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AN EMPIRICAL STUDY ON IMPACT OF EXCHANGE RATES ON INDIAN STOCK MARKET

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Abstract

For any investor in the stock market supposed to consider lot of internal and external factors before he invest into stock market. Based on that, one of the external factors the currency exchange rates how it is influence the stock market is the main aim of this study. Four review of literatures done and identified the research gap. The study covers five variables i.e. Sensex, UDS, EURO, GBP and YEN for a period of 19 years i.e., from January 2000 to March 2019 daily prices collected. The main objectives for the study are to check the interdependency and correlations of stock market and currency exchange rates. Descriptive statistics finds that selected data and errors are not normally distributed. Augmented Dickey Fuller test statistics results indicates that, all the selected variables will be stationary at first difference, hence considered log returns for the same. The multiple regression analysis resulted that, here is no significant impact of selected currencies exchange rates to Indian stock exchange. To run Granger Causality test identified 8 lag structure required and resulted that there is no unidirectional causality influence between the variables, but bidirectional causality between USD and Sensex except the currency exchange of INR/USD no other currency influence the Stock market. However, remaining all selected four currency does cause each other, i.e. bidirectional. The correction coefficient test resulted that, there is no correlation or negligible correlation between Indian stock market and selected four currency exchange rates. However, there are positive correlations among the four currencies.

Keywords: *USD, EURO, Multiple regressions, Correlation and Granger causality.*

1. INTRODUCTION

Exchange rate between the countries will have lot of internal and external factors, very important question for an investor is, the exchange rates between the two countries really affects the stock exchange of the county? Or is there any interdependency between the exchange rates and stock market? Which will help an investor to take decision based on the same before he invest into stock market. As we know that, imports and exports between the countries play a vital role for countries to minimize the disequilibrium. In the case of BOP disequilibrium and in the case of deficit country can sustain without changing its exchange rates or restoring to control on its imports as long as, its stock of international liquidity holds out. In case of surplus the country will accumulate international liquidity and will continue to do as long as the surplus persists.

1.1. Scope of The Study

This study is confined to test the interdependency of selected four currency exchange rates to Indian stock market and data for the same has considered 19 years. The scope is restricted to only selected one stock exchange and four exchange rates confined to Indian context.

2. LITERATURE REVIEW

Najaf et al (2016)[1], the research tile "A study of exchange rates movement and stock market volatility", in their study they used two sample units i.e. INR/USD exchange rate and Nifty index values as two variables from 2008 to 2010, they used Granger causality test in their research work to meet the objectives. They found that, there is unidirectional relationship between exchange rate and Nifty returns. The research gap for the study is they only focused two variables and considered two years data which is very less time period.[1]

Suriani et al (2015)[3], in their research publication title on "Impact of Exchange Rate on Stock Market", kept the objective to investigate the relationship between the stock market and exchange market of Pakistan. Used descriptive study and considered KSE as dependent variable and exchange rate as independent variables. The data collected from 2004 to 2009. The major findings of their study indicate that, there is no relationship exists between exchange rate and stock price and both the variables are independent of each other. The research gap

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this study are; nation, data collected only for six years and only two variables considered i.e. exchange rate & stock exchange prices.[3]

Patel et al, (2013)[2] in their study title of "The Impact of Exchange Rate on Indian Stock Exchanges like BSE & NSE", they framed objectives were to analyze dependency and correlation of stock market on exchange rates and used descriptive study. The study was on secondary data. Daily closing price of exchange rates of BSE Sensex, NSE Nifty and exchange rate from 2005 to 2012 they have considered. From the data analysis they found that, correlation was negligible relation between Exchange Rate and Nifty and negligible relation between Exchange rate and Sensex. The Research gap for this paper is only one exchange rate and only seven year data has taken for the study and main objective they have kept on correlations.[2]

3. RESEARCH METHODOLOGY

- **Type of Research:** The study used here is descriptive research study as it seeks to identify the kind of relationship existing between selected dependent and independent variables. The variables are in quantitative in nature.
- **Method of sampling:** Sampling technique followed is Convenience Sampling. Sample units chosen are one Indian Stock Market i.e. Sensex and 4 major Currency exchange rates.
- **Sample Size:** The study covers five variables one stock market and four exchange rates i.e. (Sensex, Exchange rate of Dollar, Euro, Pound and Yen) for a period of 19 years i.e., from January 2000 to March 2019 daily prices collected.
- **Research Technique:** Different research techniques used for the study are; Descriptive Statistics, Jarque-Bera test, Unit Root Test, Multiple-Regression Analysis, Granger Causality Test and Correlations

3.1. Objectives

- To check the interdependency of stock market and currency exchange rates.
- To identify whether there is relationship between currency exchange rates volatility and stock market performance.

