Impact of Foreign Exchange Rate Fluctuations on Stock Market Index with Reference to NSE

Roshan Kumar[a*]

[a]Department of Management, Jharkhand Rai University, Ranchi, Jharkhand-834001, India
*e-mail : roshan.singh79@gmail.com

Abstract

The Research work is based on the investigation of the impact of foreign exchange rate fluctuations on stock prices in NSE nifty index from April 2005 to March 2015 using the information of monthly closing price of the NSE Nifty and the nominal Indian currency per US dollar exchange rates. The exchange rate of Indian currency and US Dollar has been consider for the research work, because, US dollar is considered as a strong currency for foreign trade. The Statistical tests are used to investigate the movement of both the series. The research objective is to study the Impact of Foreign Exchange Rate Fluctuations on Stock Market Index by applying the Unit-root Test, and Johnson co integration test. The study also examine the association of both the time series mutually. The result shows that there is no co integration between the NSE Nifty stock Market Index and exchange rate.

Keywords. *Exchange Rate Fluctuations, Stock Market Index, NSE Nifty, Stationarity test, Unit root test, ADF test, and Johnson Co-integration test.*

1. Introduction

1.1. Background about Exchange Rate

The Exchange rate is recognized to assess the global competitiveness. It is also familiar as an indicator of the competitiveness of currency of any country and an opposite association between the index and competitiveness .Exchange rate affects the business, trade, and prices of commodities among the countries. It determines the price actually paid when each transaction occurs. The foreign exchange markets are influenced by the various variables of the economy such as imports, exports, investments, disinvestments. The foreign exchange market is affecting the performance of the various stock exchanges. Like all other prices, when the flexible currency exchange rate is familiar to keep a country balance of international payments in equilibrium with all of the countries, the foreign exchange rate is believed to be sensitive to all of the impact that normally effects on merchandising and financial decisions, mainly in subsequent assets of share prices. This presumption can control in a short period of time and can change rapidly in counter to such things as changing published report of the economy, changing the position of the current account, changing the perception, strategy or business, social and political events.

The Exchange market plays a vital role in open the door for the global trade, investment and financial transactions. These markets allow potential investors in making transactions in foreign currencies or deposits. The importance of the foreign exchange is increasing due to an increase in global business transactions. The

Exchange rate is an important macroeconomic variable for any country. It affects the growth of the economy and the capital market. The fluctuation in exchange rate affects the business trade in every country. Exchange rate fluctuations have a direct/ indirect impact on decisions of an organization, working in domestic as well as Global market. Therefore, survival in the global market without understanding the movement of the exchange rate is hardly possible. It is important for an individual organization for taking important decision for operating in a global environment. The study of exchange rate helps in hedging decision, target market decisions, financing decisions, capital budgeting decision and earning assessment.

A currency exchange rate is the price of one currency quote in terms of other currency. Most of the currency trading over the world is the form of US dollar. For example, an exchange rate of US dollar 0.002538 per Indian rupee. It shows that the price of Re 1 is equal to US dollar 0.02538.

When, the rate is quoted per unit of the US dollar it is called the direct quote. It can be expressed differently. If the rate is quoted as in the terms of the US dollar per unit for the domestic currency rupee, it is known as indirect Quote. When, the value of the currency in terms of other one is not clear. In such a situation, one currency is selling for a common currency and again, the common currency is exchanged for another one currency. This phenomenon is known as cross -rate currency.

A stock Market Index measure the relative value of stocks markets in numerical terms. It calculated the price of selected stocks. It is important method for the investors and financial expert to describe the market and to compare the return. Secondary market are very reactive and they get affected whenever there is any event happen in the world whether it relates to issue like religion, politics, finance, etc. So decision in selecting the stocks for any stakeholder should be very specific. Stockholders should have good knowledge about stock exchanges and its movement in the market. One should also consider the whole stock market before making investing in any stocks because a one mistake in selecting the appropriate stocks can leave a person financial loss.

