

AN EMPIRICAL STUDY ON EFFECTS OF CHANGES IN EXCHANGE RATE (₹ VS \$) ON THE MOVEMENT OF INDIAN STOCK MARKET

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Abstract

The researchers aimed to study the relationship and impact of exchange rate with the movement of Indian stock market. The period of the study was 14 years commencing from January 2006 to June 2019. The researcher selected the indices of Sensex and Nifty as market proxy and exchange rate of Indian rupee against US dollar as proxy for exchange rate. The secondary data were collected from official websites of BSE, NSE and RBI. A total of 3262 observations came, return was calculated for the variables. These data were analyzed using correlation and regression analysis. The results of the study indicated that exchange rate and Indian stock market both in terms of return on Sensex and Nifty had significant negative relationship during the period of study and the quantum of relationship was moderate. Exchange rate explained the movement of Indian stock market to the extent of 9 percent and exchange rate had significant negative impact on the movement of Indian stock market as per the results of regression analysis. The results of correlation analysis during different period of study based on nature of the market showed that irrespective of nature of market, exchange rate had significant negative relationship with Indian stock market. No differences were found in the quantum and nature of relationship under various market conditions such as bull market and bear market.

Key words: Stock market, index, return, movement, exchange rate, bear market and bull market.

Introduction

In Indian financial system stock market is playing an important role. Stock market make way for channelizing small savings towards big investments, which help for the development of industries and which will help for economic development in many ways. Stock market deals with second hand securities, which were issued in primary market. In other words, already issued securities can be purchased and sold in stock markets. Indian stock market is one of the fastest developing markets in the world and ranked among top 15 in the world, both Bombay Stock Exchange and National Stock Exchange. The primary nature of a stock exchange is fluctuation. Based on changes in prices of stock prices in a particular index the index is moving.

Movement of an index tells us the direction of movement of the whole stock market. In India, there are many recognized stock exchanges, among them Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) are popular and big stock exchanges. More than 99.5 percent of the total share transactions in India are taken place in these two stock exchanges and meager part of the transactions (less than 0.5 percent) are being done in all other stock exchanges. The popular index of BSE is Sensex, of which 30 top stocks are listed and Nifty is the popular index of NSE, of which top 50 stocks are listed. Fluctuations in both the top indices reveal the movement of entire stock exchanges. Many factors such as macro-economic factors, political factors, industry related factors, international factors etc. Among them macro-economic factors are playing an important role in determining the fluctuation of Indian stock market. In international trade, about all the countries accept either gold or US dollar as exchange for the goods supplied. Hence American dollar is playing as a common currency in international market. Exchange rate of Indian rupee against American dollar is determined by demand and supply of the currency. Fluctuations in the exchange rate are also determining the fluctuations of Indian stock market. Hence the researcher has taken exchange rate as independent factor in order to test the relationship and impact on the movement of Indian stock market.

Literature Review

Abbas Alavi Rad (2011) in his empirical study found that the response of TSE price index to shocks in macroeconomic variables such as consumer price index (CPI), free market exchange rate, and liquidity (M2) was weak. The researchers concluded that political shocks or other economic forces could effect on TSE price index in Iran. Masood Mashkooor Siddiqui and Muhammad Nabeel (2013) in their study revealed that the oil prices, exchange rate and foreign private portfolio investment had positive correlation with stock market performance while democratic set up was found to have a negative impact over stock market performance in Pakistan. Kantasha Sanningammanavara, Kiran Kumar K V and Rakesh H M (2014) found that the Depreciation in the Rupee against the Dollar had led to decrease in the share prices. It had a negative impact on the stock prices and Increase in the Inflation rate had led to decrease in the share prices. Pooja Singh (2014) through their study evidenced significant impact of macroeconomic variables on Indian stock market. The gold prices, exchange rate had negative impact on the stock market. Foreign investment and money supply had significant positive impact on the stock market. Kulathunga KMMCB (2015) found that all macroeconomic factors influenced the stock market development. More precisely, volatile inflation rate and exchange rate together with higher deposit rate had curtailed the stock market development in Sri Lanka. Iftaqar Ahmad and Jyotsna Sinha (2016) in their study evidenced that both the independent variables show positive correlation with dependent variable. GDP showed a high degree of positive correlation. The study concluded that GDP was the significant predictor and Exchange Rate was not the significant predictor of BSE Sensex. Piyali Roy Chowdhury and Anuradha A (2018) in their study found that there was an impact of currency value on SENSEX. It was a positive effect which said that, as Rupee gets depreciated against dollar; stock market goes up and vice versa. Smita Mahapatra and Saumitra N Bhaduri (2019) in their paper the exchange rate risk factor was becoming a prominent determinant of stock returns, indicating

