

# “Impact of Macro Economic variables on Stock Market Volatility with reference to Inflation rate and BSE 100 Index during the year 2018”

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**ABSTRACT:** *Movements in the stock market can be quite volatile and sometimes movements in share prices can seem divorced from economic factors. However, there are certain underlying factors which have a strong influence over the movement of share prices and the stock market in general. Within the framework of a Correlation Coefficient Model, we examine whether a number of macroeconomic variables influence stock prices in Indian Stock Market. A Correlation analysis is applied in order to model the long-term relationship between Inflation Rate and BSE 100 in the Indian Capital market. This study being a descriptive in nature examines the major economic indicators and the Indian stock market represented by BSE 100. During the past ten years there is down in the Indian stock market and foreign portfolio investment patterns, consequent upon several changes affecting the Indian economy. However the researcher found that the Depreciation in the Rupee against the Dollar has led to decrease in the share prices. It has a negative impact on the stock prices and Increase in the Inflation rate has led to decrease in the share prices. The effect of changes of inflation rate on BSE 100 is very less. However a few of scrip have not been affected by Inflation. The researcher concluded that Other than the above two economic factors there are other factors such as Interest Rate, Market Sentiments, Global factors, performance of company etc...which affect the share prices of Indian Stock Market*

**Key Words** *BSE 100, Inflation rate, correlation, stock market return, regression model, t-test, etc.*

## I. Introduction

Stock market volatility is the main worries for any investor in the stock market as their return depend on various macro-economic factors. We know that fundamental analysis is the part of any investment decision and in that main part is economic analysis. Moreover the stock market return reflects the economy of the country and other countries economy that it is associated with. The current research mainly covers prominent indicator inflation rate of Indian economy and their influence on the stock market returns. It helps the most while taking part in the stock market that whether the investment analysis should really include the analysis of economy of the India and to what extent it matters on the stock market performance.

## II. Review of Literature

The numbers of study have been conducted to examine the effects of macroeconomic factors or economic indicators on Indian stock market prices. The studies have shown the result of financial deregulation, the stock markets becomes more receptive to domestic and external factors. It is evident from literature that the relationship between stocks returns and economic variables have received great attention over recent years in India and economic conditions. The level of return achieved or expected from an investment is dependent on variety factors. These are the literature are as follows:

1. **SARIKA KESWANI, DR. BHARTI WADHWA (2017)** examine the relation between Effect of Macro economic variables on stock market with reference to Indian government introduced liberalization and globalisation policies.
2. **Kantesha Sanningammanavara, Kiran Kumar K V, Rakesh H M (2014)** examines the relationship between various economic indicators and the Indian stock market represented by BSE Sensex. During the past 16 years there is down in the Indian stock market and Foreign portfolio investment patterns, consequent upon several changes affecting the Indian economy, like the technology slowdown, common wealth scam and political instability to name a few. By using yearly data from April 1989 to March 2014, the researcher’s tried to capture the cause effect relationship between main economic indicators and Indian Stock Market.
3. **Karam Pal and Ruhee Mittal (2011)** have made an attempt towards examination of the impact of macroeconomic variables on Indian capital market, In today’s globalised era, where markets are

becoming increasingly integrated, it has become imperative to understand the underlying fundamentals affecting the markets at domestic and global level. Thus, macroeconomic variables, i.e. inflation rate, exchange rate of INR to USD, Interest rate on treasury bills and GDP of India have been taken as explanatory variables and to represent Indian Capital market BSE Sensex and S&P CNX Nifty are dependent variables.

