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The Effect and Volatility of Exchange Rates on BSE Sectoral Indices

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ABSTRACT

Indian economy has the emerging market which offers immense opportunity to increase the development of the country and the economy reforms. The significant growth and development of the Indian economy are driven by some of the factors such as investment decision, infrastructure facilities and proactive government regimes. Indian Stock market offers a significant contribution to investment destination by the movement of prices and also the volatility of exchange rate of the various countries currency. The rate at which one money is converted into another is an exchange rate. Exchange rate volatility is associated with unexpected movement in the exchange rate. The present study helps to analyze the volatility of Exchange rate on BSE (Bombay Stock Exchange) Sectoral Indices through the data collected from the period of January 2014 to December 2018. Using SPSS Software,Descriptive Statistics, Regression, Correlation, Johnson Cointegration test and GRACH model have helped to ascertain the volatility of Exchange rate that determined the movement of prices in the Bombay Stock Exchange Sectoral Indices which provides the relevant information to the Institutional investors and other investors to take investment decision and also helped to frame policies by the government.

1. Introduction

All economic activities of an economy which take place in foreign currency fall in the external sector such as export, import, foreign investment, external debt, current account, capital account, balance of payments etc. Indian currency, 'the rupee' was historically linked with the British Pound Sterling till 1948 which was as far back as 1928. Once the IMF came up, India shifted to the fixed currency system committed to maintain rupee's external value (i.e., exchange rate) in terms of gold or the US ($ Dollar). In September 1975, India delinked rupee from the British Pound and the RBI started determining rupees exchange rate movements of the basket of world currencies ($,DM, Fr, £, ¥.). This was as an arrangement between the fixed and the floating currency regimes. In 1992-1993 financial years, India moved to the floating currency regime with its own method which is known as the 'dual exchange rate'. There are two exchange rates for rupee, one is the official rate and the other is market rate. Indian currency has seen frequent exchange rate volatility in recent times which influences the Sectoral Indices of Stock Exchange. There are major two stock exchanges that are trading in the Indian Stock market. They are Bombay Stock Exchange and National Stock Exchange.Bombay Stock Exchange is the oldest exchange in Asia which is now popularly known as the BSE. Indices are the important part of stock market and thereof investments. An index makes it easy for an investor to compare the price trends of the index and the stock. BSE SENSEX and NSE Nifty are the bench stock market index for equity market. The market sector indices summarize the performance of stock grouped by specific market sectors. The major sectoral indices of the Bombay Stock Exchange are S&P BSE TECK, S&P BSE Information Technology, S&P BSE CONSUMER DURABLES, S&P BSE Fast Moving Consumer Goods, S&P BSE POWER, S&P BSE India Infrastructure Index, S&P BSE OIL & GAS, S&P BSE AUTO, S&P BSE PSU, S&P BSE Healthcare, S&P BSE CAPITAL GOODS, S&P BSE BANKEX, S&P BSE METAL, and S&P BSE REALTY. Exchange rate Volatility refers to the tendency of foreign currencies to appreciate or depreciate in value. The volatility is the measurement of the amount that these rates change and the frequency of those changes. Economic fundamentals such as the inflation rates, interest rate and the balance of payments are source of exchange rate. The present study "The Effect and volatility of exchange rate on BSE Sectoral Indices" selected five indices such as BSE AUTO, BSE CG, BSE GREENEX, BSE BANK, BSE SENSEX and BSE OIL GAS to determine price movement of stocks in those selected sectoral indices through of changes in volatility of the Exchange rate.

2. Review of Literature

This work 'The Effect and volatility of exchange rate on BSE Sectoral Indices' reveals the movements of exchange rate and fluctuation which affects the various sectoral Indices and its relationship between them with special references to Indian Stock Market.

Smita Mahapatra, Saumitra N. Bhaduri (2018), 'Dynamics of the impact of currency fluctuations on stock markets in India: Assessing the pricing of exchange rate risks' The study conducted data collected during the period from 2005 to 2016 by estimating a two factor arbitrage pricing model. It found that stock returns react significantly to foreign exchange rate fluctuations in the post-crisis period. The study explored that last four years of the sample 2012 to 2016, the

exchange rate risk factor is becoming a prominent determinant of stock returns, indicating that Indian investors are increasingly expecting a risk premium on their investment for their added exposure to exchange rate risk. It alsofurther corroborated by the study by highlighting the fact that higher the foreign exchange exposure of industry, measured by trade balance (net inflows), higher is their sensitivity to exchange rate risk.

