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"ATTEMPTING REGRESSION ANALYSIS TO STUDY THE FLUCTUATIONS AND SENSITIVITY OF FOREIGN EXCHANGE AND INFLATION ON NATIONAL STOCK EXCHANGE OF INDIA"

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1. INTRODUCTION

1.1 Stock Markets Overview

The stock market assumes a sizeable imperative part in deciding the development or fall of an economy. Events in the securities exchanges are observed by the administration, business, and national banks (RBI in India) since it to a great extent influences the economy of a nation. Stock costs change in securities exchanges every day. Additionally, amid specific circumstances of the year, it is effortlessly seen that stock costs value each morning, and this may happen ordinarily in one day for a few stocks. This implies free market activity powers dictate stock costs. There is no penny percent precise framework that demonstrates the correct development of stock costs. Notwithstanding, the elements behind increments or declines in the request as well as the supply of a specific stock could incorporate organization essentials, external components, and market conduct.

The Indian securities exchange was controlled in standard with the foreign nations with the foundation of Security Exchange Board of India. National Stock Exchange was set up in the time of 1990 with more than two lakh exchanging terminals. CNX NIFTY 50 is the leader list of National stock trade and speculators over the globe exchange on it frequently.

Critical advancement in Indian securities exchange occurred in the post-change period. Changes in monetary essentials happened to roll out improvements in securities exchange execution. However, securities exchange execution is affected if any progressions occur in the strategies made by the legislature and the Central Bank. Different full-scale financial factors drive securities exchanges. Both positive and negative effects can be seen on securities exchanges because of changes in the large-scale monetary factors.

In India, it is accepted that trade rates and swelling rates are the dominant full-scale financial factors that affect the securities exchanges. The 1997-98 Asian emergencies instructed the

lesson of a dynamic linkage between stock costs and swapping scale. Amid this period, fall in the market costs of the developing markets was being seen because of significant deterioration of trading scale in wording US Dollar. A securities exchange which sprouts up will draw in remote speculators to put their cash into the residential market, and thus it makes an interest for the nation's money. In the event of falling stock costs, remote financial specialists might want to leave advertise by offering the offer and changing it into outside cash against household money. This would make an interest in external capital, and it will prompt devalue the private cash against remote monetary standards. In this way, developments in securities exchange impact swapping scale to acknowledge or devalue against distant financial forms. Securities exchange return is additionally affected by the expansion.

Expansion apparently has contrarily affected the securities exchanges throughout the years. Financial solidness is measured as far as value strength of a nation. High swelling makes vulnerability in an economy, and it makes residential and remote financial specialists not to put resources into securities exchange. Determining or evaluated expansion enables speculators to deal with the stock costs successfully while the others lose because of increment in swelling for that specific timeframe. Unexpected swelling sway adversely, and it influences sparing capacity of nationals since the financial specialists settle on choices without thinking about the conceivable future expansion, and they lose in the market. Accordingly, the interest for stocks goes down because of poor sparing example.

This examination is an endeavor to assess the effect of expansion and conversion scale on securities exchange execution from 2009-2014 (Six years). Direct Multiple Regression and Correlation are utilized to discover the relationship between expansion and trade rate(Dollar) on securities exchange return.

1.2 The BSE and NSE

Most of the trading the Indian securities trade occurs on its two stock exchanges: The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The BSE was considered in 1875 and the NSE, on the other hand, was built up in 1992 and started trading 1994. The trading framework, trading hours, the settlement process is equivalent to both the exchanges. At the last check, the BSE had around 4,700 recorded firms, while the rival NSE had approximately 1,200. Out of all the registered companies on the BSE, just about 500 groups constitute more than 90% of its market capitalization; whatever is left of the gathering involves significantly illiquid shares.

The vital firms in India are by and large recorded on both the exchanges. NSE acknowledges an overwhelming offer in spot trading, with around 70% of the bit of the general business,

beginning at 2009, and practically a whole controlling framework in derivatives trading, with about a 98% offer in this market, furthermore starting at 2009. The two exchanges pursue the demand stream that prompts decreased costs, feature capability and advancement. The closeness of arbitrageurs keeps the expenses on the two stock exchanges inside a tight range.