1.2. Exchange Rate system and Foreign Exchange Market in India

India is associated with IMF and it used the fixed exchange system before the 1970s as an outcome of this the worth of the currency in terms of gold was initially fixed as the equal to 0.268601 gram of fine gold. India has the strong alliance with the country England and membership of the sterling area from the year 1939 to the year 1972 the rupee was fixed to the pound sterling system. The exchange rate was 1s 6d/rupee. In the year 1949, the depreciation in pound sterling was followed by the depreciation of the rupee at the same rate. The exchange rate thus remained unchanged but the gold content of the rupee fell to 0.186621 gram. Again, with the depreciation of the Indian currency in June 1966 the gold price fell further to 0.118489 gram.

In the year 1971, the fixed rate system was launched and the value of the rupee was Rs 7.50 per US dollar and this continued till December 1971. The exchange market in India came into force in the year 1978 when Reserve Bank of India gave permission to the commercial bank to trade in foreign exchange rate.

1.3. Need for the study

The exchange rate fluctuations have been an important area of research in the last decade. Fluctuations in exchange rates may also affect the financial activities of the organization. The capital market is also affected by the exchange rate. Lots of research have been carried out to find the relation between the exchange rate and share price. There is various research work concluding contradictory results, based on different variables on the different time period. Further, limited research has been carried out to find out the impact of exchange rate on Stock Market Index. This given research work is being carried out to find out the impact of exchange rate fluctuations on stock price Indices performance.

1.4. Review of Research on Relation between share prices and currency rates in case of developed and other Asian countries

To examine the relation of share prices with currency rates it has been found that there is no association prevailed between share returns and currency rates.[1] The researchers suggested that Asset approach is more suitable and they rejected another approach like traditional and portfolio approach. The research has been conducted to study the association between amendment in the US share prices and amendment in the trade- weighted currency rate of the US Dollar during the period of 1974-1978.[1,2] They concluded that the share value and the worth of the US currency were firmly correlated and the association was extreme in the shorter period than in the longer period. The connection between macroeconomic variables and stock prices in the USA have been found but found there was negative association among stock prices and inflation.[3]

The macroeconomic variables like industrial production index, change in risk premium and inflation have a systematic influence on stock return and showed the presence of a long run association.[4] However, they also found that consumption and oil prices did not have a significant effect on stock prices. The empirical research work for investigating the association among real domestic share price return and real currency rate has been conducted.[5] They used the data for the period 1973-1983 with respect to 8 developed nations and observed an anti-correlation between real domestic share price returns and real currency rates. But, a weak positive relationship was found between the variables for the period 1979-1983. The stock exchange has been examined but took a separate time duration and variation of previous research by indicating a relevant anti-association between share prices and currency rates.[6] The research work has been conducted and he used maximum likelihood estimate and ARCH model on daily returns on share markets and foreign exchange markets in the developed economies.[7] These markets express more valid jump components in foreign exchange market than in share market extend the duration 1973 1985 and concluded

significant differences among the structures of the two markets. The llocal currency in value negatively affected the local share price fluctuations for an export- oriented economy and vice versa for import oriented countries in their study on six major industrialized countries covering the period 1973-1983.[8] The association with various macroeconomic elements and share market of India has been investigated.[9] To investigate the association with the elements, the associated fact was interpreted by tool Vector Error Correction Model. On the basis of the result of this work, they suggested that local inflation was the most important to Indian share market effectiveness and the resident output was its important factor. The research to investigate the interaction with share prices and currency rates in Malaysia during the duration from 1979 to 1996 has been conducted.[10] They analysed using co-integration and Granger causality technique. The monetary variables were money supply, reserves, and multiple forms of the exchange rate. The study could not establish any long period strong relationship between share prices and any form of currency rate through a bi-variate analysis. The research conducted to investigate the association with stock prices and exchange rates for G-7 countries (France, Canada, Italy, Germany, Japan, the United Kingdom, and the United States). for the duration 1982-1994 by using co-integration method and concluded that stock price index and exchange rate levels show a common cyclical trend which is co-integrated in the short-run period.[11] The impact of the inflation rate on the performance of the Egyptian stock market price Market activity

