The Impact of macro-economic indicators on selected BSE sectoral indices: An empirical analysis of India.

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Abstract

The key intention of this study is to look into the significant link between the variables of macroeconomics and the performances of Bombay stock exchange Indices. The study is based on the data collected monthly for a period of more than five years i.e. from April 2015 to Jun 2020. Foreign Institutional Investment, Foreign Direct Investment, Liquidity Aggregates, Foreign Exchange reserve, Gross Fiscal Deficit etc are used along with the indices from Bombay stock exchange (S&P BSE Energy, S&P BSE Basic Metals, S&P BSE First Moving Consumer Goods, S&P BSE Consumer Durables, S&P BSE Industrials, S&P BSE Finance, S&P BSE Utilities, S&P BSE Infrastructure, S&P BSE Manufacturing, and S&P BSE Healthcare). The Ordinary Least Square Method, Augmented Dickey Fuller Test, Vector Auto Regression Model, Granger causality Test, etc are applied to elaborate the existence of short-run and long-run effect of macroeconomic variables with the S&P BSE indices in India. Further, the study confirms that there exists the substantial relationship between the variables but relationship varies from the situation of the

economy and the demand condition of the market. The Ganger causality test also confirmed the existence of causality between the indicators of macroeconomics and the stock indices of Indian stock market.

Kay Word: -Stock Indices, SEBI, National stock Exchange, Bombay stock exchange. Test.

1. Introduction:

A few decades ago two major incidents transformed the history of the Indian capital market. Firstly, in the 1990s, Harshad Mehta perpetrated a massive manipulation in the Bombay Stock Exchange and, secondly the Old Capital Issue Act 1947 was replaced, by SEBI and introduced as a new regulator of the capital market in India in 1992. These evident had a significant impact on investors, who had been withdrawing their funds from the market for several years. These happenings clear sighted Indian government, which demands for the formation of, a fully automated electronic market place i.e. The National Stock Exchange (NSE) of India. Blowing in the same direction, BSE also tried on major necessary changes and swiftly automated itself following NSE. New technologies and systems are being deployed to restore the investor's confidence in gaining the ownership of shares and safely securing rewards from the investments under various programs. Now in India at Bombay, there are two main stock exchanges BSE and NSE and both are considered as the core to the Indian financial system. The BSE were two new competitors by 1992, the Over the Counter Exchange of India (OTCI) and the National Stock Exchange (NSE). From that time until the early 2000s there was no major stock market fraud in India. However, following the Ketan Parekh scam in the year 2000, India introduced internet-based trading system, which changed the face of the old capital market of India. Since the early 2000s, substantial amounts of FII and FDI have been flowing into India. Now the Indian stock market has been regarded as the world's most matured structure, well-regulated, stringently liberal, highly rational, and more global oriented stock market.

2. Literature Review:

Aditya Prasad sahoo, Dr B.C.M Pattnaik, Dr Ipseeta satapathy (2020) Observed on impact of macroeconomic factors on stock market of India and America. Used correlation, regression, t-test and ANNOVA model for the study, based on data from 2015 to 2019. The finding ensured that macroeconomic factors are individually significant with the stock market of both the countries.

Using quarterly data from 1991 to 2018, Kaan Celebi and Michaela Hönig examined the influence of the German Stock Index (DAX30) on several macroeconomic parameters. The influence of independent factors on the dependent variable Likelihood Ratio Test was investigated using the OLS Regression test and the Wald test. It was found that, as per WALD Test CLI and Unemployment rate has substantial influences on the stock exchange. According to the LR Test, CLI, GDP and BCI have a major impact on the stock market. Bonds with maturities of 5 years, 2 years, and 3 years have a significant impact on the stock market. GDP (in real terms), monetary aggregates, current A/C Experts, CPI, Unemployment Rate, German Government Bond Yields Savings Rate,

Composite Leading Indicator (CLI), Business Confidence Index are some of the macroeconomic variables examined in this research (BCI).

R. Venkatamuni Reddy, RaghavendraNayak, Nagendra S, Ashwith (2019) looked into Crude Oil Price, Gold Price, Silver Price, Exchange Rate, Inflation, and Interest Rate using BSE sectoral indices like S&P BSE Bankex, S&P BSE Oil and Gas, S&P BSE Consumer Durables, S&P BSE Capital Goods, S&P BSE Realty, S&P BSE PSU, and S&P BSE Power. The findings of the study pointed out the positive relationship of GP, Rata of exchange, index price of consumer, and interest rate with four indices but crude oil price and silver price have positive relationship with three indices only.

S. Sudhakaran and P. A. S. Balasubramanian (2019) investigated the Money Supply (MS), Foreign Direct Investment (FDI), Inflation Rate (IR), Industrial Production Index (IIP), Foreign Exchange Reserve (FER), and Foreign Portfolio Investment with the BSE Bankex. By using Unit root test, multiple regressions, and Multicollinearity method on the data from 2005 to 2015, the result showed the existence of substantial link between variables of macroeconomics and BSE Bankex.