Dr.S.Baranidharan, N.Dhivya (2018)made a study entitled as "Causal Relationship and Volatility of BSE Index with special references to Indian Stock Market". They found that there would be a bidirectional relationship exists between the BSE SENSEX, BSE AUTOEX, BSE CORBANEX and BSE GREENEX. It also explored that the integration and price movements of BSE Indices has been examined through the tools such as Johansen Co-integration and Granger Causality test for the period of 2010-2018. Through Unrestricted Co-integration test, the study observed that there is a long run relationship and also the price movement of BSE affects the other Indices.

Piyali Roy Chowdhury, Anuradha.A (2018), entitled as "Impact of Exchange Rate fluctuation on stock market volatility - A study to predict the economic scenario in India"collected data from the period of 2010 to 2016. The study suggested the Indian Stock Investors to invest inIndian stock market for long run to get higher return and to avoid the short term fluctuation in thestock market.

Mallikarjun.M, Sivakiran Guptha.K, Prabhakar Rao.R (2017), entitled as "Modeling Sectoral Volatility of Indian Stock Markets" studied through the data collected from the period 2010 to 2016 by using the GRACH model in the Various Sectoral Indices of the National Stock Exchange. The study found that there was relatively low volatility in IT Sector and it occured due to stable demand for Indian IT services in the global market and the depreciation of rupee was favourable to IT sector. The study found that all the segments except Nifty FMCG and Nifty Pharma were asymmetries in Volatility. It also explored that except Nifty IT, Nifty Pharma and Nifty PSU Bank sectors, all the indices had significant leverage effect.

Aruna Polisetty, Dr. D.Prasanna Kumar, Mrs.Jikku Susan Kurian (2016), under the title "Influence of Exchange Rate on BSE Sensex & NSE Nifty" through the data collected from the period April 2005 to March 2014 found that There was no significant cause and effect relationship between the two variables such as BSE SENSEX and NSE Nifty. It also revealed that the contact occurred between the variables during different periods was because of the chance factor and not because of cause factor and results provided the evidence for the presence goods market or portfolio approach. The study examined that Indian stocks were profoundly sentiment driven and stocks of individual companies may change for no reason and also some of the few qualitative factors that influence stock prices like speculation and investor confidence level.

3. Hypothesis

Null Hypothesis (H0): There is no significant relationship between the Volatility of Exchange rates and BSE Sectoral Indices.

Alternate Hypothesis (H1): There is significant relationship between the Volatility of Exchange rates and BSE Sectoral Indices.

4. Research Methodology

4.1 Statement of the problem

Foreign Exchange rate becomes huge profit earning method which influences not only government but also all companies, traders as well as individual investors in an economic. The volatility and unpredictability of the exchange rate increases uncertainty which discourages long term investment in capital stock in favour of short run speculative activities.

The present study is used to remove the misconception of exchange rates and its volatility on Various BSE Sectoral Indices with particular references to Indian Stock market which provides the guidelines to the various institutional investors to take investment decision making.

4.2 Objectives of the study

1. To ascertain the influences of exchange rate on Various BSE Sectoral Indices such as BSE CG, BSE AUTO, BSE BANK, BSE GREENEX, BSE OIL GAS, BSE SENSEX.
2. To ascertain the volatility of exchange rate and its fluctuations that help the investors to take investment decision making regarding BSE Sectoral Indices.
3. To analyze the movement of prices on Exchange rates and various BSE Sectoral Indices with special references to Indian Stock market.

4.3 Scope of the study

The study reveals the linkage between the Exchange rate and Bombay Stock Exchange Sectoral indices such as BSE CG, BSE AUTO, BSE BANK, BSE GREENEX, BSE OIL GAS, and BSE SENSEX using SPSS from January 2014 to December 2018. The study portrays about that casual relationship between the BSE Sectoral Index and how the volatility of Exchange influences the investors to make a better investment strategy for long term investment decision making.

4.4 Sources of Collection

The study has been made by using Secondary Data obtained from www.bseindia.com

4.5 Study Period

The study 'The Effect and volatility of Exchange rates on BSE sectoral Indices' has been made through the data collected from the period January 2014 to December 2018.

