

STUDY OF INTER-LINKAGES AND INTER-DEPENDENCE BETWEEN STOCK MARKET OF INDIA AND SRI-LANKA

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ABSTRACT

Capital market of a country works as a channel for creating demand and supply of the debt and equity capital. It's always been a very important part of overall financial system of every economy. On one hand primary market helps raising the funds for long-term requirements of the corporates and institution and on the other, secondary market provides buying and selling the securities already issued in primary market and hence provide liquidity to investors. This paper made an attempt to investigate the inter linkages and inter relationships between Sri Lanka and India's stock market. This paper made an attempt for investigating the inter linkages and inter-relationships between India and Sri Lanka's stock market. Colombo stock exchange and National Stock Exchange are two fully automated exchanges of South Asia and leading stock exchange too. Since Sri Lanka and India are not only neighboring Asian Countries but they also enjoy good economic and political relationship from years therefore this paper tried to identify scope of integration between Sri-Lanka and India's stock market due to establishment of the long-term relations between both the countries. We applied ADF test for stationarity of data series and found stationary at first difference. Descriptive statistics showed NSE market provide a little higher return in compare of Colombo stock market. Correlation between the indices of India and Sri Lanka is coming out to be +0.545507. Testing results of Granger Causality explained that return at Colombo exchange does not Granger Cause return at Indian stock exchange and vice versa. Johansen Co-integration test also speaks about no co-integration between them. Therefore, even though good relationship exists between these nations still stock market of both the nations are not integrated towards each other. Moreover, we did not find any causal relationship and inter linkages between both the nations stock market.

KEYWORDS: India-Sri-Lanka Inter-relationship, Stock Market, Integration, Granger Causality

INTRODUCTION

Capital market of a country works as a channel for creating demand and supply of the debt and equity capital. It's always been a very important part of overall financial system of every economy. On one hand primary market helps raising the funds for long-term requirements of the corporates and institution and on the other, secondary market provides buying and selling the

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securities already issued in primary market and hence provide liquidity to investors. This market does not only boost growth of different sectors of economy but also channelize the surplus funds (savings) to the deficient fund (borrowings) units of the society and thereby enables the optimum allocation of the scarce capital resource thus provide the long-term funds for sustainable economic growth. As we know that, a sound and efficient stock market are now need of the hour for increasing economic growth rate manifold therefore, the focus has been shifted now on the establishment of the variables which determine the stock returns.

The Colombo stock exchange and National Stock Exchange are two fully automated exchanges of South Asia and leading stock exchange too. Since Sri Lanka and India are not only neighboring Asian Countries but they also enjoy good economic and political relationship between each other from years although their relationship was affected by the civil war in Sri Lanka and failure of intervention made by India during the period of war but still both countries now enjoy a good trade, economic and political relations with each other. Both countries enjoy strategic position in South Asia region and they have sought to build common security platform in Indian Ocean. Even historically both the nations are very close to each other as more than seventy percent Sri Lankans are following Theravada Buddhism till date. This paper attempts to explore the existence of dynamic inter-linkages and causal relationship between stock market of India and Sri Lanka and attempt to identify scope of integration between Sri-Lanka and Indian stock market due to establishment of the long-term relations between both the countries or there is no significant impact on stock market of these countries even if they have a good relations in trade and politics.

ABOUT INDIAN AND SRI LANKAN STOCK MARKET

INDIA: In India, there are basically two leading stock exchanges the National Stock Exchange of India Limited (NSE) and Bombay Stock Exchange (BSE) but for the purpose of this article only NSE has been taken as it is being considered as the real barometer with the market capitalization of over US \$1.65 trillion ranked 12th in the world exchnage.NSE was established in the year 1992 being India's first demutualized electronic exchange, does not only provide more modern and screen-based fully-automated trading system but also makes the trading facility easier to investors who are spread across India. NSE's flagship index is CNX Nifty which incorporates 50 stock index, which is used by the investors extensively in and around India and world for analyzing the Indian capital markets. NSE's is having a state of-the-art application with up time record of 99.99% which processes messages around 450 million daily having sub millisecond response time.