1.3 Trading Mechanism

Exchanging at both the trades occurs through an open electronic limit arrange book, in which organize planning is done by the trading exchanging PC. There are no market makers or specialists, and the entire strategy is mastermind driven, which infers that market orders set by money-related authorities are customarily organized with quite far solicitations. The anonymity of buyers and vendors is kept up. The advantage of this is it brings more straightforwardness, by demonstrating all buy and offer demands in the trading system. In any case, execution of the solicitations remains an issue in perspective of the lack of definition.

1.4 Market Indexes

The two prominent Indian market indexes are Sensex and Nifty. Sensex is the oldest market index for equities; it includes shares of 30 firms listed on the BSE, which represent about 45% of the index's free-float market capitalization. It was created in 1986 and provides time series data from April 1979, onward.

The NIFTY 50 index is National Stock Exchange of India's benchmark broad-based stock market index for the Indian equity market. It represents the weighted average of 50 Indian company stocks in 12 sectors. The Nifty 50 was launched on 21st April 1996 and is one of the many stock indices of Nifty. During 2008-12, NIFTY 50 Index share of NSE market capitalization fell from 65% to 29% due to the rise of the sectoral index like NIFTY Bank, NIFTY IT, NIFTY Pharma, NIFTY SERV SECTOR, NIFTY Next 50, etc. The NIFTY 50 Index gives 29.70% weight to financial services, 0.73% weight to industrial manufacturing and nil weight to agricultural sector.

1.5 Foreign Exchange Markets

The Foreign Exchange Market is known to be the most liquid financial market in the world. It is also called the 'Forex Market.' It is essential to understand how values of different currencies are determined since they are the main regulation mechanism for individual's interactions in an economy.

Currencies have increasingly become the most actively traded assets, and so, the volume and speed of their flows are just incredible. Trading in foreign exchange markets averaged $5.3 trillion per day in April 2013 (BIS Triennial Central Bank Survey 2013). This is up from $4.0 trillion in April 2010 and $3.3 trillion in April 2007. The most actively traded instruments in

April 2013 were FX swaps, at $2.2 trillion per day, followed by spot trading at $2.0 trillion. Smaller banks accounted for 24% of turnover, institutional investors such as pension funds and insurance companies 11% and hedge funds trading firms another 11%. Trading with non-financial customers, mainly corporations, contracted between the 2010 and 2013 surveys, reducing their share of global turnover to only 9%. The US dollar remained the dominant vehicle currency. The Euro was the second most traded currency. Instruments covered in FX market include spot transactions, outright forwards, FX swaps, Currency swaps, OTC options, etc.

Due to over the counter nature of cash markets, there are reasons many interconnected commercial centers, where distinctive monetary forms, instruments are arranged. Consequently, there isn't a single conversion scale but instead various unique rates or costs relying on which bank or financial specialist is exchanging and the area of this one. Transferring is however progressively gathered in the biggest budgetary focuses.

Like other Asian developing economies, Indian value showcase has kept on developing and has seen the unwinding of outside venture limitations essentially through nation deregulation. Amid the 1990s, India has started the money related area changes by a method for receiving universal practices in its financial market. Parallel to this, the issuance of American Depository Receipts (ADR's) or General Depository Receipts (GDR's) has encouraged the exchange of foreign securities on the NYSE, NASDAQ or on non-American trades. Throughout the years, Indian Rupee is gradually moving towards full convertibility, which has likewise affected the Indian capital market as worldwide financial specialists have put about the US $15 billion in Indian capital market. The two-route usefulness of ADRs/GDRs permitted by RBI has additionally conceivably reinforced the linkages between the stock and remote trade showcases in India.

