

Relationship Between Stock Market and Foreign Exchange Market in India: An Empirical Study

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This paper attempts to examine whether or not a causal relationship exists between foreign exchange rates and stock market. By applying the techniques of Granger Causality test and correlation test, relationships between INR/\$ exchange rate and Indian stock market indices (SENSEX and NIFTY 50) were determined for data between 2004 and 2012. The granger results suggest that over the course of 8 years there exists no relationship between exchange rates and stock market. However, Correlation result shows that there is very less degree positive relationship between the two.

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Keywords: Stock Market, Foreign Exchange Market, Granger Causality, Correlation

Background and Literature Review

In an increasingly complex scenario of the financial world, it is of paramount importance for the researchers, practitioners, market players and policy makers to understand the working the analysis of dynamic and strategic Interactions between stock and foreign exchange market came to the forefront because these two markets are the most sensitive segments of the financial system and are considered as the barometers of the economic growth through which the country's exposure towards the outer world is most readily felt. The present study is an endeavor in this direction. Before going to discuss further about the linkages between the stock and foreign exchange market, it is better to highlight the evolutions and perspectives that are associated with both the markets since liberalization in the Indian context. There are two explanations for which variable cause the other. The flow oriented model approach as described in Dornbusch and Fischer (1980) research show that currency movements directly affect international competitiveness. In turn, currency has an effect on the balance of trade within the country. As a result, it affects the future cash flows or the stock prices

of firms. The counter argument suggests that taking a portfolio-balance approach (Dornbusch, 1976), where portfolio holders should diversify to eliminate firm specific risk, requires effective investments allocation including currencies. As with other financial instruments, currencies therefore are under the rules of supply and demand for assets. In order for investors to purchase new assets they must sell off other less attractive asset in their portfolio. In other words buying and selling of domestic or foreign investments if less attractive. As countries assets become more valuable, interest rates begin to increase creating an appreciation of domestic currency. Although two valid explanations, no consensus has been made between the two. So, this study attempts to examine whether or not a causal relationship exists between exchange rates and stock market by using the Granger Causality and co-relation, relationships were determined for data between 2004 and 2012 in India.

For determining the relationship between stock exchange market and foreign exchange market various studies were undertaken by the researchers.

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Researchers used models like granger causality, GARCH (1, 1), vector autoregressive (VAR), Vector Error Correction Model (VECM), regression, multi-regression for finding out relationship between stock market and foreign exchange market. An early attempt to examine the exchange rate and stock price dynamics was by Franck and Young (1972) who showed that there is no significant interaction between the variables. Soenen and Hennigar (1988) studied the same market but considered a different time period and contrast with prior studies by showing a significant negative relationship between stock prices and exchange rates. Solnik (1987) made a slightly different study and tried to detect the impact of several economic variables including the exchange rates on stock prices. He concluded that changes in exchange rates do not have any significant impact over stock prices. Nieh and Lee (2001) supported the findings of Bahmani-Oskooee and Sohrabian (1992) and reported no long-run significant relationship between stock prices and exchange rates in the G-7 countries. Roll (1992) also studied the US stock prices and exchange rates and found a positive relationship between the two markets. Chow et al. (1997) examined the same markets but found no relationship between stock returns and real exchange rate returns. They repeated the exercise with a longer time horizons and found a positive relationship between the two variables. Abdalla and Murinde (1997) employed co-integration test to examine the relationship between stock prices and exchange rates for four Asian countries named as India, Pakistan, South Korea and Philippines for a period of 1985 to 1994. They detected unidirectional causality from exchange rates to stock prices for India, South Korea and Pakistan and found causality runs from the opposite direction for Philippines. Yamini Karmarkar and G Kawadia tried to investigate the relationship between RS/\$ exchange rate and Indian stock markets. Five composite indices and five spectral indices were studied over the period of one year: 2000. The results indicated that exchange

rate has high correlation with the movement of stock market. Wu (2000) did a similar study using stock prices and exchange rates of Singapore and portrayed a unidirectional causality from exchange rates to stock prices. Apte (2001) investigated the relationship between the volatility of the stock market and the nominal exchange rate of India by using the EGARCH specifications on the daily closing USD/INR exchange rate, BSE 30 (Sensex) and NIFTY-50 over the period 1991 to 2000. The study suggests that there appears to be a spillover from the foreign exchange market to the stock market but not the reverse. In a recent study, Bhattacharya and Mukherjee (2003) investigated Indian markets using the data on stock prices and macroeconomic aggregates in the foreign sector including exchange rate concluded that there is no significant relationship between stock prices and exchange rates.

