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DYNAMIC LINKAGES BETWEEN SECTORAL INDICES AND EXCHANGE RATES: EVIDENCE FROM INDIAN MARKET

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ABSTRACT

Using a time series data of the variables between 2013 – 2017, the present study tries to establish a causal relationship between exchange rate and sectoral indices in NSE. Emphasis has laid on understanding the impact of sectoral indices on the exchange rate. This paper uses unit root test(ADF), Johansson Co-integration and Granger causality test. The variables used in this study were not stationary at level, and stationary at first difference and co-integration exist between the exchange rate(USD/INR) and sectoral indices(NIFTY Auto, NIFTY FMCG, NIFTY IT, NIFTY Metal, NIFTY Pharma, NIFTY PSU and NIFTY Realty) in India. This indicates that both the variables have a relationship of balance and equality movement in the long run. There is a two-way of causal relationship between NIFTY-IT and USD_INR, both short term and long term. This indicates that the variations that occur in the exchange rate will cause a variation in NIFTY IT and vice versa.

Keywords: *Exchange rate, equality movement, Granger causality, sectoral indices, variation*

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INTRODUCTION

Stock market and foreign exchange market is distinguished as an extremely an important factor of the financial sector of any economy. It plays a vital role in the mobilization of capital in India. Both the market are very complex and they get affected whenever there is any disaster in the world whether it relates to finance, religion, politics, etc. The problem of inter temporal relation between exchange rates and stock returns has recently preoccupied the minds of economists, for theoretical and empirical reasons. Also, the relationship between foreign exchange and stock returns rates has often been utilized in forecasting the future trends by investors. The continuing rise in the world trade and capital movements has made the foreign exchange as one of the main factor of equity prices and business profitability (Kim, 2003). A change in exchange rate directly effects the international competitiveness of firms, given their impact on input and output price (Joseph, 2002). Foreign exchange volatility affects the value of a firm since the future cash flows of the firm alter with the variations in the foreign exchange rates. When the Exchange rate gains the exporters will lose their competitiveness in international market,the profits and sales of exporters will shrink and the stock prices will decline. On the other hand, importers will raise their competitiveness in their markets.

In the previous studies, researchers have examined the impact of exchange rate on all types of stocks under BSE and NSE. The present study is carried out to know the effect of Exchange rate on all the sectors listed in NSE. The study will provide insights for investors regarding the impact of exchange rate fluctuations over each sector.

REVIEW OF LITERATURE

Existing literature relating to the association between stock prices and exchange rates shows diverse outlook. An early attempt has been made by (Saadet Kasman,2003) in this area considered TRY/USD, financial sector index, production sector index, service sector index and found that a long run relationship exist between only industry sector index with TRY/USD. (Kalim Ullah, 2015) analyzed the relationship between both the market in Pakistan and

concluded there exist a bidirectional relationship between PKR/USD and KSE 100 i.e., investors can use information of one market to predict the other market.

N. S. Nataraja, Ganesh. L and Sunil Kumar (2014) made a slight different study to detect the impact of CNX Bank NIFTY with INR/USD. He found a negative correlation and Granger causality test reveals unidirectional relationship between both the variables. Similar study has been conducted by Uma Shankar Megha (2012) concluded that week rupee rate has significant positive relationship with stock prices of Infosys and Wipro companies. Nikita Kagalwala and Divyang Patel(2013) analyzed the relationship between Indian stock exchange and exchange rate using monthly data and found that there is no or little impact of exchange rate on Indian stock market. In recent days, economists are giving significance for the study of temporal relation between exchange rates and stock returns, for theoretical as well as empirical reasons. The development of any country's economy is in fluenced by the changes in the series, stock price and exchange rate. Also, the relationship between both the rates gives the guidelines in predicting the future trends for each other by investors.

DATA AND METHODOLOGY

To establish the relationship between exchange rate and stock market, this study uses daily data for exchange rate and all the sectors listed in NSE over the period 1.1.2013 – 31.4.2017.

The study start by testing stationarity for all the series using Augmented Dickey Fuller (ADF) test to assess the order of integration of all the series. Further, the study proceed to test for co-integration between series integrated of the same order I(1). Using Johansen co-integration, the study tries to ascertain whether the linear combination of the series possesses

Unit root test result

Table 1 report the result of Augmented Dickey Fuller (ADF) unit root test for the period 1.1.2013 – 31.4.201 shows that all the variables are not stationary at level. However, at first difference, the variables are stationary suggesting that they are all I(1).

