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IMPACT OF MACROECONOMIC VARIABLES ON BSE SENSEX

Management

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ABSTRACT

The Indian stock market has gone through many transformations after the year 1991. The Indian stock market plays an important role in the growth and development of the Indian economy. This is the reason the performance of the Indian stock market is tested by using macroeconomic variables. The main objective of the paper is to study the impact of bank rates and exchange rates on the BSE SENSEX index. The data from April-2021 to March-2023 is collected from secondary sources. The simple regression model is used to test the linearity between the variables. A positive strong correlation is found between the variables. There is a linear relationship between the variables and both macroeconomic variables that is bank rates and exchange rates show a positive impact on BSE SENSEX.

KEYWORDS

Bank rates, Exchange rate, and BSE SENSEX.

INTRODUCTION

The Indian stock market plays an important role in the development and growth of the Indian economy. The changes in the Indian economy happen due to external factors that are called macroeconomic variables. There are many studies in the literature that shows that macroeconomic variables show an impact on the stock market. In the last decades, many transformations happened in the Indian stock market. The major stock exchanges in the Indian stock market are BSE (Bombay Stock Exchange) and NSE (National Stock Exchange). In India, the benchmark index is BSE SENSEX. It is the oldest stock index in India that is operated by the S&P that is Standard & Poor. It has been launched in the year 1986 and the calculations of this index are done in terms of Indian Rupees and US Dollars.

Purpose Of The Research

The study investigates whether there is a relationship between the select macroeconomic variables and BSE SENSEX. Then it assesses the impact of select macroeconomic variables on BSE SENSEX. It also tests whether there exists a linear relationship between the macroeconomic variables and BSE SENSEX. The bank rates will be used as a measure of interest rates. The exchange rate of (INR Vs USD) is taken as a measure. The bank rate is the interest rate between the transactions between the banks.

Literature Review

Gopinathan and Durai (2019), have studied the impact of macroeconomic variables on the Indian stock market. To perform the research the monthly data of 25 years that is from April 1994 to July 2018 has been taken as a sample. The main aim is to test the long-run relationship between the variables. It was identified that after applying the standard co-integration test no long-run relationship is found between the variables. Mohiuddin (2008), has studied the relationship between macroeconomic variables and the stock market by using multiple regression analysis. It was found that there is no relationship between the macroeconomic variables and the stock market.

The studies like Lawala et al. (2018), Inci and Lee (2014), and Bekhet and Matar (2013), have investigated the long-run relationship between macroeconomic variables and stock market returns and used Engle-Granger test, Granger's causality test, and Johansen's cointegration test. It was found that there is a linear relationship between variables and no changes were observed between the variables based on changed time period. At the same time, a time-variant relationship is found between the variables in the study conducted by McMillian (2005). The study used Johansen's co-integration test and found that the changes in macroeconomic variables occur as the changed time period. According to the studies of Boucher (2007) and Kizys and Pierdzioch (2009), the relationship between the stock market and macroeconomic variables varies in the long run based on changes in time. Humpe and Macmillan (2014), have studied the non-linear relationship between the variables. In empirical studies, it is found that when the relationship between the variables is non-linear in nature then the research conclusion will be misleading. Sharma (2010), has analyzed the long-run relationship between macroeconomic variables and BSE stock prices by using a regression equation model. In the results, it was found that there is a high correlation between the independent variables that is gold prices and exchange rates that led to having a high influence on stock prices. It was also found that the influence of foreign exchange reserves and inflation rates on stock prices is moderate.

METHODOLOGY

The monthly data from the period of April 2021-March 2023 is collected to perform the analysis part. The macroeconomic variables that are selected to perform the study are exchange rates and interest rates (bank rates) as independent variables. The BSE SENSEX is the dependent variable selected in the study. A total of 24 observations were used for performing the analysis. The linear regression analysis is used to check the impact of selected macroeconomic variables on BSE SENSEX. The data used in the study is secondary in nature. The monthly data of BSE SENSEX is collected from the BSE website. The macroeconomic variables data is collected from the Handbook of Statistics on the Indian Economy that will be published on the RBI website.

Data Analysis

The daily data of bank rates and exchange rates is collected from the period of April-2021 to March-2023 and the average of months is calculated. A total of 24 observations are selected for analysis. The monthly data of BSE SENSEX is collected and considered for analysis. To test the linearity the simple regression method is used and two regression tests were conducted. One is between bank rates and BSE SENSEX and the other is between exchange rates and BSE SENSEX. The following is its analysis part with output.

