Macroeconomic Variables and Indian Stock Market:A Relationship Analysis

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Abstract- The Indian Stock Market showed a tremendous growth during last two decades. The SENSEX Index of Bombay Stock Exchange had reached to 38000 level points in August, 2018 which is its life time high level. It raises empirical questions regarding the fundamental connection between stock price and key macroeconomic indicators. The present study is an attempt to find the impact of macroeconomic variables on Indian Stock Market, with respect to SENSEX Index of Bombay Stock Exchange. The macroeconomic variables considered for the purpose of the study include Foreign Institutional Investors, Domestic Institutional Investors, Exchange Rates, Interest Rates and Inflation etc. The monthly closing values were taken for analysis for the period from January 2012 to August 2018. The Regression Analysis, Co-relation Analysis and Granger Causality Test will be applied to examine the relations between the selected variables.

Keywords- Macroeconomic Variables; Indian Stock Market; SENSEX Index; Bombay Stock Exchange.

I.   INTRODUCTION

The Indian Stock Market showed a tremendous growth during last two decades. The SENSEX Index of Bombay Stock Exchange touches 38000 points, the life time high. It raises empirical questions regarding the fundamental connection between stock price and key macroeconomic indicators. The macroeconomic variables might have some considerable effect on the functioning of the stock markets. The volatility in macroeconomic variables affects the equity stock returns and ultimately affects the equity stock prices. Since economy and market are closely related, information regarding macroeconomic behavior may be very useful.

The present study investigated the impact of macroeconomic variables on Indian Stock Market to test that whether or not a growth in macroeconomic variables lead to growth in Indian Stock Market. The present study is an attempt to find the impact of macroeconomic variables on Indian Stock Market, with respect to SENSEX Index of Bombay Stock Exchange. The macroeconomic variables considered for the purpose of the study include Foreign Institutional Investors, Domestic Institutional Investors, Exchange Rates, Interest Rates and Inflation etc. The monthly closing values were taken for analysis for the period from January 2012 to August 2018. The Regression Analysis, Co-relation Analysis and Granger Causality Test will be applied to examine the relations between the selected variables.

MACROECONOMIC VARIABLES
Macroeconomic Variables are the variables reflecting general economic conditions, variables related to interest rate and monetary policy, variables concerning price level and variables involving international activities. Variables relating to general economic conditions include variables like industrial production index or unemployment rate. The variables concerning interest rate and monetary policy include interest rate, term spread, default spread, money supply, etc., Variables focusing on price level may be general price level index or inflation rate. Variables involving international activities are exchange rate or foreign direct investments (FDI), etc.

INDIAN STOCK MARKET
The Indian Stock Market is one of the largest stock market in the world. Indian Stock Market consists of two stock exchanges i.e., Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). SENSEX Index is the representative index of BSE. The SENSEX Index is currently known as Standard and Poor's Bombay Stock Exchange Sensitivity Index i.e., S&P BSE SENSEX Index. SENSEX Index consists of 30 largest blue chips companies, from various sectors, which are mostly traded stocks. The S&P CNX Nifty Index is the representative index of NSE. It consists of the 50 largest and most actively traded stocks representative of various sectors of the Indian economy. These indices are considered as the pulse of the Indian Stock Market.

II.   LITERATURE REVIEW

A study empirically tested the effect of macroeconomic factors on the Indian Stock Market. Study used variables like IPI, Interest Rate, WPI, Foreign Exchange Rate and MSCI

World Equity Index. Jhonsen's Co-integration Analysis and Vector Error Correction mechanism were used for this purpose. Study concluded that IPI, Interest Rate and WPI were the most effecting variables in the long run. Th study also concluded that the impact of domestic variables was more as compared to global variables on the performance of the Indian Stock Market [1].

Another study examined the impact of Macroeconomic variables on Indian Stock Market. The variables used were Whole Sale Price Index, GDP, Cash Reserve Ratio, Gold Price, Silver Price, Inflation Rate, Reverse Repo Rate and Forex Rate. Monthly data of the selected variables were used in the study. Multiple Correlation, Multiple Regression and Anova Test were used for the purpose. Study concluded that Forex Rate, Gold Price, Whole Sale Price Index and Inflation Rate were the most significant variables affecting the Indian Stock Market [2].