SRI-LANKA: Colombo Stock Exchange of Sri-Lanka, established in the year 1985, is also the fully automated stock exchanges with reference to South Asian countries stock market and provide the greater accessibility to its user with respect to trading which is also known as "order-driven trading platform". It has various branches across Sri-Lanka in Jaffna, Kandy, Matara,

Anuradhapura, Kurunegala, Ratnapura and Negombo. It has the representation of 295 companies which showcase twenty business sectors having market capitalization value of more than 3 trillion rupees which amount to one third Gross Domestic Product (GDP) of Sri-Lanka. Although after 1999, Milanka Price Index was used but it was abolished in the December 2012. Currently, it has two different indices viz; All Share Price Index and S&P Sri Lanka 20 Index. In 2015, Colombo stock exchange marked its entry in the Sustainable Stock Exchanges Initiative of United Nations for promoting Social and Corporate Governance issues with the help of local. It is 52nd exchange which had been elected to the membership of the World Federation of Exchanges. After end of thirty year old civil war in Sri-Lanka, the capital market of the country has seen a larger increase in the amount of capital inflow in the country. One more reflection of end of civil war also seen in stock index of Colombo exchange that throughout 1900s it was witnessing the poor performance but after ceasefire agreement which was signed in 2001, it saw the remarkable growth in both the index and crossed the 2000 index value which was running around 500 before this period.

REVIEW OF LITERATURE

Chaudhuri (1997) investigated the relation among six Latin American countries for the period of 1985 -1993 by using the Engle-Granger, Granger causality test and co-integration and found a long-run relationship among all the six Latin America country's group. The study also explored there was a significant causal relationship in both directions. Melle (2004) tried to verify in her study that weather introduction of Euro affects integration of European stock markets or not and then further tried to explore that whether integration among European stock market has been increased after the introduction of euro. The study was conducted by applying Vector Auto regression (VAR) methodology, to be préciséd Impulse Response Function (IRF) is estimated. The main findings of her study were that, before introduction of Euro stock market was presenting a high degree of efficiency and integration and hence both volatilities and stock prices reflect the peculiar characteristics of each of stock market and therefore the Euro does not causes the increase in degree of correlation between them. However, the study noticed increase in the correlation is noticed after the Euro between main stock exchanges viz; the Italian, French, German, Spanish and Dutch ones. Kožluk (2008) did a rare study comprising of 135 indices of 75 countries in total from early 1990s to 2007 time period which includes markets of both Russia and China. The results the application of the approximate factor model, which allows the identification of global versus regional factors, showed that while Russian stock markets behave like a typical emerging market, i.e., rising integration with world markets, China's A and B-share markets move largely independently from global markets.

Aktar (2009) examined the co-movement in stock prices among the Russia, Turkey and Hungry's market with the use of using daily index value from January 2000 to October 2008 using the different testing tools like JJ co integration, VEC Model, Granger Causality test.

Findings of study pointed out existence of co integration among stock indices Russia, Turkey and Hungry. Furthermore, Granger Causality test applied reveal bidirectional causality for the Turkish and Russian stock indices on the other Hungarian stock market Granger cause to Turkish stock market but not vice versa. An and Brown (2010) examined the co-movements between the BRIC and US stock markets using the weekly and monthly index returns during the period October 13, 1995 to October 13, 2009. Their pointed out some degree of co-integration between China and US, while no co-integration found between the US and the other emerging markets by themselves. Hence, they concluded all the BRIC stock markets, except China, provide attractive portfolio diversification opportunities for the global investors.

The study conducted by Sheu and Liao (2011) analysed the evolving pattern of integration and Granger causality relationships among the BRIC stock markets and US market. Their empirical results showed stock markets of Russia, China and Brazil have started exerting significant influences on the US Dow Jones exchange to some extent after the period of 2006 and Dow Jones index has continued to play a vital and dominant role in Granger causing shifts in the emerging markets of China, India and Russia. Their findings spoken about the time-varying nature of the non-linear, co-integration and causality relationships and apart from that it also indicated potential benefits from international risk diversification, to some extent, may have gradually diminished within these group of markets.

Vieito, Bhanumurthy and Tripathi (2013) tried to explore weak-form efficiency in the most developed countries of the world (G-20) along with measuring impact of 2007 financial crisis in markets of these countries, in terms of their efficiency. They explored the emergence of strong contemporaneous effects across all international markets (barring Saudi Arabia) as a consequence of 2007 crisis may be just because of intra-day activity increment international across world markets. They found market index was inefficient while the individual stocks were efficient. Although study conducted by Bhanumurthy and Singh (2014) evaluated the short-run IPOs' performance but they also revealed that the performance of the IPOs also affect the return of stock index (though in short-run). So, the stock index returns of different markets are also influenced by the IPOs introduced in their respective economy.