Regression Analysis Of Bank Rates And Bse Sensex
Table -4 Summary Output

Regression Statistics	
Multiple R	0.541982942
R Square	0.293745509
Adjusted R Square	0.261643032
Standard Error	2851.118524
Observations	24

Table-5 Anova

	df	SS	MS	F	Significance F
Regression	1	74381210	74381210	9.150244407	0.006223902
Residual	22	1.79E+08	8128877		
Total	23	2.53E+08			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	48047.81275	3074.20909	15.62932	2.1424 3E-13	41672.2933	54423.33	41672.29	54423.33
Bank Rates	1802.938331	596.025066	3.024937	0.0062 23902	566.85 79977	3039.019	566.858	3039.019

In the table-4 the multiple R represents the correlation coefficient of the variables. It shows how strong the relationship is between the variables bank rates (independent variable) and BSE SENSEX (dependent variable). The multiple R is 0.54 which shows that there is a strong positive correlation between bank rates and BSE SENSEX. The multiple R^2 shows the amount of variation that is happening in the dependent variable due to changes happening in the independent variable. Here 29% of the variation (impact) is observed in BSE SENSEX due to changes in bank rates.

The following is the hypothesis
- H0: There is no linear relationship between bank rates and BSE SENSEX.
- H1: There is a linear relationship between bank rates and BSE SENSEX.

In table-5 the significant F value is the p-value, here the level of significance is 5%, if the p-value is less than or equals 0.05, then reject the null hypothesis and accept the alternate hypothesis. if the p-value is greater than or equals 0.05, then we fail to reject the null hypothesis (accept) and reject the alternate hypothesis. In the given table the p=0.006, which means the "p-value" is less than 0.05. Therefore, the null hypothesis (H0) is rejected and the alternate hypothesis (H1) is accepted. Therefore, it is found that there is a linear relationship between bank rates and BSE SENSEX. The following is the linear regression equation after the analysis. The values are taken from the table below the ANOVA table showing the intercept value and bank rates.

General equation is Y=a+bX; the a=48047.81 and b=1802.93
Y = 48047.81+1802.93 X1
Whereas 'Y' is BSE SENSEX and 'X1' is bank rates.

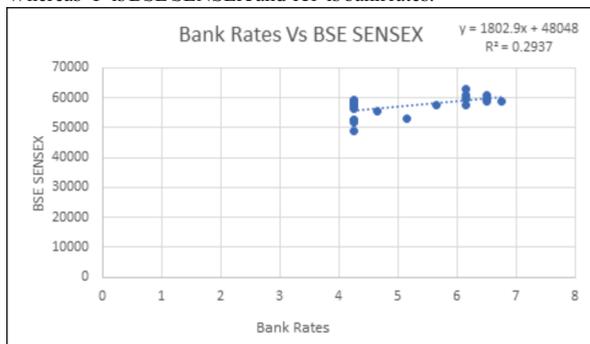**Chart-1** Linear Relationship Between Bank Rates And Bse Sensex

Regression Analysis Of Exchange Rates And Bse Sensex
Table-6 Summary Output

Regression Statistics	
Multiple R	0.581006
R Square	0.337568
Adjusted R Square	0.307457
Standard Error	2761.247
Observations	24

Table-7 Anova

	df	SS	MS	F	Significance F
Regression	1	85477782	85477782	11.21095	0.0029086
Residual	22	1.68E+08	7624487		
Total	23	2.53E+08			

	Coeffi cients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Inter cept	10091 3.6	13073.9 9	7.718 652	1.06E -07	73799. 7814	12802 7.4	73799. 78	128027 .4
Exc. Rates	-564. 564	168.613 2	-3.34 828	0.002 909	-914.24 6192	-214.8 81	-914.24 6	-214.88 1

In the table-6 the multiple R represents the correlation coefficient of the variables. It shows how strong the relationship is between the variable's exchange rates (independent variable) and BSE SENSEX (dependent variable). The multiple R is 0.58 which shows that there is a strong positive correlation between exchange rates and BSE SENSEX. The multiple R^2 shows the amount of variation that is happening in the dependent variable due to changes happening in the independent variable. Here 33% of the variation (impact) is observed in BSE SENSEX due to changes in exchange rates.
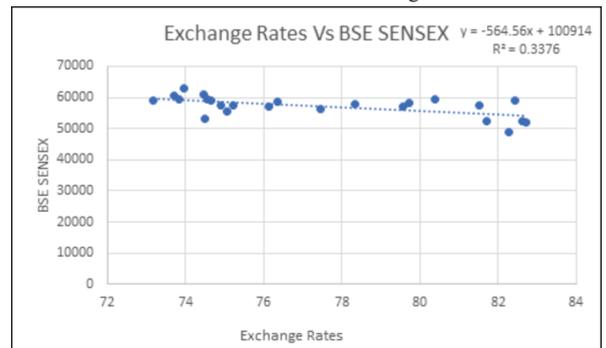
The following is the hypothesis
- H0: There is no linear relationship between exchange rates and BSE SENSEX.
- H1: There is a linear relationship between exchange rates and BSE SENSEX.

In table-7 the significant F value is the p-value, here the level of significance is 5%, if the p-value is less than or equals 0.05, then reject the null hypothesis and accept the alternate hypothesis. if the p-value is greater than or equals 0.05, then we fail to reject the null hypothesis (accept) and reject the alternate hypothesis. In the given table the p=0.002, which means the "p-value" is less than 0.05. Therefore, the null hypothesis (H0) is rejected and the alternate hypothesis (H1) is accepted. Therefore, it is found that there is a linear relationship between exchange rates and BSE SENSEX.