Another study examined the long run and the short run relationship between stock price and a set of macroeconomic variables for Indian economy by using annual data from 1979 to 2014. The long run relationship was examined by implementing the ARDL bounds testing approach to co-integration. VECM method was used to test the short and long run causality and variance decomposition is used to predict long run exogenous shocks of the variables. The results confirm a long run relationship among the variables. The long-run estimates of ARDL Test showed that positive and significant relationship exists between economic growth and stock prices. It also confirmed a significant and positive influence of Exchange Rate and Inflation on stock price movements in India. However, there existed a negative and significant relationship between crude oil price and stock prices [3]. Another study analyzed the Impact of Macroeconomic factors on Indian Stock Market. Descriptive Statistics and Pearson Correlation was used to find the relationship between the SENSEX Index (dependent variable) and Macroeconomic variables (independent xvariables). The data over the period of 1991 to 2017 were used for the study. The result showed that there is a positive relationship between the SENSEX Index and Macroeconomic factors except average. Inflation and unemployment rate as they show negative relationship [4].

III. OBJECTIVES OF THE STUDY

The objectives of the study are as under:
- To assess the impact of selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange.
- To analyze the relationship among selected Macroeconomic Variables and SENSEX Index of Bombay Stock Exchange.

- To examine the causal relationship between selected Macroeconomic variables and SENSEX Index of Bombay Stock Exchange.

NULL HYPOTHESIS
The null hypotheses are as under:
Ho1: There is no significant impact of selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange.
Ho2: There is no significant relationship between selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange.
Ho3: DIIS does not Granger Cause SENSEX Index of Bombay Stock Exchange..
Ho4: Exchange Rate does not Granger Cause SENSEX Index of Bombay Stock Exchange.
Ho5: FIIS does not Granger Cause SENSEX Index of Bombay Stock Exchange.
Ho6: Interest Rate does not Granger Cause SENSEX Index of Bombay Stock Exchange.
Ho7: Inflation does not Granger Cause SENSEX Index of Bombay Stock Exchange.

RESEARCH METHODOLOGY
The present study empirically tested the relationship and impact of selected Macroeconomic Variables on Indian Stock Market. To represents Indian Stock Market SENSEX Index of Bombay Stock Exchange. has been used. Macroeconomic Variables considered for the study were Inflation, Foreign Institutional Investments (FIIs), Domestic Institutional Investments (DIIs), Interest Rates and Exchange rate. Monthly closing values of SENSEX Index and selected Macroeconomic Variables were taken from January 2012 to August 2018. Regression Analysis was applied to find the impact of selected Macroeconomic Variables (Independent) on SENSEX Index (Dependent Variable). Co-relation Analysis and Granger Causality Test were applied to test the short term and long term relationship between the studied variables. The data have been collected from various sources like ww.nseindia.com, RBI website, Data base of Indian economy (dbie.rbi.org.in) and annual reports of RBI and SEBI.

IV. RESULTS AND ANALYSIS

Regression Analysis
The Regression Analysis studies the impact of Macroeconomic Variables on SENSEX Index as shown in Table 1 below. It was observed that the values of r2 was 0.3973, indicating 39.73% variations in SENSEX Index were due to changes in selected Macroeconomic Variables when SENSEX Index was studied as dependent and Macroeconomic variables as independent variables. The p value is smaller than 0.05 indicating that there is an impact of dependent variables on independent variables and thus the

null hypothesis i.e., Ho1: There is no significant impact of selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange is rejected.

Table 1 Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012512	0.004528	2.76331	0.0072
DIIS	-5.48E-07	1.00E-06	-0.546938	0.5861
EXCHANGE_RATE	-0.787351	0.187308	-4.203517	0.0001
FIIS	6.02E-07	8.23E-07	0.731148	0.467
INFLATION	0.005253	0.019526	0.269016	0.7887
INTEREST_RATE	-0.009468	0.178555	-0.053025	0.9579
R-squared	0.397386	Mean dependent var		0.010252
Adjusted R-squared	0.356111	S.D. dependent var		0.038003
S.E. of regression	0.030494	Akaike info criterion		-4.069643
Sum squared resid.	0.067883	Schwarz criterion		-3.889685
Log likelihood	166.7509	Hannan-Quinn criter.		-3.997546
F-statistic	9.627792	Durbin-Watson stat		1.905455
Prob.(F-statistic)	0			

Correlation Analysis

Karl Pearson Coefficient of Correlation was being applied to study the relationship between SENSEX Index and selected Macroeconomic Variables. As per Table 2 and on analysis, it was conferred that, DIIs investments and Exchange Rate had very low degree of negative correlation with SENSEX Index. Inflation and Interest Rate had very low degree of positive correlation with SENSEX Index. FIIs had positive correlation with had very low degree of positive correlation with SENSEX Index. Thus, the null hypothesis, i.e., Ho2: There is no significant relationship between selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange was accepted.