Research Methodology

Objectives: The broad objective of the study is to basically find out the two way relationship between stock closing price and foreign exchange rates. INR/\$ is evaluated against SENSEX and NIFTY50.

Hypothesis

- Null hypothesis (H01); Foreign exchange rate does not granger cause stock indices.
- Second null hypothesis (H02); stock indices does not granger cause foreign exchange rate.

Data Collection

Data is collected for Indian stock indices (SENSEX & Nifty 50) and the INR-USD exchange rate from 1st April 2004 to 31st March 2012. Daily observations of SENSEX & Nifty 50 and the INR-US dollar exchange rate was gathered from historical data section of www.nseindia.com, www.bseindia.com and www.onada.com.

Statistical Tool Applied

In this study Granger Causality test and Correlation Method has been used to find out relationship between Stock indices and foreign exchange rate.

According to the results obtained if significance level is greater than 0.05 than null hypothesis is not rejected else alternative hypothesis is accepted.

E-Views 7 software will be used for the analysis purpose.

Granger Causality

Granger causality is tested in the context of linear regression models. For illustration, consider a bivariate linear autoregressive model of two variables X1 and X2.

$$X_1(t) = \sum_{j=1}^p A_{11,j} X_1(t-j) + \sum_{j=1}^p A_{12,j} X_2(t-j) + E_1(t)$$

$$X_2(t) = \sum_{j=1}^p A_{21,j} X_1(t-j) + \sum_{j=1}^p A_{22,j} X_2(t-j) + E_2(t)$$

Correlation Method

Correlation is computed into what is known as the correlation coefficient, which ranges between -1 and +1. Perfect positive correlation (a correlation coefficient of +1) implies that as one security moves, either up or down, the other security will move in lockstep, in the same direction. Alternatively, perfect

negative correlation means that if one security moves in either direction the security that is perfectly negatively correlated will move in the opposite direction. If the correlation is 0, the movements of the securities are said to have no correlation; they are completely random. The formula for the correlation is:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Empirical Analysis and Results:

Table 1: Granger Causality Results for BSE:

Pairwise Granger Causality Tests

Date: 05/15/12 Time: 14:06

Sample: 1 2922

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
BSE does not Granger Cause FOREX	1989	1.05897	0.34701
FOREX does not Granger Cause BSE		0.27031	0.76317

In table1 null hypothesis (H01) cannot be rejected it implies that BSE does not granger cause forex. And null hypothesis (H02) also cannot be rejected showing

that forex does not granger cause BSE. So it can be inferred that there is no relationship between BSE and foreign exchange rates.

Table 2: Granger Causality Results for NSE

Pairwise Granger Causality Tests

Date: 05/15/12 Time: 14:08

Sample: 1 2922

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
FOREX does not Granger Cause NSE	2009	1.42433	0.24091
NSE does not Granger Cause FOREX		0.58131	0.55926

In this table null hypothesis' (H01) cannot be rejected it implies that NSE does not granger cause forex. And null hypothesis (H02) is also cannot be rejected showing

that forex does not granger cause NSE. So it can be inferred that there is no relationship between NSE and foreign exchange rates.

Table 3: Correlation Results for BSE

	FOREX	BSE
FOREX	1.000000	0.227457
BSE	0.227457	1.000000

Table 3 shows that there is a correlation of 0.22 between BSE and foreign exchange rates. So there is very less

degree of positive relationship between BSE and foreign exchange rate.