4. RESULTS, ANALYSIS AND DISCUSSION

H_0: The errors are normally distributed.

Table 1: Descriptive Statistics

	INR/ EURO	INR/GBP	SENSEX	INR/USD	INR/YEN
Mean	62.15174	81.69726	14754.36	51.34655	0.490979
Median	62.29000	81.26000	15669.12	47.42000	0.501500
Maximum	91.46820	106.0281	34352.79	69.05300	0.721200
Minimum	38.79230	63.96080	2600.120	39.27000	0.326900
Std. Dev.	11.94720	9.767589	8799.166	8.579127	0.101103
Skewness	-0.088476	0.459503	0.241439	0.733313	0.284833
Kurtosis	2.173579	2.482915	1.929431	2.050863	1.763660
Jarque-Bera	133.6007	207.9807	257.9844	570.8237	346.5987
Probability	<0.05*	<0.05*	<0.05*	<0.05*	<0.05*
Observations	4489	4489	4489	4489	4489

Sources: Computed by authors, and values are expressed in nominal terms

** Reject the null hypothesis.*

Table 1 identifies that, all the variables except INR/EURO are positively skewed and Euro is negatively skewed. GBP and USD moderately skewed and Euro, Sensex and Yen are approximately symmetric. Since all the selected variables Kurtosis value is below 3 hence it is Platykurtic. Based on the Jarque Bera Test along with probability value which is less than 0.05 as a significance value it fails to accept the null hypothesis, hence the selected data are not normally distributed.

UNIT ROOT TEST

H_0 = Data has Unit Root (Non-Stationary).

Table 2: ADF Test Results for all selected variables at Level and First Difference

		At Level			At First Difference		
Sl. No	**Variables**	**ADF T-Statistic**	**P-Value**	**Hypothesis**	**ADF T-Statistic**	**P-Value**	**Hypothesis**
1	EURO	2.846765	0.1805	Accept Ho	27.003	< 0.05	Reject Ho
2	GBP	2.836399	0.1841	Accept Ho	20.69	< 0.05	Reject Ho
3	Sensex	2.836323	0.1841	Accept Ho	64.1	< 0.05	Reject Ho
4	USD	2.208532	0.4841	Accept Ho	64.1	< 0.05	Reject Ho
5	YEN	2.587725	0.286	Accept Ho	64.1	< 0.05	Reject Ho

Sources: Computed by authors, and values are expressed in nominal terms

Augmented Dickey Fuller test statistics results indicates that, all the selected stock exchanges and four exchange rates will be stationary at first difference and critical values are less than ADF test statistics at 5% level of significance. Therefore, it accepts the null hypothesis at level and reject null hypothesis at first difference. The Figure 1 shows that, at level the selected prices are non-stationary and with log return the data set is changing to stationary.

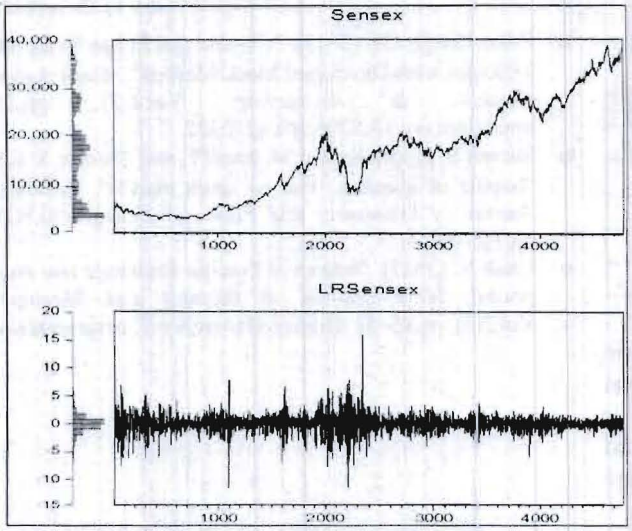

Figure 1: Indices value at Level and at Log Return

MULTIPLE REGRESSION ANALYSIS:

$\mathbf{H_0}$ = There is no significant impact of selected exchange rates to Indian stock exchange.