2. OBJECTIVES OF THE STUDY

The Primary objective of this research is to study the impact of Foreign Exchange rates (Dollar) and Inflation on the performance of NSE Index (Sensex) of India. This study involves an exchange rate with Indian rupee as the domestic currency and the US Dollar as the foreign currency. The exchange rate thus used in the study is the USD/INR (Indian rupee per US Dollar) rate.

Five widely used composite indices of NSE India are taken for this study, and one objective is assigned to each index.

The objectives of this study are as follows-

1. To study the impact of USD/INR rates and Inflation on CNX Nifty

2. To examine the relationship between the two macroeconomic variables and the five of the most-traded indices of NSE.

3. RESEARCH METHODOLOGY

3.1 Data Description

The study covers a period from January 2009 to December 2014. It is based on the secondary sources. USD/INR monthly exchange rates and Monthly CPI rates as a proxy of inflation are taken to study the impact of exchange rates on NSE Index performance and open, and close prices of five different indices considered, namely-

1. CNX Nifty
2. JUNIOR NIFTY
3. CNX 500
4. CNX Midcap
5. CNX Smallcap

NSE Indices are taken as the dependent variable, and the USD/INR exchange rates and inflation rates considered as the independent variable. Close prices of the indices are chosen to study their dependence on the macroeconomic variables.

Returns on the different indices are calculated using the following formula-

Return = Close-Open

Re=C-O……Eel (1)

These returns are used to make bar charts to understand the movement of the variables over the period of six years taken for the study.

For open and close prices of the five composite NSE indices, see Annexure 1.

USD/INR rates are taken from January 2009-December 2014, i.e., five years. Since CPI is considered as a measure of inflation in India; we have made CPI rates from January 2009-December 2014.

3.2 Data Collection

The data for the USD/INR rates and open and close prices of the five NSE indices are taken from investing.com.

The Inflation rates are taken from the website of The Reserve Bank of India (RBI) and the Inflation rates are taken from the website www.inflationdata.com

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3.3 Tests conducted

In the regression analysis, standardized coefficients utilize for investigating the adjustment in the standard deviation of the dependent variable because of progress in the standard deviation of the independent variable. Unstandardized coefficients are used to compose the regression equations for all the dependent factors.

Standardized coefficients or beta coefficients are the assessments coming about because of an analysis completed on independent variables that have been standardized, so their variances are 1. Like this, standardized ratios allude to what number of standard deviations a reliant variable will change, per standard deviation increment in the indicator variable.

Every factor is standardized by subtracting its mean from each of its esteems and after that separating these new values by the standard deviation of the variable.

Standardization of the coefficient is done when the factors are measured in different units of estimation.

In this examination, trade rates, expansion rates and the value returns of the NSE Indices are altogether measured in Rupees.

Correlation analysis is carried out to determine the influence of indicators on the performance of CNX Nifty Index, CNX Junior Nifty, CNX 500, CNX Midcap and CNX Small cap. A value close to +1 indicates high positive correlation. Implying, a unit increase in indicator value leads to a proportionate rise in Sensex.
A value close to -1 indicates high negative correlation. Implying, a unit increase in indicator value leads to a proportionate decrease in Sensex.
Whereas, a value close to zero suggests that the indicator in question doesn't influence the performance of the indices.

Durbin-Watson test values are used to check if autocorrelation exists in the dataset.

The study evaluates the impact of exchange rates (Dollar) and inflation on the five NSE indices using Linear Multiple Regression Model. The regression equation is as follows-

$$Y = \alpha + \beta X$$

Where,

Y is the dependent variable, i.e. NSE Price Return,

α is the constant,

β is the slope of exchange rate (Dollar), and

X is the exchange rate (Dollar)

4. OBSERVATIONS

4.1 Descriptive Statistics

1. Exchange rate (Dollar)

Table 1: Descriptive Statistics (USD/INR)

	N	Mean	Std. Deviation	Skewness	Kurtosis
USD/INR	72	52.3550	6.48231	.394	-1.261

The average foreign exchange rate (Dollar) for five years starting from January 2009 to December 2014 is 52.3550 and the volatility is 6.48231. The Skewness value is positive which means that the left side of the mean is slower than the right side. Kurtosis is below 3 therefore the exchange rates are normally distributed.