General equation is Y=a+bX; the a=100913.6 and b=-564.64
Y = 100913.6-564.64 X2
Whereas 'Y' is BSE SENSEX and 'X1' is exchange rates.

Graph-2 Linear Relationship Between Exchange Rates And Bse Sensex

Findings
The objective of the research is to study the linear relationship between the select macroeconomic variables and BSE SENSEX. First the linear relationship is tested between the bank rates and BSE SENSEX. Then the linear relationship is tested between the exchange rates and BSE SENSEX indices. The simple regression model is used to test the correlation, level of variation between the variables. It was found that there is linear relationship between bank rates and BSE SENSEX. It is also found that there is linear relationship between the exchange rates and BSE SENSEX.

There is positive strong correlation between bank rates and BSE SENSEX and there is strong positive correlation between the exchange rates and BSE SENSEX. It is found that there is 29% of impact of bank rates on BSE SENSEX and 33% of impact of exchange rates on BSE SENSEX.

CONCLUSION
There are many studies in the literature that investigated the impact of macroeconomic variables on Indian stock market. Few studies were developed on BSE SENSEX and few studies were developed on NIFTY Index. Few studies were developed on sectorial indices and there are many macroeconomic variables that affects the performance of Indian stock market like GDP, index of industrial production, money supply, oil prices, inflation rates, exchange rates, interest rates, gold prices, FDI and others. The researcher can easily develop the new model of macroeconomic variables and develop new research objectives.

The present study has only two macroeconomic variables that is bank rates as a measure of interest rates and exchange rates. The dependent variable is BSE SENSEX index. The simple regression analysis model is used to investigate the linear relationship between the variables and impact of macroeconomic variables on BSE SENSEX. It was found that the relationship is positive and strong between the variables. There exists the linear relationship between the variables and bank rates and exchange rates has impact on BSE SENSEX.

Limitations
There are many studies in the literature showing the impact of macroeconomic variables on Indian stock market. The present study is also aimed to investigate the impact of macroeconomic variables on

BSE BANKEX. The study is limited to the period of 2 years that is from April-2021 to March-2023. There are many macroeconomic variables but the study uses only two that is bank rates and exchange rates. Even there are other indices like NIFTY, sectorial indices but the present study uses only one index that is BSE SENSEX. When the large amount of data is collected from financial sources that will be non-stationarity in nature. When data is non-stationary then the results of the research will be spurious. This is the reason to get accurate results the stationarity tests will be conducted to convert the non-stationary time series data into stationary form. This study ignores the concept of stationarity and non-stationarity.

Appendix-1
Table-1 Monthly Data Of Bse Sensex [april-21 To March-23]

Month	BSE SENSEX
Apr-21	48782.36
May-21	51937.44
Jun-21	52482.71
Jul-21	52586.84
Aug-21	57552.39
Sep-21	59126.36
Oct-21	59306.93
Nov-21	57064.87
Dec-21	58253.82
Jan-22	58014.17
Feb-22	56247.28
Mar-22	58568.51
Apr-22	57060.87
May-22	55566.41
Jun-22	53018.94
Jul-22	57570.25
Aug-22	59537.07
Sep-22	57426.92
Oct-22	60746.59
Nov-22	63099.65
Dec-22	60840.74
Jan-23	59549.9
Feb-23	58962.12
Mar-23	58991.52

Table-2 Monthly Data Of Exchange Rates ([april-21 To March-23]

Month	Exc. Rates
Apr-21	82.2886
May-21	82.714
Jun-21	81.6988
Jul-21	82.6213
Aug-21	81.5138
Sep-21	82.433
Oct-21	80.3878
Nov-21	79.5739
Dec-21	79.709
Jan-22	78.3331
Feb-22	77.4611
Mar-22	76.3493
Apr-22	76.1394
May-22	75.0525
Jun-22	74.4973
Jul-22	75.2307
Aug-22	74.5535
Sep-22	74.8862
Oct-22	73.6892
Nov-22	73.9662
Dec-22	74.4666
Jan-23	73.8166
Feb-23	73.167
Mar-23	74.641

Table-3 Monthly Data Of Bank Rates [april-21 To March-23]

Month	Bank Rates
Apr-21	4.25
May-21	4.25
Jun-21	4.25
Jul-21	4.25
Aug-21	4.25
Sep-21	4.25
Oct-21	4.25
Nov-21	4.25
Dec-21	4.25
Jan-22	4.25
Feb-22	4.25
Mar-22	4.25
Apr-22	4.25
May-22	4.65
Jun-22	5.15
Jul-22	5.65
Aug-22	6.15
Sep-22	6.15
Oct-22	6.15
Nov-22	6.15
Dec-22	6.5
Jan-23	6.5
Feb-23	6.5
Mar-23	6.75

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