



A STUDY ON THE IMPACT OF EXCHANGE RATE VOLATILITY ON STOCK MARKET INDICES (Evidence from Indian Stock Market)

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ABSTRACT

The foreign exchange rate is the price of a country's currency in terms of another country's currency. The frequent increase in the whole world trade and capital structure have made the exchange rates as one of the main factors of business profitability and equity prices. Basically, foreign exchange rate volatility influences the firm since the future cash flows of the firm change with the fluctuations in the foreign exchange rates. Exchange rates not only influence the stock prices of multinational companies and export-oriented firms but also the domestic companies.

A stock market index helps the investors to compare current price levels with past prices to calculate market performance. BSE index Sensex and NSEindex Nifty50 are the two most important stock market Indices in India. This study is made using these two indices which are used for analysis with relation to the exchange rates for the period of 5 years (1 April 2016-31 March 2021). The aim of this paper is to find the Impact of exchange rate volatility on stock market indices (NIFTY50, SENSEX) and the effect of the impact i.e., positive or negative on the stock market indices. Various tests like Granger Causality test, Correlation, Augmented Dickey Fuller test, Normality test have been calculated using EViews software. The final interpretation of the analysis concludes that there was a moderate correlation between Sensex. Nifty50 and Exchange rates in which the residuals are not normally distributed. The Exchange rate granger causes Sensex and Nifty50. So, investors need to analyze the Forex rate movements before taking investment decisions.

KEYWORDS:

Exchange rate, Sensex, Nifty50, Stock Exchange, Volatility.

1.INTRODUCTION:

INDIAN STOCK EXCHANGE:

Stock Exchange market facilitates the transaction between traders of financial instruments and targeted buyers. A **stock exchange in India** sticks to set of rules regulated by Securities and Exchange Board of India. The Bombay Stock Exchange (BSE) is India's oldest and the largest exchange. Based in Mumbai, India, the BSE lists close to 7,400 companies and is one of the largest exchanges in the world. The NSE was established in 1992 in Mumbai and is accredited as the pioneer among the demutualized electronic **stock exchange** markets in India.

NIFTY50

The **NIFTY 50** is a benchmark Indian stock market index that represents the average of top 50 largest Indian companies which are being listed on the National Stock Exchange. The Nifty 50 index was introduced on 22 April 1996, and is one of the main stock indices of Nifty.

SENSEX

The **BSE SENSEX** (also known as the S&P Bombay Stock Exchange Sensitive Index) is a stock market index of 30 well-established and financially sound companies listed on Bombay Stock Exchange. The 30 companies are some of the largest and most actively traded stocks, are the representative of various industrial sectors of the Indian economy.

2.INDUSTRY PROFILE

FOREX MARKET

The forex market is the market where the participants involve in buying and selling of currencies. The forex market is comprised of banks, central banks, companies, forex brokers, investors and other financial institutions. The forex market is a 24-hour market. The US Dollar is by far the most traded currency, making up close to 85 percent of all trades.

Analyzing the interrelationship between currency, market volatility and stock market volatility will create an abundant trading opportunities for the investors irrespective of the return of one market, which is moving up or down.

3.REVIEW OF LITERATURE:

1. **Deepti Gulati and Monika Kakhani**(Nov, 2012) studied the Exchange Rate Volatility on Stock Index of India. The study tries to establish the relationship between stock market and foreign exchange market in India.

2. **Dr. Gaurav Agrawal** (Dec, 2010) analyzed the relationship between the returns of NSE Nifty and the Dollar Exchange Rates.

3. **Maysami-Koh**(2000), who examined the impacts of the interest rate and exchange rate on the stock returns and showed that the exchange rate and interest rate are the determinants in the stock prices.

4. **Oskooe and Sohrabian**(1992) found out that there is no longer term impact of forex rates on stock market and concluded that bidirectional causality exist for the two variables.