Table 4: Correlation Results for NSE

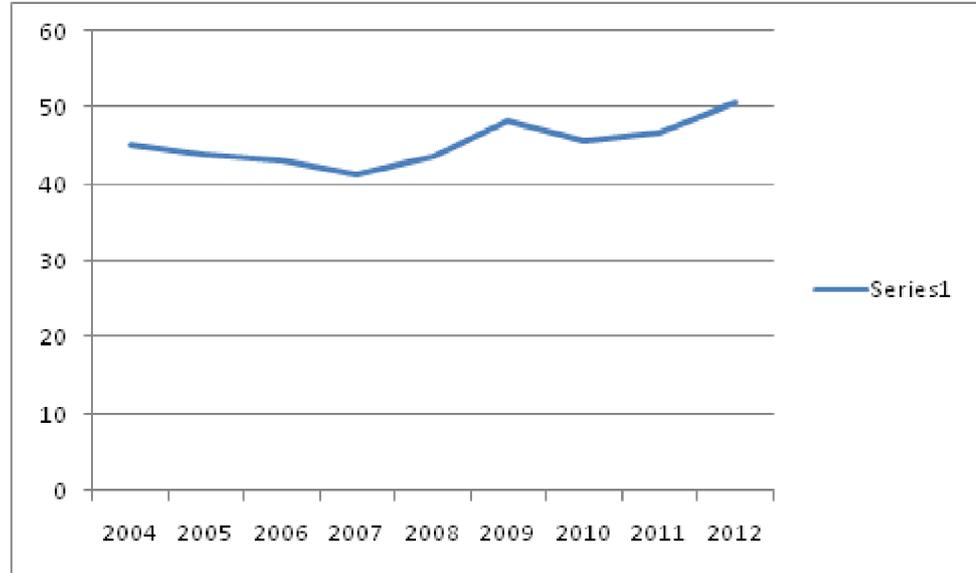
	NSE	FOREX
NSE	1.000000	0.197624
FOREX	0.197624	1.000000

Table 4 shows that there is a correlation of 0.19 between NSE and foreign exchange rate. So there is positive

but very less degree of relationship between NSE and foreign exchange rate.

Table 5: Graphical Representation of foreign exchange rate fluctuations

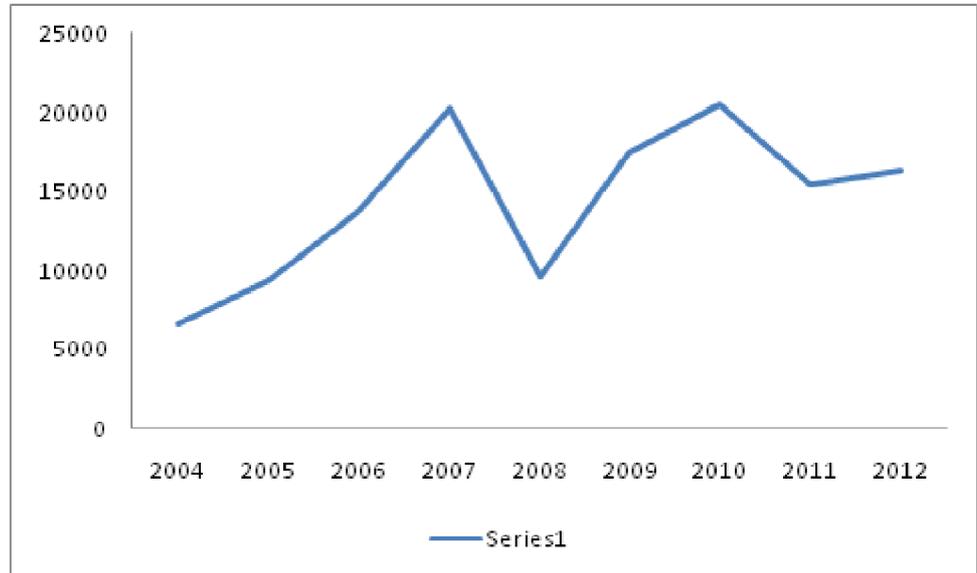
Year	forex
2004	45.2106
2005	43.9700
2006	43.1700
2007	41.3400
2008	43.6193
2009	48.4238
2010	45.7152
2011	46.8466
2012	50.7008



Source of data: Foreign exchange rate fluctuations data taken from historical data section of www.onada.com.)

Table 6: Graphical Representation of SENSEX fluctuations

Year	SENSEX
2004	6602.69
2005	9397.93
2006	13786.91
2007	20286.99
2008	9647.31
2009	17464.81
2010	20509.09
2011	15454.92
2012	16292.98



(Source of data: SENSEX fluctuations rates data taken from <http://www.bseindia.com/stockinfo/indices.aspx>)

Conclusion

The following conclusions have been derived from our granger causality test analysis that:

- There is no relationship between SENSEX and foreign exchange rate (INR/\$).
- There is no relationship between Nifty 50 and

foreign exchange rate (INR/\$).

The following conclusions have been derived from our correlation analysis:-

- There is very less degree of positive correlation between stock indices and foreign exchange rates.

Hence, we cannot reject the hypothesis that there is no relationship between the exchange rate and stock indices and the two are affected by various factors in spite of the increasing integration between the two markets.

The outcome of the study is consistent with the findings of Bhattacharya and Mukherjee (2003) it also in agreement with Nath and Samanta (2003).

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