Interlinkages between Indian and Chinese Stock Markets

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ABSTRACT

The integration of global stock markets has attracted attention of researchers. The existence of interlinkages among global stock markets has serious importance for international portfolio managers and policy makers. The study analyses the linkages between India and China. The stock indices used for study are SSE Composite Index for China and CNX Nifty for the Indian stock markets. The Daily Closing price levels of the benchmark indices in these countries are taken from the period of 1st April 2008 to 31st March 2015. By applying the ADF unit root test, Johnson's cointegration Test, the study found that all markets are first differenced stationary and long run relationship exist among stock markets.

Keywords: ADF, Unit Root, Co-integration, indices, Diversification.

INTRODUCTION:

International diversification of portfolios and global integration of stock markets has always been an area of great concern for researchers. Investors who purchase shares in domestic and foreign markets always try to reduce their market risk and get benefits through international diversification. Diversification provides benefits only when the markets are not perfectly correlated with each other. The integration among the global economies seems increased with the lifting of restrictions on capital flows and reforms taken place in working and functioning of exchanges.

In general terms, integration is the process through which a country's financial markets become more closely linked with other markets of the world. It implies the elimination of barriers for foreign individuals and institutions to operate or to offer cross-border financial services.

With economic liberalization and globalization in the economic policy, 1991, India becomes integrated with the globalised world. India made economic relations with develop and developing nations that resulted free flow of capital, transparent flow of information among financial markets, improvement in technological infrastructure in financial markets, emergence of country level regulatory bodies and elimination of traditional regulatory barriers.

This article made an attempt to examine the linkages of the Indian stock market in recent years with the china. The need of the present study aroused to fill the gap as no one previously tried to examine the linkages between India and china.

OBJECTIVE OF THE STUDY:

The main objective of this research paper is to examine the linkages between Indian market and Chinese stock market.

REVIEW OF LITERATURE:

A large number of studies have been done to investigate stock market linkages. Stock markets are integrated when correlation exists between markets. The results of these studies are contradicted.

Kumar and Mukhopadyay (2002) examined co- movement between US and Indian stock markets. The results found causality and spillover effect running from US market to Indian stock market. Lamba (2004) analyzed the dynamic relationship among India, Pakistan, Sri Lanka, France, Germany, US, UK, and Japan. It was found that developed markets influenced the Indian market, but Indian market did not influence other Asian markets. In another study, Wong et al. (2005) found that the Indian stock market is integrated with the matured markets of the world. Mukherjee and Mishra (2007) studied the interdependence among the 23 countries of the world including India. The results concluded high degree of market integration. Countries from the same region were highly co-integrated with each other. Raj and Dhal (2009) found strong integration of Indian market with other markets. Siddiqui (2009) found that world stock market indices were interrelated with each other.

Conversely, Nath and Verma (2003) suggested that no long run equilibrium relationship found among India, Singapore and Taiwan markets and therefore equity market of south Asian were not inter-related with each others. Gunasinghe (2005) examined the integration among the stock markets of India, Pakistan, and Sri Lanka, after liberalization policies. The results provided no evidence of any long-run relation across these markets mean that these markets were not dependent on each another. Chattopadhyay and Behera (2006) examined whether the reform in the Indian stock market had led to the integration with the developed stock markets in the world. The results suggested that Indian stock market is not co-integrated with the developed market. Sharma and Bodla (2010) studied the co-integration between India, Pakistan and Sri Lanka and no evidence of any relationship was found among these markets.

The literature review shows that there is conflicting evidence on the issue of international stock market linkages and hence the issue needs further investigation.

This study comprises five (5) sections including this introduction. Section two narrates the review of literature, followed by this study's research objectives, data and methodology. Section four of this study examines the empirical results and section five summarises and presents the concluding remarks.

DATA AND METHODOLOGY:

The study analyses the relationship between India, and China. The stock indices used for study are SSE Composite Index for China and CNX Nifty for the Indian stock markets. Daily closing stock prices are collected from the website of yahoofinance. The data is then analysed using E-Views. A description of the indices analysed here is presented in Table 1.