that Indian investors were increasingly expecting a risk premium on their investment for their added exposure to exchange rate risk.

Objectives

The present study has been undertaken with the following objectives.

- To study the relationship between exchange rate (₹ Vs \$) and the movements of Indian stock market.
- To analyse the impact of exchange rate (₹ Vs \$) on the movement of Indian stock market and
- To test period-wise relationship between exchange rate (₹ Vs \$) and the movements of Indian stock market.

Methodology

The researchers intended to test the relationship between exchange rate and the movement of Indian stock market and the impact of exchange rate on Indian stock market. The researcher selected the indices of Sensex and Nifty as market proxy and exchange rate of Indian rupee against US dollar as proxy for exchange rate. For this purpose the researchers collected secondary data of the popular indices namely Sensex of Bombay Stock Exchange (BSE) and Nifty of National Stock Exchange (NSE) and exchange rate of Indian rupee against American dollar. These data were collected on daily basis for study period of 14 years spanning from January 2006 to June 2019. A total of 3262 observations came, return was calculated for the variables. These data were analyzed using correlation and regression analysis.

The regression models used for the study are described below.

Model 1: Impact of Exchange rate on Sensex

$$SE_i = \alpha + \beta ER_i + \varepsilon_t$$

Where, SE indicates return on Sensex, α indicates constant, ER indicates return on Exchange Rate and ε indicates error term.

Model 2: Impact of Exchange rate on Nifty

$$NI_i = \alpha + \beta ER_i + \varepsilon_t$$

Where, NI indicates return on Nifty, α indicates constant, ER indicates return on Exchange Rate and ε indicates error term.

Results and Discussion

The researchers have attempted to test the relationship between exchange rate on return on the indices Sensex and Nifty and also studied the impact of exchange rate on the movement of the above indices. For this purpose the descriptive analysis was made and the results are presented in table 1.

Table 1: Descriptive Statistics

Factors	N	Minimum	Maximum	Mean	Std. Deviation
Sensex	3262	8160.40	40267.62	21604.19	7786.51
Nifty	3262	2524.20	12088.55	6521.24	2404.97
Exchange Rate	3262	39.27	74.39	55.03	10.03

Source: Computed from Secondary Data

Table 1 shows that the index of Sensex ranged between 8160.40 and 40267.62 during the period of study. Its mean value stood at 21604.19 and standard deviation was 7786.51. The index of Nifty ranged from 2524.20 to 12088.55 during the study period, its mean and standard deviation stood at 6521.24 and 2404.97 points respectively. Exchange rate of Indian rupee against US dollar ranged between Rs.39.27 and Rs.74.39 during the study period, its mean and standard deviation were Rs.55.03 and Rs.10.03 respectively. The results of standard deviation and mean showed that there was low level of deviation in both the index and exchange rate from the mean value. Table 2 brings out the results of correlation between exchange rate and the movement of Indian stock markets.