and Market liquidity are treated as stock price market performance variables has been investigated.[12] The study observed that the existence of short and long run association existed between the stock price market performance variables and the inflation rate. A strong positive feedback Association among Thailand, Hong Kong, Malaysia and Taiwan. They used daily data and took the sample for the duration from 1986 to June 1998 has been observed.[13] They conclude the traditional approach in Korea, while they suggested the portfolio approach for the Philippines. The extended period relation with share prices and currency rates for nine Asian nations (Taiwan, Japan, Thailand, Hong Kong, Singapore, Malaysia, Korea, Indonesia, and the Philippines) has been investigated.[14] They use the monthly data from January 1980 to June 1998 and applied co integration technique. The extended period relation with share prices and currency rates was observed only for Singapore and Philippines. They concluded this lack of co integration between the said elements to the bias created by the "omission of important factors". When interest rate element was considered in their co integrating equation they observe co integration between share prices, currency rates and interest rate for six of the nine countries. The research work conducted to examine the relationship between Indian Rupee and US $ currency rate and Indian share markets.[15] They consider the 5 composite indices and five sectoral indices which was observed over the period in the year 2000. The finding showed that currency rate has a high correlation with the fluctuations of the share

market.

The dynamic relations between exchange rate regimes, capital flows and currency crises in prominent economies have been investigated.[16] The research draws on findings during the 1990s, and deals with economy policy controversies that come to light after the Mexican, East Asian, Russian and Brazilian crises. He come to conclusion that under the proper conditions and policies, floating exchange rates can be effective and efficient. The characteristics of the causal association between share market, currency rate, foreign currency reserves and merchandise balance with respect to India from the duration April 1990 to 2001 by using the co integration and extended Granger causality test have been examined.[17] The empirical finding suggested that there is no causal relation with share prices and the three elements like currency rate, foreign currency reserves and worth of merchandise balance. In the research to investigate the relation between share prices and currency rates of four South Asian nations like Bangladesh, India, Pakistan and Srilanka it has been observed that there is no relevant association with the factors either in limited period or extended period in Pakistan and India. But they observed a bidirectional relationship in case of Bangladesh and Srilanka.[18] The Granger causality test has been applied on per day share price during the period 1993 to 2002.[19] The research result concluded that the two markets did not have any strong association, however, the detailed analysis of the work did not find any significant strong association between exchange rate and share price volatility except for the Years 1993,

2001 and 2002.Unidirectional causal influence from share price to foreign exchange market was found in these years and mild reverse causal influence during 1997 and 2002. Very less coverage to global resources is available for the backward nations, so less rate of inflation and the higher level of durability is linked with fixed currency rate regime in those nations.[20] However, they suggested that no strong association with economic performance and currency rate regime in the advance economies. They concluded that developed economies may face a durable and slightly higher level of growth rate without the higher level of inflation in flexible exchange rate regime. The research work conducted for the direction of casualty in short run and long run period.[21] They used quarterly data for the duration 1960-2004. This study apply the statistical tools like unit root, co-integration and Standard Granger causality tests to examine the relationship between these two financial variables. The empirical results show that there is no causal relation and no co-integration between the stock prices and exchange rates.

2.   Research Methodology

The present research was undertaken to find out the impact of exchange rate fluctuations on the performance of the Stock Market Index in India. To cover with this objective two important economic variables viz. Stock Market Index and exchange rates were taken as the subject of study.

3.   Research Objective

To study the Impact of exchange rate fluctuations on the Stock Market Index

4. Hypothesis taken in the study

Null Hypothesis. There is no Impact of exchange rate fluctuations on the Stock Market Index.

Alternative Hypothesis: There is Impact of exchange rate fluctuations on the Stock Market Index.

5. Data collection

The data collected were of wide coverage to make the study as comprehensive and extensive as possible. The data on NSE Nifty Index was taken for a span of 10 years from 1st April 2005 to 31st March 2015. The daily spot exchange rates and reference rate of Rupee to US Dollar were collected from RBI monthly bulletins and the website www.rbi.org.in.The data obtained were compiled and collated as a daily series. Once the data was arranged on a daily basis it was further subjected to scrutiny to convert the same into a systematic daily time series based on five day week running from Monday to Friday. Any missing data for weekdays on account of intervening holidays or otherwise were substituted by the value of the previous trading day from the corresponding series.