Table 1: Description of the selected markets

Country	Stock Exchanges	Index	Symbol
India	Bombay Stock Exchange	BSE SENSEX	BSE 30
China	Shanghai Stock Exchange	SSE Composite Index	SSE

The study spans over a period of 7 years starting from 1st April 2008 to 31st March 2015. All of the indices are expressed in terms of local currencies to avoid problems related to transformation due to fluctuations in exchange rates.

The return series was derived from the log of the indices. Log of the series gives the daily returns of the indices under study. In this way, new variables are created and we assign those, name as RNIFTY and RSSE which denote the returns. After that the data have been analysed by using the various time series econometric tools to meet the objectives of the study. Besides the usual descriptive statistics, correlation analysis, Augmented Dickey-Fuller and Phillip-Perron Unit root tests, Co-integration test, Granger Causality test and some other relevant statistical tools used to analyze the data.

We start with the computing of basic statistics so as to get an idea about the data. For performing the econometric analysis, it is very necessary to make sure that the series are stationary. Going further we discuss linkages between these markets.

GRAPHICAL EXPOSITION:

A graphical presentation of the indices values over the period of the study is given in Figure 1. It can be seen that the indices are broadly moving together. Both the indices seem to be falling during the sub-prime crisis period.

Figure 1: Movement of stock indices
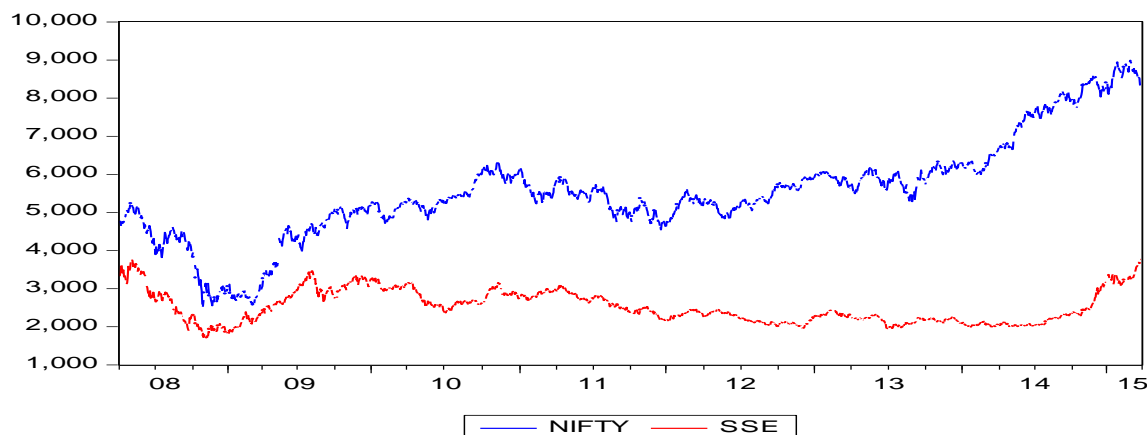
Descriptive Statistics:

Table 2: Descriptive statistics of the return series

	RNIFTY	RSSE
Mean	0.0290	0.0004
Median	0.0495	0.0172
Maximum	16.334	9.034
Minimum	-13.014	-8.017
Std Deviation	1.535	1.616
Skewness	0.275	-0.11
Kurtosis	15.620	6.814
Jarque-Bera	10844.51	992.58
Probability	0.00000	0.0000
Observations	1631	1631

Table 2 gives the summary statistics of the index returns of India and china. The Indian market has the highest average daily returns as compared to china. It is evident from the statistics that the Chinese market accompanied with high volatility as exhibited by the high standard deviation as compared to Indian market. Skew is a measure of symmetry. The skewness for normal distribution is zero. Indian market shows Positive skewness that indicates the distributions for these series have a long right tail. On other hand, Chinese market has a long left tail. Kurtosis is a measure of peakedness and flatness. Kurtosis for normal distribution is 3. The above stock markets exhibited kurtosis value more than 3 that infer that the distributions are fatter tailed and highly peaked (leptokurtic) relative to the normal. The Jarque-Bera statistics for all the indices strongly reject the null hypothesis that their distributions are normal

Correlation Analysis:
Correlation is one of the widely used tools by portfolio managers in making asset allocation decisions. Correlation coefficients measure the extent of degree of linear association between stock market returns of different countries.