Table 2: Correlation between Exchange Rate and Indian Stock Market

		Sensex	Nifty	Exchange Rate
Sensex	Pearson Correlation	1		
	Sig. (2-tailed)			
Nifty	Pearson Correlation	0.985**	1	
	Sig. (2-tailed)	0.000		
Exchange Rate	Pearson Correlation	-0.300**	-0.299**	1
	Sig. (2-tailed)	0.000	0.000	
	N	3262	3262	3262

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Computed from Secondary Data

It could be known from table 2 that high correlation between Sensex and Nifty indicated that both the stock markets are moving together. The correlation between return on exchange rate and return on Sensex was negative at -0.3000 and correlation between return on exchange rate and return on Nifty was also negative at -0.299, they were statistically significant at 1 percent level, hence there was negative relationship between exchange rate and the movement of Indian stock market. In other words when exchange rate increases stock market decreases and when exchange rate decreases stock market increases. Significant

negative relationship was identified between exchange rate and the movement of Indian stock market during the period of study.

In order to know the impact of fluctuations in exchange rate on the movement of Indian stock market, regression analysis was applied assuming that the indices of stock markets are dependent variable and exchange rate is independent variable. These results are presented subsequently. Table 3 provides the results of ANOVA under regression.

Table 3: ANOVA under Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
SENSEX						
1	Regression	593.255	1	593.255	322.889	0.000 ^b
	Residual	5989.705	3260	1.837		
	Total	6582.960	3261			
Adjusted R ²		0.090				
NIFTY						
2	Regression	594.168	1	594.168	320.613	0.000 ^b
	Residual	6041.505	3260	1.853		
	Total	6635.673	3261			
Adjusted R ²		0.089				

a. Dependent Variable: Sensex; b. Predictors: (Constant), Exchange Rate

Source: Computed from Secondary Data

The results of table 3 shows that the calculated F statistics of impact of exchange rate on Sensex was 322.889 and F statistics of impact of exchange rate on Nifty was 320.613, they were statistically significant at 1 percent level. Hence the models framed to test the impact of exchange rate on the movement of Indian stock market was fit for the study. It was also found that the calculated adjusted R square of exchange rate on Sensex stood at 0.090 and it was 0.089 of exchange rate on Nifty. These results showed that exchange rate explained the movement of Indian stock market to extent of 9 percent. Table 4 brings out the results of regression coefficients of exchanger rate on the movement of Indian stock market.

Table 4: Regression Coefficients of Exchange Rate on Indian Stock Market

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
SENSEX						
1	(Constant)	0.067	0.024		2.806	0.005
	Exchange Rate	-0.872	0.049	-0.300	-17.969	0.000
NIFTY						
2	(Constant)	0.066	0.024		2.785	0.005
	Exchange Rate	-0.873	0.049	-0.299	-17.906	0.000

a. Dependent Variable: Sensex and Nifty

Source: Computed from Secondary Data

Table 4 shows that the calculated beta value of return on exchange rate on return on Sensex was negative at -0.3000, it was statistically significant at 1 percent level, hence exchange rate had significant negative impact on Indian stock market in terms of return on the index Sensex. Similarly the calculated beta value of return on exchanger rate on the movement of Nifty was -0.299, it was also statistically significant at 1 percent level, hence there was significant negative impact of exchange rate on the movement of Nifty also. It is summarized that exchange rate had significant negative impact on Indian stock market both in terms of return on Sensex and Nifty during the study period.

Period-wise Relationship between Exchange Rate and Indian Stock Market

The movement of stock market is not uniform during all the period. Many factors are determining the movement of stock market in a country, such as general economic factors, industry related factors, political factors, extern factors, international factors etc. In favorable conditions, stock market is keeping on increasing with small adjustments and during the period with unfavorable conditions, stock market is keeping on decreasing with small adjustments. Continuous upward movement of stock market is known as bull market and continuous downward movement of stock market is known as bear market. The total period of study of the study has been divided into 7 based on their nature of market. They were categorized based on Compounded annual growth rate (CAGR) calculated for each year based on monthly points of both the indices Sensex and Nifty. Positive CAGR were categorized together as bull market and year of market with negative CAGR were categorized as bear market. The researcher intended to test whether there are any significant differences on relationship between exchange rate and the movement of Indian stock market based on nature of market, the correlation analysis was applied for each sub-period separately and the results are presented in table 5.