2. Inflation

Table 2: Descriptive Statistics Inflation

	N	Mean	Std. Deviation	Skewness	Kurtosis
INFLATION	72	226.1365	8.06314	-.195	-1.305

The mean Inflation rate for five years is 226.1365 and the volatility is 8.06314. The Skewness is negative which means that the left side is stronger than the right side of the mean. Kurtosis is below three therefore the inflation rates are normally distributed.

3. CNX NIFTY

Table 3: Descriptive Statistics (CNX NIFTY)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX NIFTY	72	5622.9354	1127.31783	.333	1.491

The average Price on CNX NIFTY is 5622.9354and the volatility is 1127.31783. The Skewness is positive which means that the left side is slower than the right side. Kurtosis is below 3 therefore the CNX NIFTY prices are normally distributed.

4. CNX JUNIOR NIFTY

Table 4: Descriptive Statistics (CNX JUNIOR NIFTY)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX JUNIOR NIFTY	72	11215.3896	2872.88816	.242	1.580

The average price on CNX JUNIOR NIFTY is 11215.3896and the volatility is 2872.88816. The Skewness is positive which means the right side is stronger than the left side. Kurtosis value is 1.580, therefore prices are normally distributed.

5. CNX 500

Table 5: Descriptive Statistics (CNX 500)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX 500	72	4492.1910	913.24348	.320	1.901

The mean value of CNX 500 is 4492.1910and the volatility is 913.24348. The Skewness value is .320 therefore the right side is stronger than the left side. Kurtosis value is 1.901therefore the prices are normally distributed.

6. CNXMIDCAP

Table 6: Descriptive Statistics (CNX MIDCAP)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX MIDCAP	72	7761.8264	1800.42049	.207	1.757

The average price of CNX MIDCAPis 7761.8264and the volatility is 1800.42049. The Skewness is positive which means that the right side is stronger/faster than the left side. The kurtosis value is below 3 therefore the values are normally distributed.

7. CNX SMALLCAP

Table 7: Descriptive Statistics (CNX SMALLCAP)

	N	Mean	Std. Deviation	Skewness	Kurtosis
SMALLCAP	72	3480.2197	800.85798	.183	1.179

The average price of CNX SMALLCAP is 226.1365 and the volatility is 8.06314. The Skewness is negative which means that the right side is slower/weaker than the left side. The kurtosis value is below 3 therefore the values are normally distributed.

4.2 Regression Analysis

Table 8: Regression Summary

Model	R	R Square	Adjusted R Square	Standard Error Mean	N
1	.770[a]	.592	.580	730.18356	72

a. Predictors: (Constant), ER, IN
b. Dependent Variable: NIF

R-square gives data about the decency of fit of a model. In regression, it demonstrates how well the relapse line approximates the accurate data focuses.
It gauges the extent of the variety in the dependent variable (CNX Nifty) that was clarified by variations in the independent variables (USD/INR trade rates and the expansion).

Here, "R-Square"' tell us that 59.2 % of the variation in CNX Nifty was explained by Exchange rates (USD/INR) and inflation rates.
Adjusted R-square is a modification of R-square that adjusts for the number of explanatory terms in a model. Unlike R-square, the adjusted R-square increases only if the new condition improves the model more than would be expected by chance. The adjusted R-square will always be less than or equal to R-square. In this case, it is .580.

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX Nifty performance prediction is off by Rs.730.18356

Table 9: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	P value
		B	Std. Error	Beta			
1	(Constant)	-21680.700	3318.663		-6.533	.000	9.23888819539326E-09 0.158437480807383
	ER	-33.294	23.351	-.191	-1.426	.158	
	IN	128.448	18.773	.919	6.842	.000	2.56711671314918E-09

P-values of each coefficient and the constant provide the likelihood that they are real results and did not occur by chance. The lower the P-Value, higher the possibility that ratio is valid.
The t-static is the standard error isolated by the coefficient value for each information. To have an extensive t-measurement infers that the coefficient could be evaluated with a considerable measure of precision. If the t-detail is more than 2 (disregarding the sign), it is presumed that the independent variable significantly affects the ward variable. Also, higher the t-detail esteem, bring down the p-esteem.