Table 3: Multiple Regression Analysis of Indian Stock Market and Exchange Rates

Dependent Variable: LRSENSEX				
Method: Least Squares				
Date: 05/07/19 Time: 18:09				
Sample (adjusted): 2 4489				
Included observations: 4488 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.041313	0.022133	1.866608	0.0620
LREURO	-0.002753	0.002970	-0.927235	0.3539
LRGBP	0.003527	0.003809	0.926144	0.3544
LRUSD	0.001250	0.003376	0.370340	0.7111
LRYEN	0.001776	0.002569	0.691408	0.4893
R-squared	0.000430	Mean dependent var		0.041330
Adjusted R-squared	-0.000461	S.D. dependent var		1.482392
S.E. of regression	1.482734	Akaike info criterion		3.626766
Sum squared resid	9855.878	Schwarz criterion		3.633906
Log likelihood	-8133.463	Hannan-Quinn criter.		3.629282
F-statistic	0.482576	Durbin-Watson stat		1.856083
Prob(F-statistic)	0.748573			

Sources: Computed by author, and values are expressed in nominal terms

The table 3 shown above reveals that, considering BSE Sensex as dependent variables and remaining four exchanges rates are independent variables. Based on the result the coefficient is positive and Durbin Watson stat value is greater than r square and which is also indicate the model is fit. The multiple regression analysis of t-statistics value with p-values are not significant hence it accepts the null hypothesis therefore there is no significant impact of selected currencies exchange rates to Indian stock exchange.

GRANGER CAUSALITY TEST:

Table 4: Selection of VAR Lag Order

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + c_1 + v_1(t)$$

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + \sum_{j=1}^{\infty} \beta_j x(t-j) + c_2 + v_2(t)$$

VAR Lag Order Selection Criteria						
Endogenous variables: EURO GBP SENSEX USD YEN						
Exogenous variables: C						
Sample: 1 4791						
Included observations: 4481						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-85593.20	NA	2.69e-10	38.20496	38.21211	38.20748
1	-62579.38	45966.01	941277.6	27.94438	27.98728	27.95950
2	-62111.15	934.1610	772329.9	27.74655	27.82520	27.77427
3	-61676.25	866.6938	643203.9	27.56360	27.67800	27.60392
4	-61148.00	1051.559	513805.4	27.33898	27.48913	27.39190
5	-60304.65	1676.909	356592.1	26.97373	27.15963	27.03925
6	-59766.87	1068.121	283645.2	26.74486	26.96651	26.82298
7	-59087.01	1348.783	211758.1	26.45258	26.70997	26.54330
8	-58591.83	981.3064*	171672.5*	26.24273*	26.53587*	26.34604*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

The table 4 which resulted to be considered the number of lags to take for Cause and effect test to run and the all LR, FPE, AIC, SC and HQ methods suggest considering 8 lag structure. Based on the lag structure further test of pairwise Granger Causality test followed in the table 5.

Table 5: Summary Result of Granger Causality Test

Pairwise Granger Causality Tests				
Sample: 1 4791				
Lags: 8				
Null Hypothesis:	Obs	F-Statistic	Prob.	Hypothesis
GBP does not Granger Cause EURO	4481	185.216	4E-271	Reject Null
EURO does not Granger Cause GBP		180.040	2E-264	Reject Null
SENSEX does not Granger Cause EURO	4481	1.86034	0.0618	Accept Null
EURO does not Granger Cause SENSEX		1.31714	0.2297	Accept Null
USD does not Granger Cause EURO	4481	251.961	0.0000	Reject Null
EURO does not Granger Cause USD		184.042	1E-269	Reject Null
YEN does not Granger Cause EURO	4481	170.748	4E-252	Reject Null
EURO does not Granger Cause YEN		81.2499	7E-126	Reject Null
SENSEX does not Granger Cause GBP	4481	1.40511	0.1888	Accept Null
GBP does not Granger Cause SENSEX		0.81375	0.5903	Accept Null
USD does not Granger Cause GBP	4481	93.5471	3E-144	Reject Null
GBP does not Granger Cause USD		156.058	2E-232	Reject Null
YEN does not Granger Cause GBP	4481	172.089	7E-254	Reject Null
GBP does not Granger Cause YEN		33.6621	6.E-52	Reject Null
USD does not Granger Cause SENSEX	4481	2.35339	0.0160	Reject Null
SENSEX does not Granger Cause USD		3.02752	0.0021	Reject Null
YEN does not Granger Cause SENSEX	4481	1.38014	0.1997	Accept Null
SENSEX does not Granger Cause YEN		1.50396	0.1502	Accept Null
YEN does not Granger Cause USD	4481	323.223	0.0000	Reject Null
USD does not Granger Cause YEN		50.5776	8.E-79	Reject Null

The Granger Causality test explains any pair of variables there is possibility of unidirectional or bidirectional causality on none. Finally, the result of pairwise Granger Causality test reported in table 5 there is no unidirectional causality influence between the variables, but bidirectional causality between USD and Sensex except the currency exchange of INR/USD no other currency influence the Stock market. However, remaining all selected four currency does cause each other i.e. bidirectional.