Table 5: Period-wise Correlation between Exchange Rate and Indian Stock Market

Period	Nature of Market	With Sensex			With Nifty		
		Corr.	Sig.	N	Corr.	Sig.	N
2006-07	Bull	-0.146**	0.001	494	-0.119**	0.008	494
2008	Bear	-0.317**	0.000	240	-0.307**	0.000	240
2009-10	Bull	-0.395**	0.000	483	-0.398**	0.000	483
2011	Bear	-0.273**	0.000	240	-0.282**	0.000	240
2012-14	Bull	-0.339**	0.000	723	-0.349**	0.000	723
2015	Bear	-0.429**	0.000	240	-0.430**	0.000	240
2016-19 (Upto June 2019)	Bull	-0.326**	0.000	842	-0.336**	0.000	842

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Computed from Secondary Data

It could be known from table 5 that the calculated correlation between exchange rate and Sensex and Nifty during the period from 2006-07 were negative at -0.146 and -0.119 respectively, they were significant at 1 percent level. That period was bull market and there were high returns on stock market, during the period significant negative relationship was found between exchange rate and Indian stock market, but the quantum of relationship was found to be low. 2008 was the crisis period, during such period also exchange rate had significant negative relationship with Indian stock market, since correlation coefficients between exchange rate and Sensex and Nifty were -0.317 and -0.307 respectively and they were significant at 1 percent level. During the following period (2009-10) also exchange rate had significant negative relationship with Indian stock market. Correlation coefficient of exchange rate with Sensex was -0.395 and it was -0.398 with Nifty and they were significant at 1 percent level. 2011 was bear market, CAGR during the period was negative, during the period also the exchange rate had significant negative relationship with Indian stock market, during the period correlation coefficient between exchange rate with Sensex and Nifty were -0.273 and -0.283 respectively. Again 2015 was the bear market, during the period exchange rate had high and significant negative relationship with Indian stock market both in terms of return on Sensex and Nifty (Correlation with Sensex -0.429 and with Nifty -0.430) and these results were statistically significant at 1 percent level. During the period 2016-19 (upto June 2019), the bull market, exchange rate had significant negative relationship with Indian stock market. During the period, the calculated correlation coefficient between exchange rate and Sensex was -0.326 and with Nifty it was -0.336, they were statistically significant at 1 percent level. It was observed that during different periods categorized based on nature of markets, the exchange rate had significant negative relationship with Indian stock market both in terms of return on Sensex and Nifty. Hence, irrespective of nature of the market exchange rate had negative relationship with Indian stock market and there was no significant differences in the relationship based on the nature of market.

Conclusion

The primary nature of stock market is fluctuation. Stock markets are fluctuating frequently caused by various factors. Among them exchange rate of Indian rupee against US dollar is one of the important macro economic factors determining the market fluctuations. The study has been done to test the relationship between exchange rate with movement of Indian stock market and its impact on it and the researcher also tested the relationship between them based on nature of market. The results of the study indicated that exchange rate and Indian stock market both in terms of return on Sensex and Nifty had significant negative relationship during the period of study and the quantum of relationship was moderate. Exchange rate explained the movement of Indian stock market to the extent of 9 percent and exchange rate had significant negative impact on the movement of Indian stock market as per the results of regression analysis. The results of correlation analysis during different period of study based on nature of the market showed that irrespective of nature of market, exchange rate had significant negative relationship with Indian stock market. No differences were found in the quantum and nature of relationship under various market conditions such as bull market and bear market.

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