OBJECTIVE OF THE STUDY

The paper talks about inter-relationship and inter-linkages between Sri-Lanka and India's stock markets. The specific objectives of the study are as under:

Primary Objective:

1. To analyze the degree of impact and interdependence between Sri-Lanka and Indian stock market.

Secondary Objective:

1. To correlate the performance of Sri-Lanka and Indian stock market.
2. To examine the scope of integration between Sri-Lanka and Indian stock market.

RESEARCH DESIGN AND METHODOLOGY

This paper is an attempt to explore inter-linkages between Colombo exchange and Indian (NSE) stock market and tried to find the new dimensions of linkages and integration between these markets. The study was conducted for 6 year period starting from January 1, 2011 to December 31, 2016 for evaluating existence of dynamic relationship. We have taken one stock exchange from both the countries. Colombo stock exchange has been taken for Sri Lanka (CSE) as the representative exchange and All Share Price Index (APSI) is used. Since India has two leading stock exchanges National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) therefore, we opted only NSE (CNX Nifty Index) as the representative exchange of India.

The daily closing stock index value has been taken starting from January 2011 to December 2016 considering as the reference period, in this way, the data of the 72 months has been gathered (total 1477 observations) to testify existence of inter-linkages between Sri Lanka and India. For the days when either of the stock exchange is closed, Indian market is considered as the base and accordingly missing values were found out. The data mainly collected from Colombo *Exchange website*, *National Stock Exchange (NSE) website*, *Yahoo finance*, *Moneycontrol.com* and websites of the various agencies of respective government and annual reports. The secondary data and other pertinent literature available on this subject had been compiled from published/unpublished materials, documents and internet sources through extensive desk work. The data analysis was done with EViews 9.

The descriptive statistics (mean, median, mode, standard deviation, skewness, kurtosis) has been used to summarise the general trend and pattern of the dataset. For checking data series stationarity, which is essential for enhancing the reliability and accuracy of the model, we prepared the line graph of each series. Data in time series is called as stationary if the mean, variance and auto-covariance are independent of time. We have used the log value of indices and further testified the nature of data series with the application of Augmented Dickey-Fuller (ADF) test under the unit root hypothesis testing with the help of below mentioned equation.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \dots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t$$

Where α is referred as constant, β time trend coefficient and p being lag order of autoregressive process. Imposing constraints $\alpha=0$ and $\beta=0$ corresponds to modeling the random walk and use of constraint $\beta=0$ corresponds modeling the random walk with drift.

After ADF test, we applied Johansen Co-integration test in indices of India and Sri Lanka and estimated the correlation value and after finding it test of Granger causality was conducted on Sri Lanka and Indian index return for capturing the degree and the direction of causation between India and Sri Lanka stock price indices under study as well as to further explore the short and the long-run interrelationships and integration between these two stock markets.

DATA ANALYSIS AND INTERPRETATION

The data is statistically evaluated and interpreted in this section for stock indices of Colombo and NSE. Starting with descriptive statistics as shown in Table 1, the results obtained for the same depicts that CSE Index (Sri Lanka) negatively skewed which means tail of the distribution is on the left or distribution is having a long left tail and the concentration of mass distribution is on the right whereas in case of NSE index (India) positively skewed which means tail of the distribution is on the right or distribution is having a long right tail and the concentration of mass distribution is on the left. The kurtosis, in normal distribution series, has a value of 3. Since the kurtosis value of NSE and Colombo coming out to be less than 3, it infers that these return series are mesokurtic. The mean value of NSE is 8.791592 whereas the mean value of Colombo is 8.755712 which mean Indian stock market produces little bit higher return than Sri Lanka market.