4. **Pramod Kumar Naik and Puja Padhi (2012)** investigates the relationships between the Indian stock market index (BSE Sensex) and five macroeconomic variables, namely, industrial production index, wholesale price index, money supply, treasury bills rates and exchange rates over the period 1994:04–2011:06. Johansen's co-integration and vector error correction model have been applied to explore the long-run equilibrium relationship between stock market index and macroeconomic variables.
5. **Dharmendra Singh(2010)** In this research paper, attempt has been made to explore the relation especially the causal relation between stock market index i.e. BSE Sensex and three key macroeconomic variables of Indian economy by using correlation, unit root stationarity tests and Granger causality test. Monthly data has been used from April,1995 to March, 2009 for all the variables, like, BSE Sensex, wholesale price index (WPI), index of industrial production(IIP) and exchange rate(Rs/\$). Results showed that the stock market index, the industrial production index, exchange rate, and wholesale price index contained a unit root and were integrated of order one. Granger causality test was then employed. The Granger causality test indicated that IIP is the only variable having bilateral causal relationship with BSE Sensex. WPI is having strong correlation with Sensex but it is having unilateral causality with BSE Sensex. Therefore, it is concluded that, Indian stock market is approaching towards informational efficiency at least with respect to two macroeconomic variables, viz. exchange rate and inflation (WPI).
6. **Dr. Naliniprava Tripathy(2011)** This study examines the relationship between the stock market and a set of macroeconomic variables during the period of January 2005 to February 2011. The time series data set employed in this study comprises the weekly observations of the BSE Sensex, WPI, Treasury bill rate, Exchange rate, S&P 500 and BSE trading volume. The study used Ljung-Box Q statistics and Breusch-Godfrey Serial Correlation LM Test to determine the auto correlation of all variables. The study confirms the presence of autocorrelation in the Indian stock market and macro-economic variables. The study also used the Granger causality test to determine the causal effect relationship between the BSE Sensex with macro-economic variables. So the study suggests that Indian stock market is influenced by inflation rate, exchange rate and interest rate in the economy. So they can be used to predict stock market price fluctuations. The study also found that variability of international market and exchange rate is affecting trading volume change in the stock market in the economy. Further the study reveals that Indian stock markets are not weak form efficient. So it implies that the sensible investor in India can attain abnormal returns using historical data of stock prices, and macroeconomic indicators.

### III. Research Gap

The above extensive literature is about how the stock market is predicted with different two or three objectives; however that gives us an opportunity to test the performance of stock market considering various economic indicators and also those literatures are about all the advanced economies and this gives researcher to conduct research in the same area in emerging countries like India.

The main research gap between present study and existing researches lies on the dimensions of number of economic indicators considered and **time period** of the study.

### IV. Limitations of the Study

1. The stock market performance is measured only through BSE 100 indices.
2. The time period of study is only years i.e. 2018.
3. The present study covers only one macroeconomic indicator considered for the study so area is limited.

### V. Objectives of the Study

1. To judge the performance of Indian stock market (with reference to BSE 100).
2. To analyse the relationship between macroeconomic factor on stock market performance.
3. To study what extent the economic indicators do influence the stock market performance.

## VI. Scope of the Study

1. This study assists an investor to understand the effect of macroeconomic factor on stock market return.
2. Research on stock market volatility will help investors to build and plan his investment portfolio by considering the uncontrollable factor.
3. The investors of the stock market can get the knowledge of decision for buying and selling of the stock.
4. Study will help the companies to know their share prices fluctuation.

## VII. Research Methodology

### Sampling Technique

Convenience sampling technique used to pick sample

<b>Dependent variable</b>	BSE 100
<b>Independent variable</b>	Inflation rate

### Regression Analysis

Regression analysis is used to study the relationship between two or more variables. Moreover, the regression technique is used to observe changes in the dependent variable with changes in the independent variables. The parameters in the regression equation are obtained by using least square method.

#### Independent variable:

In regression analysis, the independent variable represents the inputs make the changes in the dependent variable.

#### Dependent variable:

The dependent variable represents the output based on the values of the independent variable.

Assumptions of regression analysis:

- The error term follows normal distribution with mean 0 and constant variance.
- There is no correlation between independent variables and error terms.
- The error term is same for all values of independent variable.

There are two types of regression techniques:

- Linear Regression.
- Non-Linear Regression.

Linear Regression Analysis is categorized into two types:

- Simple Linear Regression.
- Multiple Linear Regression.

Simple Linear Regression:

Simple linear regression is used to study the linear relationship between one independent and one dependent variable.

The regression **equation** is,

$$\hat{y} = b_0 + b_1x$$

where,

$b_0$  - Intercept

$b_1$  - Regression coefficient

$\hat{y}$  - Predicted value of dependent variable

$x$  - Independent variable

Multiple Linear Regression:

Multiple linear regression is used to study the linear relationship between one dependent variable and more than two independent variables.

The regression **equation** is,

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

where,

$b_0$  - Intercept

$b_1, b_2, \dots, b_n$  - Regression coefficients

$\hat{y}$  - Predicted value of dependent variable

$x_1, x_2, \dots, x_n$  - Independent variables

Non-Linear Regression:

Non-linear regression is used to study the non-linear relationship among two or more variables.