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Table 1: Augmented Dickey Fuller(ADF)

Variable	Level		First Difference		Comment
	ADF Prob-values	PP Prob-values	ADF Prob-values	PP Prob-values	
NIFTY_AUTO	-1.3981	0.5849	-1.6895	1.635^{e-038}	I(1)
NIFTY_BANK	`-0.5837	0.8031	-6.4359	9.985^{e-009}	I(1)
NIFTY_IT	-3.47702	0.1807	-6.9445	4.669^{e-010}	I(1)
NIFTY_FS	-0.7137	0.8416	-6.3489	1.716^{e-008}	I(1)
NIFTY_FMCG	-1.6760	0.4436	-8.2620	8.4^{e-014}	I(1)
NIFTY_METAL	-1.4127	0.5777	-6.1864	4.211^{e-008}	I(1)
NIFTY_MEDIA	-0.4199	0.9032	-15.543	9.312^{e-037}	I(1)
NIFTY_PHARMA	-2.4712	0.1226	-8.5542	1.111^{e-014}	I(1)
NIFTY_PRIVATE	-0.8836	0.794	-6.6219	3.322^{e-009}	I(1)
NIFTY_PSU	-2.3154	0.1671	-5.8054	3.47^{e-007}	I(1)
NIFTY_REALTY	-2.8333	0.0636	-5.6906	6.409^{e-007}	I(1)
USD_INR	-2.6447	0.0840	-7.3555	3.497^{e-011}	I(1)

Co-integration test:

After testing the precondition of non-stationary time series of price information, cointegration test has been carried out to determine the existence of a long-run relationship between the exchange rate and sectoral indices.

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Table 2: Co-integration test

	Trace Statistics		Eigen value Statistics	
	λ_{trace}	*p*-value	λ_{max}	*p*-value
NIFTY Auto and USD_INR				
H_0: r = 0	11.662	0.1739	7.190	0.4668
H_0: r ≤ 1	4.4712	0.0345	4.471	0.0345
NIFTY BANK and USD_INR				
H_0: r = 0	9.6400	0.3095	7.5587	0.4253
H_0: r ≤ 1	2.0812	0.1491	2.0812	0.1491
NIFTY FS and USD_INR				
H_0: r = 0	8.95575	0.3695	7.3615	0.4473
H_0: r ≤ 1	1.5942	0.2067	1.5942	0.2067
NIFTY FMCG and USD/INR				
H_0: r = 0	13.1852	0.1082	7.8566	0.3934
H_0: r ≤ 1	5.32864	0.0210	5.3286	0.0210
NIFTY IT and USD/INR				
H_0: r = 0	19.2295	0.0130	15.322	0.0339
H_0: r ≤ 1	3.90713	0.0481	3.9071	0.0481
NIFTY Media and USD/INR				
H_0: r = 0	8.73716	0.9303	7.97379	0.3814
H_0: r ≤ 1	0.76337	0.3823	0.76337	0.3823
NIFTY Metal and USD/INR				
H_0: r = 0	21.4209	0.0057	17.0746	0.0175
H_0: r ≤ 1	4.34631	0.0371	4.3463	0.0371
NIFTY Pharma and USD/INR				
H_0: r = 0	13.2572	0.1057	10.315	0.2034
H_0: r ≤ 1	3.12576	0.0771	3.1257	0.0771

NIFTY Private and USD/INR				
H_0: r = 0	9.1482	0.3519	7.20005	0.4657
H_0: r ≤ 1	1.9476	0.1628	1.94764	0.1628
NIFTY PSU and USD/INR				
H_0: r = 0	16.8016	0.0316	12.5472	0.0917
H_0: r ≤ 1	4.25440	0.0391	4.25442	0.0391
NIFTY Realty and USD/INR				
H_0: r = 0	18.6312	0.0163	11.2264	0.1432
H_0: r ≤ 1	7.40477	0.0065	7.40477	0.0065

Table II presents the cointegration results from the application of the Johansen method of reduced rank regression using the vector error correction model. The Johansen ltrace (trace statistics) and lmax (maximal eigen value), analysis indicates that null hypothesis of non-cointegration (r = 0) is rejected at 0.05 level of significance for all the sectors except NIFTY METAL , NIFTY PSU, NIFTY REALTY and NIFTY IT The null hypothesis of reduced rank, r ≤ 1, cannot be rejected by both the ltrace and lmax statistics for most of the commodities for which null of r = 0 is rejected, except NIFTY Auto, NIFTY FMCG, NIFTY IT, NIFTY Metal, NIFTY Pharma, NIFTY PSU and NIFTY Realty.