Table 1: Descriptive Statistics

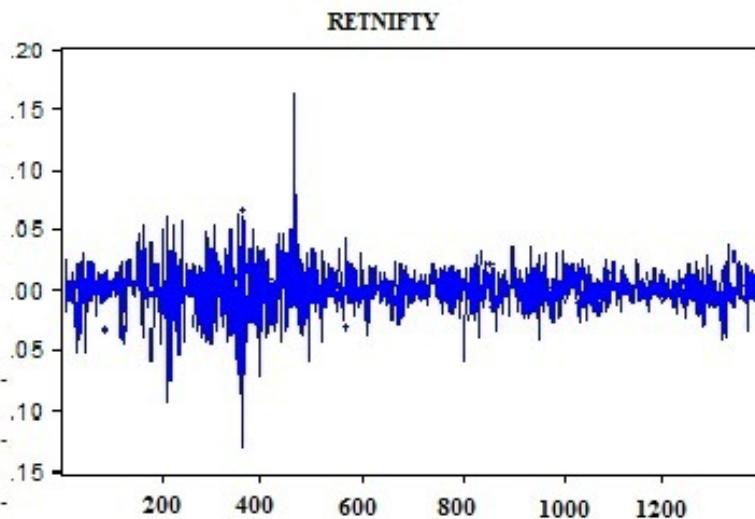
Descriptive Statistics		
	India	Sri Lanka
Mean	8.791592	8.755712
Median	8.727689	8.755281
Maximum	9.104563	8.963393
Minimum	8.421607	8.463318
Std. Dev.	0.197097	0.109485
Skewness	0.065242	-0.414183
Kurtosis	1.481698	0.538929
Jarque-Bera	142.9162	55.31223
Probability	0.000000	0.000000
Sum	12985.18	12932.19
Sum Sq. Dev.	57.33847	17.69275
Observations	1477	1477

Source : Author's own calculation

For capturing the econometric results and its interpretation two series representing the stock indices of India and Sri Lanka were statistically analysed in E-Views 9. Since it is essential to assure series under study is stationary, in econometric analysis, we have used the log value of

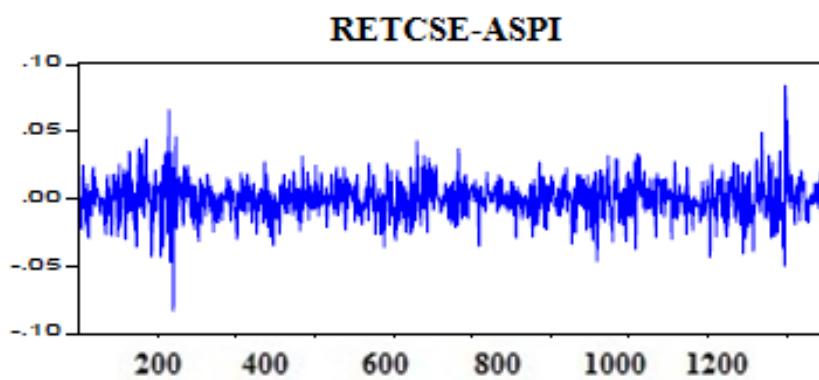
indices. The series was tested and found that stationary at first difference. The line graphs are prepared for stationarity. Graph 1 and 2 demonstrate the line graph of Indian and Russian stock indices returns at first difference. Since it is always good to testify and reconfirm the results with other available tools for having more reliability in the data series, we applied ADF test on the indices of Colombo and NSE for unit root testing.

Graph 1: Line graph of NSE Nifty Return



Source : Author's own calculation

Graph 2: Line graph of Colombo Stock Exchange - All Share Price Index (ASPI)



Source : Author's own calculation

Table 2 and Table 3 represent result of unit root with Augmented Dickey-Fuller. We tested the null hypothesis, data series has unit root, at 5% significance level and we found that since the p-value was more than 0.05 therefore making it non stationary but so it was tested again at first difference and was found stationary as the p-value was lesser than 0.05 with 2 lags. Moreover, the t-statistics was also found more than critical values so we must reject null hypothesis i.e., data has a unit root at first difference, hence it makes data fit for further econometric testing.

Table 2: ADF results for NSE Index

Null Hypothesis: D(LOGIND) has a unit root

Exogenous: Constant

Lag Length: 2 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-22.33584	0.0000
Test critical values:			
1% level		-3.434582	
5% level		-2.863296	
10% level		-2.567753	
Variable	Coefficient	Std. Error	t-Statistic
D(LOGIND(-1))	-0.960494	0.043002	-22.33584
D(LOGIND(-1),2)	0.044652	0.035338	1.263593
D(LOGIND(-2),2)	0.020086	0.026080	0.770161
C	0.000195	0.000273	0.713711
R-squared	0.459362	Mean dependent var	1.13E-06
Adjusted R-squared	0.458257	S.D. dependent var	0.014205
S.E. of regression	0.010455	Akaike info criterion	-6.280754
Sum squared resid	0.160573	Schwarz criterion	-6.266375
Log likelihood	4629.775	Hannan-Quinn criter.	-6.275392
F-statistic	416.0526	Durbin-Watson stat	1.998905
Prob(F-statistic)	0.000000		