Allison M Sousa et al. (2018) established a link between macroeconomic factors and returns on stock of Latin American public firms in the insurance and finance sector. The data was collected between 2010 and 2017 and evaluated using the Avellino-Bond e system and the Dynamic Panel Analysis Method (GMM). They discovered a positive association with the rate of exchange and a negative association with the insurance and financial sectors' with (GDP) gross domestic products.

AmithVikram Megaravalli and Gabriele Sampagnaro (2018) looked at the long-run and short-run effects of factors including the rate of exchange and the rate of inflation (consumer price index) with India, China, and Japan the three Asian countries. For this study, unit root, Co Integration method, Granger causality, and Pooled mean group estimator are used on data from January 2008 to November 2016. The findings ensured that the rate of exchange has a large negative influence on the selected Asian share market, while the rate of inflation has a modest negative influence.

MrunaliJambotkar and Guntur Anjana Raju (2018) investigated the impact of interest rates, currency rates, inflation (WPI), crude oil prices, and foreign currency reserves on NSE sectoral indices. For this investigation, ten years of data from January 2007 to December 2016 were gathered, and the Unit root, Ordinary least square model (OLS), and Correlation models were used. The findings revealed the existence of a substantial combined influence of macroeconomic factors and Sectoral Indices. In reality, the macroeconomic factors chosen have a lower explanatory ability to impact the indices.

Bambang Sutrisno (2017) sought to determine the impact of macroeconomic factors and sectoral indices on the Indonesian stock exchange. The data were collected monthly and spanned the years 2005:01 to 2014:12. The conclusion of using the Ordinary Least Square methodology (OLS) revealed that the rate of exchange, rate of inflation, and rate of interest all had a substantial impact on the Indonesian market's sectoral indices. Aside from

the rate of inflation, the rate of interest and the rate of exchange has a considerable impact on the Indonesian stock exchange's sector-based indexes.

In India, Pooja Joshi and A K Giri (2015) looked into the link between manufacturing sectoral GDP, electricity, gas, and water supply, and service sector and sector stock price. They utilised the ARDL bound testing methodology, VECM, and Variance decomposition technique to evaluate the short-run and long-run causality, as well as long-run exogenous, astounds of the variables, by collecting quarterly data from 2003: Q4 to 2014: Q4. The findings revealed that there is a co-integrating link between India's Gross Domestic Product and Sector indices.

Subburayan and Srinivasan (2014) studied the impact of macroeconomic variables on CNX Bankex in the Indian stock market. Monthly data from January 2004 to December 2013 was entered from a data source, and AD-Fuller, Co-integration method, Regression analysis, and Granger causality were utilised in the analysis. The model's findings indicated that both the interest rate and the rate of exchange have a substantial beneficial influence on CNX Bankex. The rate of interest and CNX Bankex, as well as the rate of inflation, were shown to have no causal link. However, the CNX Bankex stock has a one-way causal link with the exchange rate.

Amalendu Bhunia and Sanjib Pakira gathered data from 02 January, 1991 to October 31, 2013 to analyze the impact of gold prices and exchange rates on the Sensex. They used ADF Test, PP Test, both at levels and in 1st Difference, also employed Johansen Cointegration Test, and Granger Causality Test and found the three variables to be stationary at all levels. They refer to the long-term influence of Gold and Exchange rate on Sensex. Between gold prices and currency rates, there is a bidirectional causal link.

Swarna Lakshmi P (2013) examined data from 2008 to 2013 using ARCH (Autoregressive Conditional Heteroscedasticity). The study's variables include the NIFTY, CNX Bank, CNX PSU Bank, CNX Auto, CNX Finance, CNX Energy, CNX FMCG, CNX Media, CNX Metal, CNX IT, CNX Pharma, and CNX Realty sectors indexes. According to the study, the variability in the relationship between the sectors is both high and low compared to the NIFTY, although the CNX Realty sector has more unpredictability than all other sectors.

Ranjan Dasgupta used data based monthly from April 2007 to March 2012 to explore the influence of different macroeconomic factors on the BSE SENSEX. For evaluating the stationarity of variables, the researchers utilized the ADF Test, JJ Co-Integration Test for testing the long run relationship between the variables and Granger Causality Test for testing the short run link between variables. According to the study's findings, the ADF Test indicates that the variables are stationary. The JJs Co-Integration Test reveals an opposite relationship between the WPI and the exchange rate, as well as constructive influences between stock prices, IIP, and CMR. There is no unidirectional/bidirectional causation between factors and stock prices, according to the Granger Causality Test.