Causality test result

Since co-integration tests indicate only the existence of long-run relationship among exchange rate and sectoral indices, Granger causality tests are used to analyze the direction of relationship among variables, whether there is causal relationship between them or not.

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Table 3: Granger Causality test

Null Hypothesis	Obs	F-Stat	Prob.
USD_INR does not Granger Cause NIFTY_BANK	874	0.83837	0.4328
NIFTY_BANK does not Granger Cause USD_INR		0.86407	0.4218
USD_INR does not Granger Cause NIFTY_FINANCIAL_SERVICES	874	0.63870	0.5282
NIFTY_FINANCIAL_SERVICES does not Granger Cause USD_INR		1.23372	0.2917
USD_INR does not Granger Cause NIFTY_FMCG	874	1.32704	0.2658
NIFTY_FMCG does not Granger Cause USD_INR		0.24284	0.7844
USD_INR does not Granger Cause NIFTY_IT	874	0.31473	0.0301
NIFTY_IT does not Granger Cause USD_INR		2.33942	0.0470
USD_INR does not Granger Cause NIFTY_MEDIA	874	1.65763	0.1912
NIFTY_MEDIA does not Granger Cause USD_INR		0.13832	0.8708
USD_INR does not Granger Cause NIFTY_PHARMA	874	0.34576	0.7078
NIFTY_PHARMA does not Granger Cause USD_INR		1.01369	0.3633
USD_INR does not Granger Cause NIFTY_PSU	874	0.39657	0.6727
NIFTY_PSU does not Granger Cause USD_INR		2.61812	0.0735
USD_INR does not Granger Cause NIFTY_REALTY	874	0.23763	0.7885
NIFTY_REALTY does not Granger Cause USD_INR		2.94266	0.0533

The above table shows a bi-directional causal relationship between NIFTY-IT and USD_INR. This proves that USD/INR cause a change in NIFTY_IT and vice versa at the 1% significance level. Also, there exist a unidirectional causal relationship between NIFTY_PSU and USD/INR i.e., NIFTY_PSU cause a change in USD/INR at the 1% significance level. Similarly, unidirectional causal relationship exists between NIFTY_REALTY and USD/INR i.e., changes in NIFTY_REALTY cause a change in USD/INR at the 1% significance level.

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These results indicate that the variations that occur in the exchange rate will cause a variation in sectoral indices and vice versa, variation that occurs in the sectoral indices will lead to variations in the exchange rate. Is the exchange rate of the local currency strengthened, the interest from investors to invest in Asian stock market will be raising and the Asian stock indexes will be increasing.

CONCLUSION

The main purpose of this study is to examine the dynamic relationship between Exchange rate (USD/INR) and all the sectors listed in NSE. The variables used in this study were not stationary at level, and stationary at first difference. There is a cointegration between the exchange rate (USD/INR) and sectoral indices(NIFTY Auto, NIFTY FMCG, NIFTY IT, NIFTY Metal, NIFTY Pharma, NIFTY PSU and NIFTY Realty) in India. This indicates that both the variables have a relationship of balance and equality movement in the long run. So that in each period the short-term, variable exchange rate and sectoral indices tend to be mutually adjust to achieve its long-term equilibrium. There is a two-way of causal relationship between NIFTY-IT and USD_INR, both short term and long term. This indicates that the variations that occur in the exchange rate will cause a variation in NIFTY IT and vice versa.

Although there are few limitations in using cointegration and Granger causality test in analyzing efficiency in stock market and foreign exchange in India, these techniques provide useful understanding of futures trading system in India. Major limitation in using causality test and cointegration is much to do with the nature of time-series data and meeting the non-stationary requirements. It is also criticized that, in a strict sense the Granger causality does not imply a cause and effect relationship. Kellard et al. (1999) argued that a limitation of existing tests is the rigid classification of markets as either efficient or inefficient with no scope to assess the degree to which efficiency is present.

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