6. Statistical Tools used for Research Work

6.1. Techniques used for Interpretations:

Time series Analysis, Unit root test like Augmented Dickey Fuller test, Co- integration Techniques.

6.2. Time Series Analysis

Time series are techniques for examine time series variable in order to find out significant statistics and another attribute of the data. Time series predicting is the application of a theory to forecast future worth based on early observational values. A time series is a time ordered series of observations taken at the constant frequency over a duration of time. Time series analysis can be a utility to see how a specific asset, security or economic elements change over time or how it changes compared to other elements over the same time duration. For example, suppose if wanted to examine a time series of per day closing share prices for a particular stock over a period of one year. The first data should include the list of all the closing prices for the stock over each day for the past year and list them in date wise order. This can be a one-year, daily closing price time series for the stock.

There are basically two types of time series models.

Additive model represented by

$$Yt = Tt + Ct + St + It$$

and Multiplicative model.

$$Yt = Tt * Ct * St * It$$

Where, Yt is the observed value of the time series, and the components are T= trend C = cyclical, S = seasons and I the random error.

For the study under consideration, the multiplicative model is chosen as this model is found to be a more realistic representation of economic data like Stock Market Index and exchange rates.

6.3. Unit root Process method

A unit root procedure will only blend the mean of the sample very infrequently, and the procedure will experience long positive and negative strays away from the series mean. Whereas the Random Walk Model is a specific

case of the stochastic process a more general class of stochastic process is the integrated process.

6.4. The Augmented Dickey -Fuller Tests

The Augmented Dickey Fuller Unit Root Test has three alternative specifications as follows depending on whether the random walk process may have no drift or it may have drift and deterministic stochastic trends.

- Without Constant or Trend N Yt =)Yt-1 + ut
- With Constant N Yt = J +)Yt-1 + ut
- With Constant and Trend N Yt = J + Qt + Yt-1 + ut

Where t is the time or trend variable. The 1st is a pure random walk model, the 2nd ads an interceptor drift term, and the third includes both a drift and linear time trend.

The basic conditions of the unit root are the following:

1. If t statistics is $\leq$ ADF computed value it represents the presence of unit root for the time series data.

2. If t statistics is $\geq$ ADF computed value it means the null hypothesis is rejected and it shows that unit root does not exist.

The Augmented Dickey-Fuller test construct a parametric correction in Dickey-Fuller test for advance-order correlation by assuming that the variable follows an AR (p) process. The Augmented Dickey-Fuller test controls for advanced correlation by putting lagged variation terms of the dependent variable to the right-hand side of the regression. The Augmented Dickey-Fuller unit root test has been used to investigate the stationarity of the time variable of the study and to find the order of

integration among them. The Augmented Dickey-Fuller unit root test has been used by calculating the regression:

6.5. Test for Co-integration

The following process is applied in the uses of co integration. 1st, the order of integration of the time series data is tested. Next, if these series are integrated of the same order, then a co integrating regression is calculated and the null hypothesis that the residuals of that regression are non-stationary is tested. Only if non-co integration is rejected would the estimation of an ECM be attempted.

The process for testing of co integration are following:

- checking the relevant time series for stationarity (unit roots),
- checking for co-integration,
- checking Error-Correction Modeling

7. Results and discussion

A Unit root Test was applied to examine whether the time series data was stationary. A time series variable is stationary or not consist unit root for which augmented dickey-fuller techniques have been applied for the study. The time series variable is non- stationary if the computed value is below than observed value and after wards assumption is not accepted and the variable is called stationary.

The calculated value of the test statistic t is less than its critical value (3.41), the null hypothesis is accepted, which means for both the series EXR and SENSEX, unit root exists and they are non- stationary at their levels.

In the next step, the first difference was

taken and subjected to unit root tests and the results are given in table 1.2.