4.6 Sample Selection

The sample selection of the study 'The Effect and volatility of Exchange rates on BSE sectoral Indices' will include the following samples:

1. BSE CAPITAL GOODS,
2. BSE AUTO,
3. BSE BANK,

4. BSE GREENEX,
5. BSE OIL GAS,
6. BSE SENSEX
7. EXR

4.7 Tools used for Study

The tools used to test the study on "The Effect and volatility of Exchange rates on BSE sectoral Indices" are:

1) Descriptive Statistics
2) Unrestricted Cointegration Rank Test (Trace)
3) Regression
4) Correlation
5) GRACH Model

4.7.1 Descriptive Statistics

Descriptive statistics is brief explanatory coefficients that summarize a given data set, which can be either a representation of the entire or a sample of a population. Descriptive statistics is broken down into measures of central tendency and measures of variability (spread). Measures of central tendency include the mean, median, and mode, while measures of variability include the standard deviation, variance, the minimum and maximum variables, and the kurtosis and skewness.

Mean:

The arithmetic mean is the average of the numbers: a calculated "central" value of a set of numbers.

To calculate it:

- Add up all the numbers,
- Then divide by how many numbers are there.

$$\overline{X} = \frac{\Sigma X}{n}$$

Where:

$\bar{X}$ = The mean

$\sum$ = Symbol of summation

X = Value of the item X, I = 1, 2… n

n = Total No. of items

4.7.2 Johnson Cointegration Test

In statistics, the Johansen test, named after Johansen, is a procedure for testing Cointegration of several, say *k*, time series.There are two types of Johansen test, either with trace or with Eigen, and the inferences might be a little bit different. The null hypothesis for the trace test is that the number of cointegration vectors is $r=r^*<k$, vs. the alternative that $r=k$. Testing proceeds sequentially for $r^*=1, 2$,etc. And the first non-rejection of the null is taken as an estimate of *r*. The null hypothesis for the "maximum Eigen value" test is as for the trace test but the alternative is $r=r^*+1$ and, again, testing proceeds sequentially for $r^*=1,2$,etc., with the first non-rejection used as an estimator for *r*.

4.7.3 Regression

Regression is a statistical measurement used in finance, investing and other disciplines that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables).

The general form of each type of regression is:

1) Linear regression: $Y = a + bX + u$
2) Multiple regression: $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + ... + b_tX_t + u$

Where:

1. Y = the variable that you are trying to predict (dependent variable).
2. X = the variable that you are using to predict Y (independent variable).
3. a = the intercept.
4. b = the slope.
5. u = the regression residual.

4.7.4 Correlation

Correlation, in the finance and investment industries, is a statistic that measures the degree to which two securities move about each other. Relationships are used in advanced portfolio management, computed as the correlation coefficient, which has a value that must fall between -1.0 and +1.0.

4.7.5 GRACH model

A GARCH (Generalized Autoregressive Conditionally Heteroscedastic) model uses values of the past squared observations and past variances to model the difference at time t.

1. It is not uncommon that *p* needs to be very big in order to capture all the serial correlation in r^2_t.
2. The generalized ARCH or GARCH model is a parsimonious alternative to an ARCH (p) model. It is given by

$\sigma^2_t = \omega + \alpha r^2_{t-1} + \beta\sigma^2_{t-1}$ where the ARCH term is r^2_{t-1} and the GARCH term is σ^2_{t-1}.

3. In general, a GARCH (p, q) model includes p ARCH terms and q GARCH terms

4.8 Data Analysis and Interpretation

4.8.1 Descriptive Statistics:

Table 1: Analysis of descriptive statistics for volatility of Exchange rates on major BSE sectoral indices

	BSE_AUTO	BSE_BANK	BSE_CG	BSE_GREENEX	BSE_OIL_GAS	BSE_SENSEX	EXR
Mean	0.0005	0.0008	0.0006	0.0004	0.0004	0.0005	0.0000
Median	0.0010	0.0005	0.0004	0.0007	0.0005	0.0006	-0.0004
Maximum	0.0427	0.0535	0.0878	0.0372	0.0526	0.0338	0.0277
Minimum	-0.0719	-0.0699	-0.0709	-0.0592	-0.1268	-0.0594	-0.0113
Std. Dev.	0.0112	0.0121	0.0131	0.0088	0.0126	0.0084	0.0039
Skewness	-0.3232	0.0622	0.3462	-0.3882	-1.2239	-0.4374	2.8778
Kurtosis	5.6149	5.1839	7.4076	5.2562	14.1536	5.7982	22.6599