The full form of each hypothesis test is just: The independent variable is not a significant predictor of the dependent.

For Exchange rate, P-Value of 0.144324 indicates that there is only a 13.7% chance that the result occurred solely as a result of luck.
At a significance level of 5%, p >0.05, therefore, we do not reject the null hypothesis.
To conclude, Exchange rates have no impact on CNX Nifty
T-value (-1.426>2) confirms the same.

For Inflation rate,
At a significance level of 5%, p <0.05, therefore, we reject the null hypothesis.
To conclude, inflation rates have an impact on CNX Nifty
T-value (6.842>2) confirms the same.

Table 10: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53441435.250	2	26720717.625	50.117	.000[b]
	Residual	36788594.402	69	533168.035		
	Total	90230029.652	71			

a. Dependent Variable: NIF

b. Predictors: (Constant), IN, ER

The significance level is below .05 which means that the model is a good fit for the data. This table tells that the regression model predicts the dependent variable significantly well.

Regression Equation- NIF = -21680.700+ -33.294ER– 128.448IN

Durbin-Watson test Analysis

	CNX Nifty
Exchange rate (Dollar) **Inflation**	.164

The value of Durbin Watson statistics for dependent variable (CNX Nifty) is 2.176, if the value lies between 1.5 and 2.5; then there is autocorrelation in the study. Autocorrelations exists in this dataset.

Table 11: Correlations

	ER	**IN**	**NIF**	**JUNNIF**	**CNX500**	**MIDCAP**	**SMALLCAP**
ER	1						
IN	.820**	1					
NIF	.562**	.762**	1				
JUNNIF	.496**	.708**	.989**	1			
CNX500	.482**	.693**	.992**	.995**	1		

MIDCAP	.342**	.606**	.952**	.978**	.977**	1	
SMALL CAP	.185	.472**	.881**	.917**	.926**	.971**	1

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

4.3 Correlation Test Analysis

From the correlation table, it is observed that all the variables are significantly positively related to each other.

The percentage increase in prices of one variable will result in a proportionate increase in the costs of the second variables and vice versa.

Exchange rates and inflation rates have highest correlations with CNX NIFTY. This implies that a commensurate rise in the exchange rates or inflation rates will have a proportionate increase in the stock prices.

5. CONCLUSIONS

Exchange rates and inflation rates have been observed to have a significant impact on the five most composite indices of NSE.

Inflation rates have been observed as a stronger variable than exchange rates in this study. CPI rates used as proxy of inflation have shown impact on all the five indices of NSE taken into consideration for the conduct of the study

It was observed that the exchange rates are negatively and insignificantly related to NSE Indices whereas CPI rates used as proxy of inflation have a positive relationship with the stock prices of NSE Indices

Positive relation amongst inflation and stock costs demonstrate that Indian stocks can't be utilized to hedge inflation. The negative connection between exchange standard and NSE index signals that a fall in the exchange scale of USD/INR enhances stock returns at the Indian stock trade market. Consequently, exchange rate and inflation are essential factors deciding securities exchange returns and speculators must be aware of these factors as ceaseless increment inflation might be counterproductive for stock returns over the long run.

Durbin-Watson test shows that autocorrelation exists in this study.

Anova test clarified that the relapse show is a solid match to examine the effect of full-scale monetary factors on the stock costs.

Correlation analysis clarifies that all the seven dependent and autonomous factors are decidedly connected. It was additionally observed that the stock prices of the five lists of NSE have a robust inter-item correlation as the estimations of their match insightful correlation is higher when contrasted with their relationship with the two critical large-scale financial factors utilized.

Since just two of the many macroeconomic factors are taken for the examination, there is a probability that the execution of some of these lists is reliant on some other variable like the gold costs, silver costs, and oil costs, and so on.