Table 1.1. Unit root test at level, series with constant and trend

Period	Variable	No of observation	ADF test	Critical value @ 5%
Level	Exchange Rate	2467	-2.351188	-3.411629
	Sensex (Nifty)	2467	-2.754112	

Table 1.2. Unit root test at First difference, series with constant and trend

Period	Variable	No of observation	ADF test	Critical value @ 5%
Level	Exchange Rate	2467	-14.13092	-2.862511
	Sensex (Nifty)	2467	-46.79752	

The table 1.2. depicts the ADF test of the first difference series with constant and trend. The calculated |t| > the critical value 3.41 and hence, the null hypothesis rejected at 5% significance level i.e., unit root does not exist. Accordingly, time series for Exchange Rate (EXR) and Indices (Nifty) are stationary at their first difference and are found to be integrated of order one me (1).

7.1. Co- integration Test of the Exchange rate and Indices (Nifty)

Co- integration tool is applied to decide if there is co integration as well as the co integrating association, that, is, if there are any long period association among exchange rate and share price indices like Nifty or not. In co integration test two test is applied, the trace and the maximum Eigen value test to decide the co integrating variables.

Table 1.3. Johansen's Co-integration Test Result

Exchange rate/Nifty			Sample: 1 April 2005 to 31st March 2015		
Trend assumption: Linear deterministic trend (restricted) Observation: 2473					
Unrestricted Co integration Test (Trace)					
Hypothesis No. of CE(s)	Eigen value	Trace (λtrace)	absolute Value @ 5%	Prob.**	
None	0.00343	8.511894	15.49471	0.41241	
At 1	6.20E-07	0.001533	3.841461	0.9668	
λtrace test show no co- integration at the 0.05 level * indicate non-acceptance of the assumption at the 0.05 level					
Unrestricted Co-integration Test (Maximum Eigenvalue)					
Hypothesis No. of CE(s)	Eigen value	Trace (λtrace)	absolute Value @ 5%	Prob.**	
None	0.003435	8.510361	14.26460	0.3292	
At 1	6.20E-07	0.001533	3.841466	0.9668	
Maximum-eigenvalue test show absence co-integration at the 0.05 level * indicate non acceptance of the hypothesis at the 0.05 level					

Table 1.3. exhibits the results of the Johansen's Co-integration test as presented in above, Maximal Eigen statistic (λmax) of 8.510361 is less than the 5 % absolute value of 14.26460 and the trace test statistic (λtrace) of is 8.511894 less than the absolute value of 15.49471. On the other side the maximum Eigen value is less than critical value then we can't reject the first assumption. The p -value of the above test is 0.41241 for trace test and 0.3292 is for maximum eigen value which show that it is more than 5% so we cannot reject the hypothesis. It means the null hypothesis is accepted and it show that Stock Market Index is not affected by the exchange rate fluctuations.integration Test result it was found that the values of maximal Eigen statistic (λmax) and the trace test statistic were less than the absolute value. Hence it was proved that exchange rate fluctuations had no Impact on the Stock Market Index.

8.   Conclusion

The Impact of exchange rate fluctuations on Stock Market Index has attracted considerable attention from researchers worldwide. Since then, lots of research has been conducted by various researchers to empirically associate this relationship by using econometrics models. In this context, the research has been conducted to investigate the impact of exchange rate fluctuations on Stock Market Index of NSE Nifty and exchange rate. The research study has selected variables like exchange rate (US dollar) and stock index NSE Nifty. The duration of the research has been from 1st April 2005 to 31st March 2015. The main statistical tools applied are unit root test, Johansen co-integration test and chi- square test. The research study began with testing of hypothesis by using unit root test. For this purpose augmented dicker- fuller test was used at the level and at first difference. Further, in the next step was to check the co-integration between the variables using Johansen co integration test. The objective of the research was to study the impact of exchange Rate fluctuations on Stock Market Index. For this purpose exchange rate and Stock Market Index NSE nifty were taken and after the Johansen's Co-

References

1. Frank and Young (1972). Stock Price Reaction of Multinational Firms to Exchange Realignments. *Financial Management*, 1, 66-73.

