the variables are normally distributed. The standard deviation of NIFTY (1.376) states that the stock-market indices are comparatively less volatile than SGX (1.429). The probability of 0.000 indicates that the null hypothesis of normality assumption is rejected in the case of Nifty and SGX.

Analysis of Descriptive Statistics of Daily Returns of NIFTY and SGX

A summary of descriptive statistics of returns series of NSE and SGX of during the study is presented in Table 1. Mean, maximum, minimum, standard deviation, skewness and kurtosis have been used and discussed in the following table. In order to find the normality of the data, Jarque-bera test also employed with the support of following hypothesis testing.

Null Hypothesis (H_o) : The data is normally distributed for NSE and SGX companies during the study period.

Table 4
Descriptive Statistics of Daily Returns of NSE and Singapore Stock Exchange
(Study Period : September 2012 to December 2015)

Tools	NSE	SGX
Mean	0.050	0.011
Median	0.058	0.000
Maximum	3.738	4.373
Minimum	-6.097	-4.671
Std. Dev.	0.978	0.981
Skewness	-0.428	-0.147
Kurtosis	5.942	4.871
Jarque-Bera	322	130
'p' Value	0.000*	0.000*

Note : * - Significant at 1% level

The Table 1 clears that during the study period, the NSE and SGX companies showed sign of positive average daily returns. The highest average daily return was shown by NSE which has 0.050% and the lowest return was of SGX with 0.011%. As far as volatility was concerned the standard deviation of SGX was highest at 0.981% and the lowest volatility was present in NSE with 0.978%. It can be seen that SGX has lower return as well as more volatile as compared to NSE with high return and less volatile. The coefficients of the skewness were found to be significant and negative for both returns. The negative skewness implies that the return distributions of the shares traded in the market in the given period have a higher probability of earning returns greater than the mean.

Similarly, the coefficients of kurtosis were found to be positive and were significantly higher than 3, indicating highly leptokurtic distribution compared to the normal distribution for both the returns. That means both the companies were having more risky to investment during the study period. The Jarque-Bera test statistic was indicated that the null hypothesis is rejected for both the companies. So, it is noted that data in both the companies were not normally distributed.

Analysis of Unit Root Test

Unit Root Test of NSE and SGX

Table 2 showed that Augmented Dickey-Fuller (ADF) and Phillips-Perron Test (PP) unit root tests for NSE and SGX companies were performed including 'intercept' and 'intercept and time trend' at level and first difference for the period of September 2012 to December 2015.

Null Hypothesis (H_o) : There is no unit root problem for NSE and SGX companies during the study period at level and first difference.

Table 2
Unit Root Testing of Daily Returns of NSE and Singapore Stock Exchange (At level)
(September 2012 to December 2015)

Indices	Test	Level	First Difference
NSE	ADF	-25.930*	-17.72*
	PP	-25.853*	-264.77*
SGX	ADF	-30.888*	-18.54*
	PP	-30.884*	-432.35*

Note : * - Significant at 1% level; NS-Not Significant; Parenthesis indicates 'p' values.

: * MacKinnon critical values for rejection of hypothesis of a unit root at 1%, 5% and 10% are -3.43278, -2.8625 and -2.5677 respectively.

From the table, the result of ADF and PP statistics in level showed that all the selected companies of NSE and SGX have significant at 1% level as their Mackinnon's value and so the null hypothesis of no unit root problem was rejected. Hence, it is found that while using ADF and PP test, the series is stationary and did not show evidence of random walk at level and first difference.

6. CONCLUSION

This paper empirically investigates the relationship and the degree of co-integration between the Indian and Singapore stock market indices. All two stock market indices are found to be non-stationary, and become stationary after the first differencing. However, Indian stock market index predictability could be improved by including Singapore stock market index lags. Thus the economic intuition of this research is, regardless of strong correlation, that there is no evidence of long-run relationship between these two stock markets. As the stock market indices are independent in the long run, these markets offer the possibilities of investment diversification for international investors.

7. REFERENCES

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