Table 6: Summary of Correlation among Selected Variables

	LRSENSEX	LREURO	LRGBP	LRUSD	LRYEN
LRSENSEX	1				
LREURO	0.0069	1			
LRGBP	0.0128	0.7646	1		
LRUSD	0.0140	0.7298	0.6059	1	
LRYEN	0.0116	0.6582	0.3228	0.6854	1

Sources. Computed by authors, and values are expressed in nominal terms

As per the objective of this paper to find the correction between currency exchange rates and stock market the result in the table 6 reveals that there is no correlation or negligible correlation between Indian stock market and selected four currency exchange rates. However there are positive correlations among the four currencies.

5. CONCLUSION

This study is made the attempt to investigate the natural association between the stock market and currency exchange rates intern this will help for the investor to take decisions while their investment in stock market. In the process of investigation identified that, there is no impact of currency exchange rates to Indian stock market and no correlations between selected currency exchanges to stock market. However, among selected four currencies only USD does cause Indian Stock market and Indian Stock market does cause USD.

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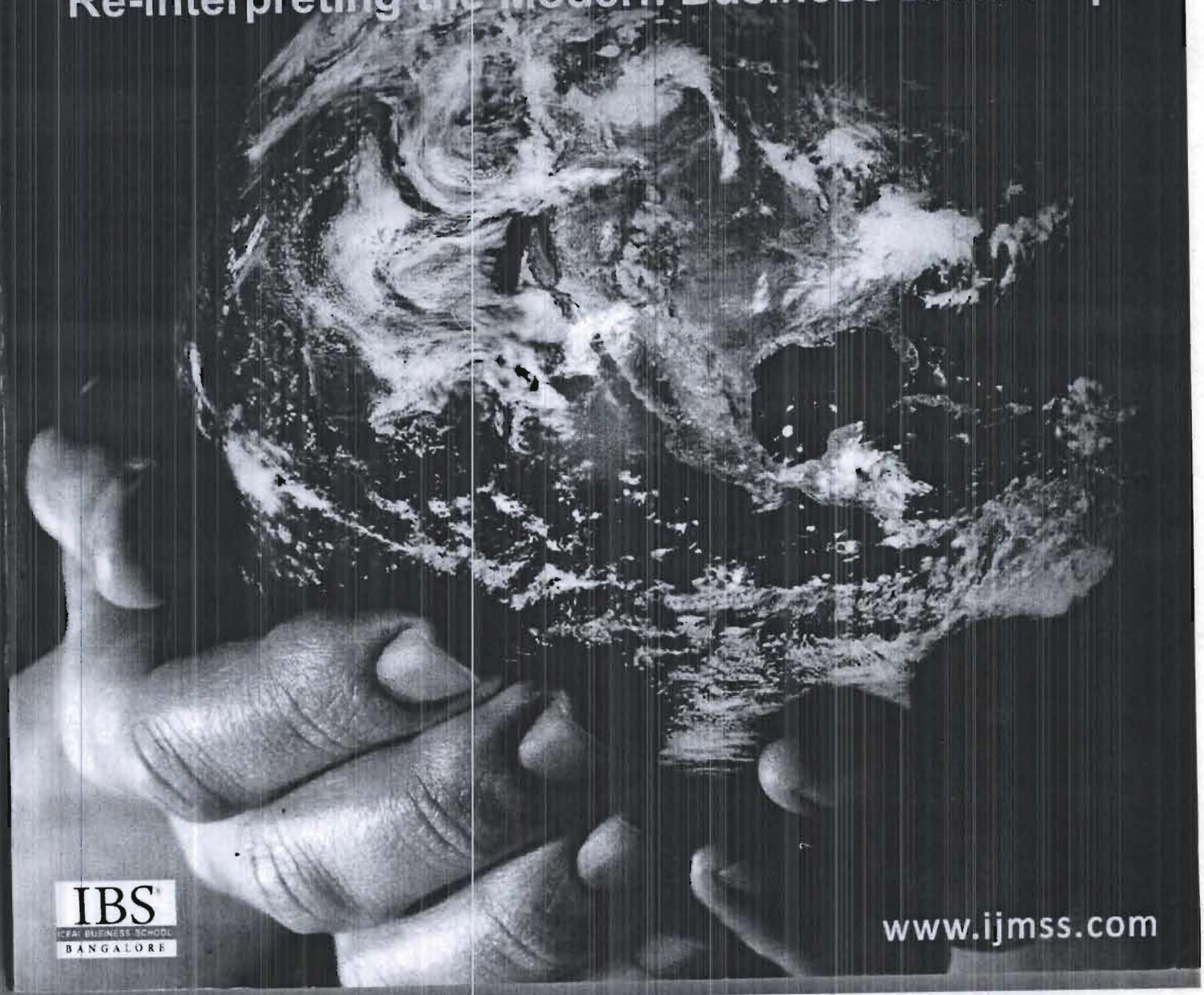

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