#### Data Used

To study the relation between the stock market performance and selected economic indicator we collected secondary data from <http://www.inflation.eu/inflation-rates/india/historic-inflation/cpi-inflation-india-2006.aspx>. BSE 100 data is collected from the BSE website which gives the opening and closing figure of the particular month so researcher has calculates this from this data which called the monthly return of stock market. Formula which is used for the monthly BSE 100 data calculation:

$$\text{Stock market return} = \frac{\text{Closing stock index} - \text{opening stock index}}{\text{opening stock index}} * 100$$

#### Hypothesis

**Null Hypothesis H0:** There is no significant relation between Inflation Rate in Percentage and BSE100 Returns

**Alternative Hypothesis H1:** There is significant relation between Inflation Rate in Percentage and BSE100 Returns

#### Time period of the study

Time period of the study is year 2018 from January 2018 to December 2018.

#### VIII. Results and Discussion

**Variable:** this study is related to impact of various macroeconomic variables on the stock market in India. In this research work inflation rate is one of the selected macroeconomic factors and stock market return is calculated from the BSE 100 stock market index. Inflation rate is also called as Consumer Price Index (CPI). For this data calculation, researcher has selected two variables one is inflation rate and other is stock market return i.e. variable X and variable Y. So, variable X is inflation rate and variable Y is BSE 100 return. Further, there are two variable independent variable and dependent variable. Here inflation rate (x) is independent variable and stock market return (y) is dependent variable because researcher wants to find the effect of inflation rate on BSE 100 return i.e. stock market gain or loss.

**Positive Effect of Correlation:** Positive correlation means when independent variable **increases** than dependent variable also **increases**.

**Negative Effect of Correlation:** Negative correlation is also called inverse impact. It means when independent variable **increases** than dependent variable is **decreases**.

**Table: 1.1 Shows relation between the inflation rate and BSE 100 Return in 2018.**

Months	Inflation in Percentage	BSE 100 Returns
Jan-18	5.41	3.4544
Feb-18	4.74	-5.0687
Mar-18	4.36	-3.2736
Apr-18	3.97	5.9590
May-18	3.96	-1.4258
Jun-18	3.93	-0.6591
Jul-18	5.61	5.4610
Aug-18	5.61	3.2207

<b>Sep-18</b>	5.61	-7.8524
<b>Oct-18</b>	5.23	-4.4321
<b>Nov-18</b>	4.86	3.7270
<b>Dec-18</b>	5.24	-0.1603
<b>Average</b>	<b>4.88</b>	-0.0875
<b>Correlation</b>	<b>-0.0097</b>	

From the above table we can say that, the highest rate of inflation was observed in Aug, Sep and Oct 2018 i.e. 5.61% in the same month BSE 100 Return was measured as 3.2207, -7.8524 and -4.4321 accordingly. It means in the same inflation rate there is vast difference in returns; it shows there is no relation between inflation rate and BSE 100 Returns. In contradiction to this in June 2018 inflation rate was measured lowest to 3.93% and BSE 100 returns for the month is -0. If researcher sees the average of inflation rate that is 4.88% for the same average of BSE 100 Returns is -0.0875.

From the Jan 2018 to Dec 2018 correlation of Inflation Rate(x) and BSE 100 Return(y) is **-0.0097%**, it means there is negative relation between them, and it shows the adverse impact of inflation rate on BSE 100 return. It means when inflation rate is increases than BSE 100 return is decreasing averagely.

Multiple R	0.00970
R Square	0.00009
Adjusted R Square	-0.09990
Standard Error	4.70766
Observations	12

- i. **Multiple R:** This is the Correlation Coefficient. It shows how strong the linear relationship is. For the Inflation rate and BSE 100 Returns the value for it shows 0.00970 that means 0.97% relationship exist for the Inflation Rate and BSE 100 Return for the period from January 2018 to December 2018
- ii. **R Square:** This is  $r^2$ , the Co efficient of Determination which shows that how many points fall on the regression model that means how well the regression line approximates the real data. For the Inflation Rate in Percentage and BSE 100 Returns the value of it shows 0.00009 that means 0.01% variation of y- values around the mean is explained by the x values .In other words, 0.01% of the values fit the model.
- iii. **Adjusted R Square:** This is quoted most often when explaining the accuracy of the regression equation. Adjusted R Square is more conservative the R Square because it is always less than R Square. For the Inflation Rate in Percentage and BSE 100 Returns the value of it shows -0.09990 that means -9.99%
- iv. **Standard Error of the Regression:** An estimate of the standard deviation of the error for population mean. This is not the same as the Standard Error in Descriptive Statistics! The Standard Error of the regression is the precision that the regression coefficient is measured which is shown as 4.70766 For the Inflation Rate in percentage and BSE 100 Returns
- v. **Observation:** Number of observations in the sample is 12