5. **Najang and Seifert**(1992), employing GARCH framework for daily data from the U.S, Canada, the UK, Germany and Japan, showed that absolute differences in stock returns have positive effects on exchange rate volatility.

6. **Liu and Shrestha** (2008) found that a co-integrating relationship exists between stock prices and the macro-economic variables like money supply, industrial production, inflation, exchange rate and interest rates.

7. **Purbaya, Yudhi Sadewa**(2000) in his analysis —The effect of exchange rate on foreign direct investment found that depreciation of currency in host country facilitates more FDI if the country is focusing on export primarily and vice versa.

8. **Magda Kandil , Ida Mirzaie**(2005) classified the exchange rate fluctuations into anticipated and unanticipated fluctuations. The study analysed the impact of foreign exchange rate on the stock prices.

9. **Alok Kumar Mishraa, Niranjanswainb , et al.**(2007), in the article —Volatility Spillover between Stock and Foreign Exchange Markets: Indian Evidence, discussed about the bidirectional volatility regarding Indian stock market and foreign exchange market.

4. NEED FOR THE STUDY

Volatility increases exchange rate risk that can quickly change the expected rates of return on international investments and impacts the stock market indices. The study pertaining the relationship between Forex market and Indian stock market is considered important.

5. OBJECTIVES OF THE STUDY:

To analyze the relationship between exchange rates volatility and stock market indices – Nifty50, Sensex over the period April 1, 2016-March 31, 2021.

6. LIMITATIONS OF THE STUDY:

- The study includes only one currency pair i.e. INR/USD.
- The research is limited to period of five years. (April 1, 2016-March 31, 2021)

7. RESEARCH METHODOLOGY:

Research Design	Analytical research design
Data Collection:	Secondary data
Variables Used:	Independent variable – USD/INR Exchange rates Dependent variable – Nifty50 and Sensex
Sample Size	The daily data of Nifty50, Sensex and USD/INR Exchange rates
Sample Size	April 1, 2016 to March 31, 2021
Tools Used For Analysis	Correlation, Normality test, Unit root test, Granger Causality test

8.DATA ANALYSIS AND INTERPRETATION

8.1. CORRELATION

	Exchange rate	Nifty50	Sensex
Exchange rate	1.000000	0.451176	0.524274
Nifty50	0.451176	1.000000	0.995543
Sensex	0.524274	0.995543	1.000000

The above table shows the correlation between the independent (Exchange rate) and dependent (Sensex and Nifty50) variables. As the value of correlation coefficients lies between 0.3 to 0.7 we can say that **moderate correlation** exists between the correlation coefficients –Exchange rates and Nifty50, Sensex.

8.2. NORMALITY TEST (Jarque Bera)

HYPOTHESIS:

H0: Residuals are normally distributed.

H1: Residuals are not normally distributed

	Exchange rate	Sensex	Nifty50
Mean	69.34327	35063.96	10556.57
Median	69.14020	35163.98	10618.20
Maximum	77.57000	52154.13	15314.70
Minimum	63.26500	24673.84	7546.450
Standard deviation	3.683969	5862.998	1607.044
Skewness	0.167017	0.543478	0.518817
kurtosis	1.877034	3.229960	3.448588
Jarque – bera	73.26411	63.67215	65.33351
Probability	0.000000	0.000000	0.000000
Sum	88828.73	43409179	12952917
Sum sq. deviation	17371.69	4.25E+10	3.17E+09
Observations	1281	1238	1227

In all these three variables, the probability level is **0.000000 which is less than 0.05**. So the null hypothesis is rejected and the alternate hypothesis is accepted. i.e, Residuals are not normally distributed.

8.3 UNIT ROOT TEST - AUGMENTED DICKEY-FULLER TEST

HYPOTHESIS

- H0: The data is non stationary (unitroot) exists
- H1: The data is stationary (unit root) does not exist

8.3.1. Sensex:

At level:

Null Hypothesis: CLOSE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.521814	0.8844
Test critical values:		
1% level	-3.435423	
5% level	-2.863668	
10% level	-2.567953	

*MacKinnon (1996) one-sided p-values.