2. Aggarwal, R. (1981). Exchange Rates and Stock Prices: A Study of US Capital Markets under Floating Exchange Rates. *Akron Business and Economic Review*.

3. Geske, R and R. Roll (1983). The fiscal and monetary linkage between stock market returns and Inflation, *J. Finance*, 38(1), 7-33.

4. Chen Roll and S. Ross. (1986). Economic forces and the stock market, *Journal of Business*.

5. Solnik, B . (1987). Using Financial Prices to Test Exchange Rate Models. *Journal of Finance*, 42, 141-49.

6. Soenen, L. and Hennigar, E. (1988). An Analysis of Exchange Rates and Stock Prices - The US Experience between 1980's and 1986. *Akron Business and Economic Review*, 19.4, 71-76.

7. Jorion, P. (1988). On Jump Process in the Foreign Exchange and Stock Markets. *The Review of Financial Studies Winter*, 427-45.

8. Ma, C.K. and Kao, G.W. (1990). On Exchange Changes and Stock Price Reactions. *Journal of Banking and Finance and Accounting*, 17, 441-49.

9. Naka, Atsuyuki, Mukherjee, Tarun et.al. (1998). Macroeconomic Variables and the Performance of the Indian Stock Market. Retrieved from- http://www.scholarworks.uno.edu/econ_wp/15.

10. Ibrahim, M., & Aziz, M. (2003). Macroeconomic

variables and the Malaysian equity market: A rolling through subsamples. *Journal of Economic Studies*, 30(1), 6-27.

11. Morely, B. and Pentecost, J.E. (2000). Common Trends and Cycles in G-7 Countries Exchange Rates and Stock Prices. *Applied Economic Letters*. 7, 7-10.12.Morely, B. and Pentecost, J.E. (2000). Common Trends and Cycles in G-7 Countries Exchange Rates and Stock Prices. *Applied Economic Letters*. 7, 7-10.

13. Granger, C.W.J. Huang, B.N. and Yang, C.W. (2000). "A Bivariate Causality between Stock Prices and Exchange Rates: Evidence from Recent Asian Flu." The Quarterly Review of Economics and Finance, 40:337-354.

14. Amare and Mohsin (2000). Stock Prices and Exchange Rates in Leading Asian Economies: Short versus Long Run Dynamics. *Singapore Economic Review*.

15. Karmakar and G. Kawadia. (2002). The Relationship between Stock Index and Exchange Rate Empirical Evidence Based on Indian Stock Market. *Applied Finance*, 8(2), 51-56.

16. Edwards, S. (2001) "Exchange Rate Regimes, Capital Inflows and Crisis Prevention", NBER and University of California.

17. Bhattaacharya, et al. (2002). Causal Relationship between Stock Market and Exchange Rate, Foreign Exchange Reserves and Value of Trade Balance: A Case Study for India. www.igidr.ac.in.

18. Muhammad, N. and Rasheed, A. (2002). "Stock Prices and Exchange Rates: Are They Related? Evidence from South Asian Countries", Karachi University G15.

19. Nath and Samanta. (2003). Dynamic Relationship between Exchange Rate and Stock Prices - A Case for India. www.nseindia.com/content/press/feb.20.Husain, A.M., Mody, A., Rogoff, K.S. (2004). Exchange Rate Regime Durability and Performance in Developing Versus Advanced Economie. *Journal of Monetary Economics*, 52(1), 35-64.

21. Olweny, T. (2011). The Effects of Macro-Economic factors on stock returns volatility in the Nairobi Stock Exchange. Kenya - Economics and Finance Review,

Books

1. Sharan, V, International Financial Management, New Delhi, Prentice Hall of India private limited, 2004.

2. Shrivastava, R M, Multinational Financial management, New Delhi, Excel books, 2008.

3. Damodar N. Gujarati, Basic Econometrics, New Delhi, McGraw-Hill Higher Education, 2003.

Websites

1. https://www.nseindia.com

2. https://www.rbi.org.in/

3. https://in.finance.yahoo.com/

4. www.sebi.gov.in/

5. https://www.oanda.com/fx-for-business/historical-rates

6. www.moneycontrol.com/stocks/histstock.php