Jarque-Bera	372.4563	245.6206	1021.8330	292.2660	6693.5300	441.2294	21541.3200
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	0.6071	0.9378	0.7110	0.5087	0.5456	0.5775	0.0291
Sum Sq. Dev.	0.1555	0.1792	0.2108	0.0943	0.1969	0.0861	0.0192
Observations	1232	1232	1232	1232	1232	1232	1232

Source: The data of the analysis computed in SPSS 20

Interpretation:

Table 1 shows that the Descriptive Statistics has been used to analyze the properties of data through mean, median, Standard Deviation, Skewness, Kurtosis and Jarque-Bera test for each dependent and independent variable. From the above it is noted that BSE BANKEX has the highest mean value of 0.0008 when compared to the all other indices such as BSE AUTO(0.0005), BSE CG (0.0006), BSE GREENEX (0.0004), BSE OIL GAS (0.0004), BSE SENSEX(0.0005) and EXR has the no mean value. Concerning with the sectoral indices such as BSE AUTO (0.0112), BSE BANK (0.0121), BSE CG (0.0131), BSE GREENEX (0.0088), BSE OIL GAS (0.0126) and BSE SENSEX (0.0084), EXR i.e. Exchange Rate has the lowest standard deviation of 0.0039. The normal distribution of the BSE sectoral indices and volatility of Exchange rate have been tested using the Kurtosis and Skewness. In kurtosis, BSE AUTO (5.6149), BSE BANK (5.1839), BSE CG (7.4076), BSE GREENEX (5.2562), BSE SENSEX (5.7982), BSE OIL-GAS (14.1536) and EXR (22.6599) where the distributions are greater than 3 indicates that the distributions are Leptokurtic for all the selected indices and the Exchange rate. BSE BANK (0.0622), BSE CG (0.3462) and EXR (2.8778) are positively skewed towards right whereas BSE AUTO (-0.3232), BSE GREENEX (-0.3882), BSE SENSEX (-0.4374) and BSE OIL-GAS (-1.2239) are negatively skewed towards the left. The Jarque-Bera Test, a type of Lagrange multiplier test, is a test for normality. A normal distribution has a skew of zero (i.e. it's perfectly symmetrical around the mean) and a kurtosis of three. In this table the probability of Jarque Bera values of the selected Indices is BSE AUTO (372.4563). BSE BANK (245.6206), BSE CG (1021.8330), BSE GREENEX (292.2660), BSE SENSEX (441.2294), BSE OIL-GAS (6693.5300) and EXR (21541.3200) indicate that distributions are not normal.

4.8.2Johansen Co integration Rank Test:

Table 2: Analysis of Johansen Cointegration Rank Test for Exchange rates and major BSE sectoral indices.

Trend assumption: Linear deterministic trend				
Series: BSE_AUTO BSE_BANK BSE_CG BSE_GREENEX BSE_OLI_GAS BSE_SENSEX EXR				
Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.213528	1642.842	159.5297	1
At most 1 *	0.196617	1348.12	125.6154	1
At most 2 *	0.185873	1079.5	95.75366	0.0001
At most 3 *	0.174602	827.1801	69.81889	0.0001
At most 4 *	0.161523	591.731	47.85613	0.0001
At most 5 *	0.154791	375.5722	29.79707	0.0001
At most 6	0.000155	0.19079	3.841466	0.6623
Trace test indicates 7 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.213528	294.7224	52.36261	0.0001
At most 1 *	0.196617	268.6199	46.23142	0
At most 2 *	0.185873	252.3195	40.07757	0.0001
At most 3 *	0.174602	235.4491	33.87687	0.0001
At most 4 *	0.161523	216.1589	27.58434	0.0001
At most 5 *	0.154791	206.347	21.13162	0.0001
At most 6	0.000155	0.19079	3.841466	0.6623
Max-eigenvalue test indicates 7 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: The data of the analysis computed in SPSS 20

Interpretation:

The unrestricted Johnson Co-integration test are report the results in Table 2. It consists of two basics types of test statistics. The first block reports are called trace statistics (λ trace) and the second block reports the maximum Eigen value (λ max). Both the trace statistic and maximum Eigen value statistics indicating that trace statistics are BSE AUTO (1642.842), BSE BANK (1348.12), BSE CG (1079.5), BSE GREENEX (827.1801), BSE OIL GAS (591.731), BSE SENSEX (375.5722) and EXR (0.19079) and the maximum Eigen value are BSE AUTOEX (294.7224), BSE BANKEX (268.6199), BSE CG (252.3195), BSE GREENEX (235.4491), BSE OIL GAS (216.1589), BSE SENSEX (206.347) and EXR (0.19079) co integrated at the 0.05 level. Hence it concluded that there will be a long run relationship between Exchange rates and BSE Sectoral indices such as BSE AUTOEX, BSE BANKEX, BSE CG, BSE OIL GAS, BSE GREENEX and BSE SENSEX and also the price movement of the Exchange rate causes the Indian Stock Market Returns which increases the investing power of both individual and institutional investors.

4.8.3 Correlation

Table3: Analysis of Correlation for Exchange rates and major BSE sectoral indices.

	BSE_AUTO	**BSE_BANK**	**BSE_CG**	**BSE_GREENEX**	**BSE_OIL_GAS**	**BSE_SENSEX**	**EXR**
BSE_AUTO	1						
BSE_BANK	0.687244	1					
BSE_CG	0.65653	0.706343	1				
BSE_GREENEX	0.850779	0.787944	0.745362	1			
BSE_OIL_GAS	0.575027	0.57819	0.572293	0.635764	1		
BSE_SENSEX	0.80206	0.851172	0.752317	0.938938	0.682797	1	
EXR	-0.024813	-0.009149	-0.026175	-0.030734	-0.057298	-0.018412	1

Source: The data of the analysis computed in SPSS 20

Interpretations:

Table 3 indicates that the relationship exists between the Exchange rate and The BSE Sectoral Indices. There is a highly insignificant negative relationship between the Exchange rate with the Sectoral indices of Bombay Stock Exchange such as BSE AUTO (-0.024813), BSE BANK (-0.009149), BSE CG (-0.026175), BSE GREENEX (-0.030734), BSE OIL GAS (-0.057298) and BSE SENSEX (-0.018412). The negative relationship indicates that there will be an inverse relationship exists between the Exchange rate and the BSE AUTO, BSE BANK, BSE GREEN, BSE CG, BSE OIL GAS and BSE SENSEX. Hence it portrays that the volatility of Exchange rate negatively affect the price movement of stocks in Sectoral indices of the Bombay Stock Exchange.

4.8.4 Regression

Table4: Analysis of the impact of BSE OIL GAS with the volatility of Exchange Rate (EXR).

Dependent Variable: BSE_OIL_GAS				
Method: Least Squares				
Date: 03/12/19 Time: 22:07				
Sample: 1/02/2014 12/31/2018				
Included observations: 1232				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000447	0.00036	1.242539	0.2143
EXR	-0.183533	0.091183	-2.012812	0.0444
R-squared	0.003283	Mean dependent var		0.000443
Adjusted R-squared	0.002473	S.D. dependent var		0.012648
S.E. of regression	0.012633	Akaike info criterion		-5.90341
Sum squared resid	0.196294	Schwarz criterion		-5.89511
Log likelihood	3638.503	Hannan-Quinn criter.		-5.90029
F-statistic	4.051413	Durbin-Watson stat		1.880259
Prob(F-statistic)	0.044352			

Source: The data of the analysis computed in SPSS 20

Interpretations

This table indicates the impact of Exchange rate on the BSE OIL GAS. This table provides the R and R^2 values. The R value represents the simple correlation between the dependent variable BSE OIL GAS and the predictors such as EXR is 0.003283 (the "R" Column), which indicates a high degree of correlation. The R2 value (the "R Square" column) indicates how much of the total variation in the dependent variable, can be explained by the independent variable. The absolute difference between the BSE Sensex and the other variable is 0.002473. The volatility of Exchange rate has been negatively impacting on the dependent variable BSE OIL GAS (-0.183533). This indicates that the fluctuations in Exchange rate have negatively affected price movement of the BSE OIL GAS.

Durbin – Watson test is a test statistics which is used to test the autocorrelation in residuals from regression analysis.