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>Fc</i>	<i>Ft</i>
Regression	1	0.02083	0.02083	0.00094	0.97614
Residual	10	221.62064	22.16206		
Total	11	221.64148			

**Significance F:** This indicates the probability that the Regression output could have been obtained by chance. A small significance of F say Ft confirms the validity of the Regression output. For the Inflation Rate and BSE 100 Return  $F_c = 0.00094$  while  $F_t$  is 0.97614 that means 0.09% relationship between Inflation Rate and Exchange Rate and BSE 100 Return

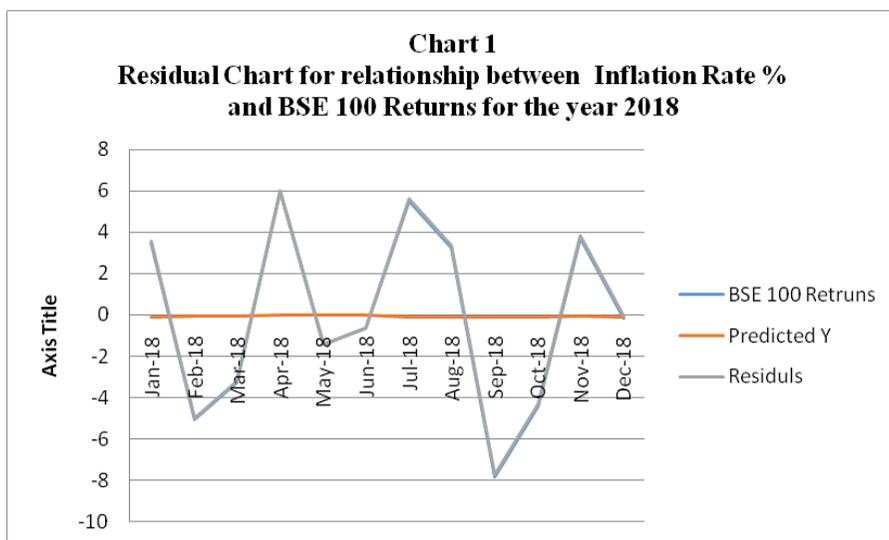
**Table: 1.4**  
**BSE100 Returns Intercept Accuracy for Regression Model for Inflation Rate % and BSE 100 Returns in 2018**

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
<b>Intercept</b>	0.22739	10.35927	0.02195	0.98292	-22.85451	23.30928
<b>Inflation Rate %</b>	-0.06456	2.10553	-0.03066	0.97614	-4.75598	4.62687

The most important aspect of this section is that it show the linear regression equation (model) as  $y = mx + b$  (it means  $y = \text{slope} * x + \text{Intercept}$ ) as per above Table slope  $m = -0.06456$  while intercept  $b = 0.22739$  Hence Linear Regression Equation is  $y' = -0.06456x + 0.22739$  this model is base for time series analysis for any period.

**Table:1.5**  
**Table of Residual Chart for Inflation Rate % and BSE 100 for 2018**

Month	BSE 100 Return in %	Predicted Value for BSE 100 Return $y'$ [ $y' = -0.06456x + 0.22739$ ]	Residual for BSE 100 Return $e = y - y'$
Jan-18	3.45441	-0.12187	3.57627
Feb-18	-5.06873	-0.07861	-4.99012
Mar-18	-3.27361	-0.05408	-3.21952
Apr-18	5.95901	-0.02890	5.98791
May-18	-1.42583	-0.02826	-1.39757
Jun-18	-0.65910	-0.02632	-0.63277
Jul-18	5.46098	-0.13478	5.59576
Aug-18	3.22075	-0.13478	3.35553
Sep-18	-7.85237	-0.13478	-7.71759
Oct-18	-4.43208	-0.11025	-4.32183
Nov-18	3.72699	-0.08636	3.81335
Dec-18	-0.16030	-0.11089	-0.04941



From the above Chart it is evident that actual BSE 100 Return is lower to the predicted BSE 100 Return on the base of Inflation Rate for Seven months out of twelve Months research period while it shows higher to the predicted BSE 100 return for remaining period of research period.

**Conclusion:**

There are various ways for studying research like as any other topic of the study but here researcher have selected only one parameter that is inflation rate and selected statistical techniques that is regression analysis and correlation. Inflation rate has only compared to BSE 100. Research is multi dimensions are for the study hence researcher have gone through various literature correspondence to research. Various areas and parameters of the study shows that external and unforeseen factors are more powerful for influence on movement of inflation rate in compare to internal and foreseen factors.

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