At first difference:

Null Hypothesis: D(CLOSE) has a unit root

Exogenous: Constant

Lag Length: 5 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-14.39036	0.0000
Test critical values:		
1% level	-3.435449	
5% level	-2.863679	
10% level	-2.567959	

*MacKinnon (1996) one-sided p-values.

8.3.2. Nifty 50:

At level:

Null Hypothesis: CLOSE has a unit root

Exogenous: Constant

Lag Length: 6 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.967116	0.7666
Test critical values:		
1% level	-3.435687	
5% level	-2.863784	
10% level	-2.568015	

*MacKinnon (1996) one-sided p-values.

At first difference:

Null Hypothesis: D(CLOSE) has a unit root

Exogenous: Constant

Lag Length: 5 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-14.20168	0.0000
Test critical values:		
1% level	-3.435687	
5% level	-2.863784	
10% level	-2.568015	

*MacKinnon (1996) one-sided p-values.

8.3.3. EXCHANGE RATE:**At level:**

Null Hypothesis: CLOSE has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.135216	0.7037
Test critical values:		
1% level	-3.435287	
5% level	-2.863608	
10% level	-2.567921	

*MacKinnon (1996) one-sided p-values.

At first difference:

Null Hypothesis: D(CLOSE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=22)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-43.77570	0.0001
Test critical values:		
1% level	-3.435287	
5% level	-2.863608	
10% level	-2.567921	

*MacKinnon (1996) one-sided p-values.

From all the above analysis it is understood that the Probability of the three variables (Exchange rate, Nifty and sensex) is 0.0000 and 0.0001 which is less than 0.05 so, reject the null hypothesis (H0) and accept the alternate hypothesis (H1). The data is stationary and (unit root) does not exist.

8.4.GRANGER CAUSALITY TEST:

HYPOTHESIS

H0: Exchange rate does not granger cause Nifty50 and Sensex.

H1: Exchange rate granger cause Nifty50 and Sensex.

Pairwise Granger Causality Tests

Date: 10/26/21 Time: 21:53

Sample: 4/01/2016 3/31/2021

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
Nifty50 does not Granger Cause Sensex	1205	0.07655	0.9263
Sensex does not Granger Cause Nifty50		0.15476	0.8566
Exchange rate does not Granger Cause Sensex	1194	11.5366	1.E-05
Sensex does not Granger Cause Exchange rate		42.2382	2.E-18
Exchange rate does not Granger Cause Nifty50	1175	10.5191	3.E-05
Nifty50 does not Granger Cause Exchange rate		45.1922	1.E-19

From the above analysis we can say that, the F- statistic values of the variables is **higher than 3.84** which means that the null hypothesis should be rejected and alternate hypothesis has to be accepted. Therefore, **Exchange rate granger cause Nifty50 and Sensex.**

9.FINDINGS:

All the above analysis and interpretation concludes that, there exists a moderate correlation between Sensex, Nifty50 and Exchange rates. All those residuals are not normally distributed in which the data is stationary without the existence of unit root. The Granger Causality test says that exchange rate granger cause Nifty50 and Sensex.

10.SUGGESTIONS:

From the study it is suggested that, Exchange rate granger causes Sensex and Nifty50. So, investors need to analyze the Forex rate movements before taking investment decisions.

11.CONCLUSION:

This study is based on finding the impact of exchange rate movements on the Indian stock market indices i.e., Nifty50, Sensex. The first step started in finding out the normality of the data, and the application of Jarque – Bera test was used. Then, the coefficient of correlation was observed between these variables and it resulted that there is moderate correlation. The next step is that the stationarity of the data series were tested using the ADF test (Augmented Dickey fuller) and it resulted that there is Stationarity in the data series.

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