Table 3: Correlation matrix

	RNIFTY	RSSE
RNIFTY	1.000	0.005
RSSE	0.005	1.000

Table 3 show the cross correlation matrices between the Indian and Chinese stock market indices returns over the mentioned time period. While the numerical values of correlation coefficients may range from 1.0 to -1.0. From the results, it was found that during the entire study period, Indian market is positively correlated with Chinese market but degree of correlation is very low almost nil.

Unit Root Test:

A unit root test is a statistical test for detecting the presence of stationarity in the series. The pioneering work on testing for a unit root in time series was done by Dickey and Fuller (Dickey and Fuller 1979 and 1981).

Stationarity time series is one whose mean, variance and covariance are unchanged by time shift. Non-stationary time series have time varying mean or variance or both. The presence of unit root in a time series is tested with the help of Augmented Dickey-Fuller Test.

The first step in the co integration technique is to check whether the series considered are stationary or not at level and if it is non-stationary then to find out the order in which they are integrated. For this we need to perform Augmented Dickey Fuller test (ADF).

By the way of Augmented Dickey Fuller (ADF) test, the null hypothesis of non-stationarity and alternate hypothesis of stationary of each index series, both in level and first difference form is tested. The test statistics against the critical values are checked and the null hypothesis is accepted or rejected if t-statistics is greater or less than the critical value respectively. Probability value of less than or equal to 0.05 ($p <= 5\%$) and statistic values lower than critical values in table implies that the Null hypothesis is rejected and the variable does not have a unit-root, which confirms that the series is stationary. If Probability value more than 0.05 ($p > 5\%$) and statistic values higher than critical values then we have to accept the null hypothesis means that our data is non-stationary. Similar kind of results is visible from the Augmented Dickey-Fuller test in table 4.

Table 4: Unit root test results

	Augmented Dickey Fuller Test				
	At Level		At First Difference		Conclusion
	ADF Statistic	P value	ADF Statistic	P value	
Nifty	-0.1937	0.9368	-38.6767	0.0000	I(1)
SSE	-1.5084	0.5293	-40.3172	0.0000	I(1)

Critical Values	
1% Level	-3.433290
5% Level	-2.863004
10% Level	-2.567597

H0: Existence of Unit Root

From table 4, it was analysed that null hypothesis of a unit root for both the stock market indices cannot be rejected at level form but it is strongly rejected at first difference because ADF test statistic values are lower than critical values and p value <= 0.05 at first difference in the test equation. So it can be said that both the variables contain a unit root, that is, non-stationary in their level forms, but stationary in their first differenced forms. Therefore it is concluded that both the index series are 1(I), i.e. integrated of order one since they become stationary after first differencing.

Cointegration Technique:

The purpose of the co-integration test is to determine whether a group of non-stationary series is co-integrated or not. The test for the presence of cointegration is performed when all the variables are non-stationary and integrated of the same order. Cointegration between non-stationary variables have been tested by the johansen's Trace and Maximum Eigen value tests result is presented in table 5.

Table 5: Cointegration Technique

Cointegration among variables	H0	Trace Statistic	5% Critical value	P value	Max Eigen Value	5% Critical value	P value
India and China,	r=0	6.9899	15.4947	0.5788	6.5202	14.2646	0.5474
	r<1	0.4696	3.8414	0.4941	0.4696	3.8414	0.4941

From the table 5, the result indicates that Trace statistics and Maximum Eigen values are less than their respective critical values and P values are insignificant at 5% level of significance. Therefore null hypothesis of no cointegration is accepted at both trace and maximum Eigen value statistics. Hence it indicates that no cointegration equation exist at 5% level of significance. There is no long run cointegration relationship exist between Indian and Chinese stock markets.

CONCLUSION:

The objective of the study aim is to analyse the linkages between India and China stock market from the period of 1st April 2008 to 31st March 2015. By applying the tests like ADF unit root test, Johnson's cointegration Test, the results found that all markets are first differenced stationary and no long run cointegration relationship exist among the stock markets. Hence, diversification benefits are available for portfolio investors in the long run.

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