Table 2 Correlation Analysis

Variables	SENSEX	DIIS	Exchange Rate	FIIS	Inflation	Interest Rate
SENSEX	1	-0.44179	-0.573287409	0.498126	0.066595	0.034858709
DIIS	-0.44179	1	0.360368988	-0.90926	-0.02812	-0.185731605
Exchange Rate	-0.57329	0.360369	1	-0.47589	-0.0731	0.006043534
FIIS	0.498126	-0.90926	-0.475889709	1	0.034757	0.114648728
Inflation	0.066595	-0.02812	-0.073101395	0.034757	1	-0.018704715
Interest Rate	0.034859	-0.18573	0.006043534	0.114649	-0.0187	1

Granger Causality Test

Granger Causality Test as shown in Table 5 below indicates the directional bilateral relationship among the studied variables. The study infers that the p values > 0.05 in all the cases (except case no.3 and 4) at lags ranging from 1 to 20. This proves that in the null hypothesis: Ho3: DIIS does not Granger Cause SENSEX Index of Bombay Stock Exchange; Ho5: FIIS does not Granger Cause SENSEX Index of Bombay Stock Exchange; Ho6: Interest Rate does not Granger Cause SENSEX Index of Bombay Stock Exchange; and Ho7: Inflation does not Granger Cause SENSEX Index of Bombay Stock Exchange were accepted bi-directional. The null hypothesis Ho4: Exchange Rate does not Granger Cause SENSEX Index of Bombay Stock Exchange was rejected unidirectional.

Table 3 Granger Causality Test

Case	Null Hypothesis	Obser.	F Statistics	Probability	Lag	A* / R*
1	DIIS does not Granger Cause SENSEX	78	0.06686	0.7967	1	Accepted
2	SENSEX does not Granger Cause DIIS		1.05688	0.3072	1	Accepted
3	Exchange Rate does not Granger Cause SENSEX	66	2.13724	0.0338	13	Rejected
4	SENSEX does not Granger Cause Exchange Rate		0.64377	0.8022	13	Accepted
5	FIIS does not Granger Cause SENSEX	78	0.20054	0.6556	1	Accepted
6	SENSEX does not Granger Cause FIIS		0.70678	0.4032	1	Accepted
7	INFLATION does not Granger Cause SENSEX	78	0.46993	0.4951	1	Accepted
8	SENSEX does not Granger Cause INFLATION		0.4393	0.5095	1	Accepted
9	Interest Rate does not Granger Cause SENSEX	78	0.05631	0.8131	1	Accepted
10	SENSEX does not Granger Cause Interest Rate		0.53856	0.4653	1	Accepted
A* - Accepted and R* - Rejected						

V.   DISCUSSION

The result of Regression Analysis stated that indicating 39.73% variations in SENSEX Index were due to changes in selected Macroeconomic Variables. It means there are some other variables which are moving the stock market. The Correlation Analysis indicating the Foreign Institutional Investments supporting the market for its growth. Continuous flow of FIIs investments helping the market to touches new high. Granger Causality Test stated that there was no bidirectional relationship among studied variables. Only exchange rates were affecting the market. It indicated that exchange rate contains some significant information to forecast stock market performance. Therefore, Reserve Bank of India should try to maintain a healthy exchange rate.

VI.   CONCLUSION

The results of Regression Analysis suggested that there is an impact of selected Macroeconomic Variables on SENSEX Index of Bombay Stock Exchange. Correlation Analysis showed that there is no significant relationship between the studied variables. Only Foreign Institutional Investment showed a positive correlation with SENSEX Index. There is no Granger Cause among the variables except in case of exchange rate. The above conclusions state that the selected Macroeconomic Variables had no short term and long term relationship with SENSEX Index, except the variable Foreign Institutional Investment.

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