Source : Author's own calculation

Table 3: ADF results for Colombo Stock Index

Null Hypothesis: D(LOGSRI) has a unit root

Exogenous: Constant

Lag Length: 2 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-19.67730	0.0000
Test critical values:			
1% level		-3.434582	
5% level		-2.863296	
10% level		-2.567753	
Variable	Coefficient	Std. Error	t-Statistic
D(LOGSRI(-1))	-0.755214	0.038380	-19.67730
D(LOGSRI(-1),2)	-0.022373	0.032989	-0.678190
D(LOGSRI(-2),2)	-0.036968	0.026052	-1.419007
C	-5.62E-05	0.000179	-0.314236
R-squared	0.390685	Mean dependent var	-6.88E-06
Adjusted R-squared	0.389441	S.D. dependent var	0.008784
S.E. of regression	0.006863	Akaike info criterion	-7.122528
Sum squared resid	0.069198	Schwarz criterion	-7.108149
Log likelihood	5249.742	Hannan-Quinn criter.	-7.117167
F-statistic	313.9686	Durbin-Watson stat	2.002899
Prob(F-statistic)	0.000000		

Source : Author's own calculation

We applied Ganger causality test between them and found the probability value of the hypothesis RETIND does not Granger Cause RETSRI and RETSRI does not Granger Cause RETIND more than 0.05 which infers null hypothesis is accepted and both countries stock market does not have any causal relationship.

Table 4: Granger causality test results

Null Hypothesis	Obs	F-Statistic	Prob.	Causal Relationship
RETIND does not Granger Cause RETSRI	1475	1.02692	0.3584	No
RETSRI does not Granger Cause RETIND		1.32874	0.2651	No

Source : Author's own calculation

We applied Johansen Co-integration test, after Granger causality, for evaluating stock market co-integration between them. It is clear from the results that since trace statistic is less than the critical value and p-value is also coming out to be more than 0.05 therefore we accept null hypothesis, no co-integration between stock market of India and Sri Lanka.

Table 5: Co-integration results of India and Sri Lanka index return

Trend assumption: Linear deterministic trend
 Series: LOGSRI LOGIND
 Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.003681	6.003201	15.49471	0.6952
At most 1	0.000391	0.575062	3.841466	0.4483

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.003681	5.428139	14.26460	0.6871
At most 1	0.000391	0.575062	3.841466	0.4483

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by $b^*S11^*b=I$):

LOGSRI	LOGIND
-10.79386	4.180464
-1.903861	-4.423329

Unrestricted Adjustment Coefficients (alpha):

D(LOGSRI)	0.000406	2.66E-05
D(LOGIND)	-0.000119	0.000202

Source : Author's own calculation

CONCLUSION

The Colombo stock exchange and National Stock Exchange are two fully automated exchanges of South Asian countries and the leading stock exchange too. Since India and Sri Lanka are not only neighboring Asian Countries but they also enjoy a good trade, economic and political relationship from years. This paper explored the existence of financial relationship between India and Sri Lanka with the help of stock index and presence of co-movement with the use of various econometric tests.

We applied ADF test for checking usability of data series for econometric testing and found data series non-stationary at level but stationary at first difference. Descriptive statistics showed that Indian stock market provide a little higher return in compare of Colombo stock market Correlation between the indices of India and Sri Lanka is coming out to be +0.545507 which depicts that stock market of India is having positive movements with respect Colombo market of Sri Lanka.

Testing results of Granger Causality explained that return at Colombo exchange does not Granger Cause return at Indian stock exchange and vice versa. Johansen Co-integration test also speaks about no co-integration between them. Therefore, our concluding remark is that India and Sri Lanka have good relations with each other, although it was affected by the civil war in Sri Lanka and failure of intervention made by India during the period of war but still both countries now enjoy a good trade, economic and political relations with each other. Both countries have strategic position in South Asia and they have sought to build common security platform in Indian Ocean. Even historically both the nations are very close to each other as more than seventy percent people of Sri Lanka are following Theravada Buddhism till date. Even though these commonness and good relationship exists between these two nations still the stock market of both the nations are not integrated towards each other. Moreover, we did not find any causal relationship and inter linkages between both the nations stock market.

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