The Durbin Watson test reports a test statistic, with a value from 0 to 4, where:

1) 2 are no autocorrelation.
2) 0 to <2 is positive autocorrelation (common in time series data).
3) >2 to 4 is negative autocorrelation (less common in time series data).

In this study the value of Durbin Watson test is 1.880259 which portrays that positive auto correlation between the BSE OIL GAS and predictor variable EXR.

F and Sig. – This is the F-statistic the p-value associated with it. The F-statistic is the Mean Square (Regression) divided by the Mean Square (Residual): 4.051413. In this study the value of F statistic is 4.051413 which are significant at the 0.044352; through this we conclude that there will be an impact of Bombay Stock Exchange OIL GAS with the EXR and also there will be a variation between them.

The table concluded that if there are any changes in the volatility of the Exchange rates, it will inversely affect the price movements of the stocks in various BSE Sectoral Indices.

4.8.5 GRACH MODEL

Table 5: Analysis of GRACH MODEL for EXR

Dependent Variable: EXR				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	-9.10E-05	0.00012	-0.75609	0.4496
EXR(-1)	-0.00833	0.020709	-0.40203	0.6877
	Variance Equation			
C	3.76E-07	2.14E-08	17.55024	0
RESID(-1)^2	-0.01597	0.000598	-26.723	0
GARCH(-1)	0.991733	0.001031	961.9173	0

Source: The data of the analysis computed in SPSS 20

Interpretation:

Table 5 indicates that GRACH model to measure the volatility risk concerning the investment decision. The above table explains the value of alpha coefficient is -0.01597 and the Beta coefficient is 0.991733 and the sum of the alpha coefficient and beta coefficient is 0.975763. It indicates the value is near to the value 1. It clearly defines that there is a high volatility inside BSE Sectoral Indices based on the Exchange rate and also significantly instability. Hence, the investors can invest in the BSE Sectoral indices such as BSE AUTO, BSE CG, BSE GREENEX, BSE BANK, BSE SENSEX and BSE OIL GAS.

5. Findings

Through this study, the following results are found:

1) Descriptive statistics shows thatBSE BANKEX has the highest mean value of 0.0008 when compared to the all other indices such as BSE AUTO (0.0005), BSE CG (0.0006), BSE GREENEX (0.0004), BSE OIL GAS (0.0004), BSE SENSEX (0.0005) and EXR has the no mean value. Jarque Bera test indicates that distributions are not normal.
2) The Unrestricted Johnson Cointegration test indicates that there will be a long run relationship between Exchange rates and BSE Sectoral indices such as BSE AUTOEX, BSE BANKEX, BSE CG, BSE OIL GAS, BSE GREENEX and BSE SENSEX.
3) It also found that there will be an inverse relationship exists between the Exchange rate and the BSE AUTO, BSE BANK, BSE GREEN, BSE CG, BSE OIL GAS and BSE SENSEX.
4) Durbin Watson test of the Regression is 1.880259 which portrays that positive auto correlation between the BSE OIL GAS and predictor variable EXR.
5) GRACH model indicates that the sum of alpha coefficient and Beta coefficient value of the Exchange rate suggests that the value is near to the one and clearly defines that there is a high volatility of the EXR in all the selected indices and also significantly instability so the investors can invest in the required indices.

6. Conclusion

The present paper titled as "The Effect and volatility of Exchange rate on BSE Sectoral Indices" hasexplored that the integration and volatility of Exchange rate that affect the BSE sectoral indices has been examined through the tools such as Unrestricted Johansen Co-integration and GRACH model for the period January 2014- December 2018. It shows that the Unrestricted Co-integration test has expressed that long run relationship and price movement in Exchange rate which affects the Indian Stock Market Bombay Stock Exchange Indices. GRACH model indicates that there is a high volatility inside BSE Sectoral Indices based on the Exchange rate and also significantly volatility. The study also reveals that if there is any fluctuation in the Exchange rate, it inversely affect the Stock prices in the Bombay Stock Exchange sectoral indices such as BSE AUTO, BSE CG, BSE GREENEX, BSE BANK, BSE SENSEX, BSE OIL GAS. This is helpful for the Institutional investors and traders to take investment decision and also volatility with reference to Exchange rate and Indian Stock Market. It helps to fix the price for securities and invest in stocks and also assistsregulatory authority and policymakers to frame policies.

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