The Baltic States' stock market index and factors from macroeconomics environment were studied by Pilinkus Donatas and used data from January 2000 to December 2008. The researchers utilized the Granger Causality Test, Vector Auto regression, and Johansen Co integration to estimate the short-term and long-term relationships

between the index of stock market and macroeconomic factors. GDP, Imports, and State Debt have no substantial influence on the market index in the short run, but macroeconomic factors have a 99 percent impact on the index of stock market in the long run, according to the study. GDP, Unemployment, FDI, State Debt, Money Supply, Harmonized CPI, Export, Import, Trade Balance, and Short Term Interest Rates, are the macroeconomic variables studied.

Ifuero Osad Osamwonyi and Esther Ikavbo Evbayiro Osagie used data from 1975 to 2005 and examined the effect of various variables of macroeconomics on the All Share Index of the Nigerian Capital Market. For this study, the researcher utilized the Unit Root Test to evaluate the stationarity of the variables and the Vector Error Correction Model to analyze the co-integration among the variables. The findings ensured that the model's variables are stationary at 10% confidence levels. Money supply and GDP have a substantial effect on the index of stock market. In the near run, Inflation, Budget Deficit and Exchange Rate, are all positively connected.

IhsanIlahi, Mehboob Ali, and Raja-Ahmed Jamil examined the influence of several macroeconomic factors on the KSE 100 Index, using data gathered between January 2007 and December 2012. For evaluating the relationship of the dependent variables with the independent variables, they utilized Multiple Linear Regression. The study found that just 7% of dissimilarities in the stock return could be explained by the macroeconomic factors used, showing that there are weak connections between the macroeconomic variables and the stock returns.

3. Objectives of study:

To determine the existing link between macroeconomic factors and BSE indices in India.

To determine the nature of the link exist between macroeconomic factors and BSE indices in India.

4. Hypotheses of the Study

- H_0: The Macroeconomic Indicators have a significant impact on the Indian stock market.
- H_0: The Macroeconomic Indicators have substantial short run impact on the Indian stock market.

5. Research Methodology:

Data Source: The secondary data was gathered from the website of RBI and BSE.

Sample Size: From April 2015 to Jun 2020, 63 time-series observations were used in this research.

Periodicity: The data utilised in the study spans are more than six-year period, from April 2015 to Jun 2020.

6. Tools & Techniques:

The connection between chosen macroeconomic factors and BSE indices is calculated by employing the Ordinary Least Squire (OLS) Model. The data's stationary was determined by using the Augmented Dickey Fuller (ADF) Test. The Johansen's Co-integration test is also applied to detect the co-integrating relationship at different levels of Test Statistics and the critical value between the macroeconomic variables and the BSE sectoral indices used in the observation. In this research, the VAR is used to determine the existing led lag

relationship between them. However, efforts have been made to discover, if there is any substantial connection and causation between the macroeconomic variables and BSE indices in the short run.

7. Analysis & Interpretation:

For this statistical analysis, the BSE Indices which are considered are S&P BSE Energy (BSEENGY), S&P BSE Basic Metals (BSEBM), S&P BSE First Moving Consumer Goods (BSEFMCG), S&P BSE Consumer Durables (BSECD), S&P BSE Industrials (BSEIND), S&P BSE FINANCE (BSEFIN), S&P BSE Infrastructure (BSEINFRA), S&P BSE Manufacturing (BSEMANU), S&P BSE Utilities (BSEUTIL), and S&P BSE Healthcare (BSEHC) and the macroeconomic indicators like Foreign institutional Investment(FII), Foreign Direct investment (FDI), Liquidity Aggregates(LA), Foreign Exchange Reserve (FER), Gross Fiscal Deficit (GFD) etc are the Key to predict the trends of Indian Economy.

8. Explanatory Statistics:

The outcome of the data are always shown in mean, standard deviation, minimum, and maximum values in different percentage forms such as 25%, 50%, and 75%.

Table: 1- Descriptive statistics Results.

	count	mean	std	min	25%	50%	75%	max
BSEENGY	63	3735.122	916.132	2338.380	2808.685	3940.250	4445.605	5280.380
BSEBM	63	2570.329	549.340	1513.950	2138.300	2651.520	2936.555	3552.560
BSEFMCG	63	9940.454	1594.712	7114.45	8293.13	10290.14	11329.74	12771.69
BSECD	63	17769.643	5268.385	10377.600	12293.850	18966.500	21979.150	26893.500
BSEIND	63	3064.854	425.002	1867.170	2851.985	3073.040	3318.750	3955.020
BSEFIN	63	5167.006	1047.306	3144.100	4167.255	5449.050	5965.775	6996.140
BSEUTIL	63	1800.93	237.381	3116.21	1585.3	1811.83	1958.67	2289.61
BSEINFRA	63	189.722	31.3	115.75	169.975	186.7	213.145	252.45
BSEMANU	63	404.4811	44.98359	304.52	366.335	413	443.18	480.68
BSEHC	63	14815.292	13379.214	-47571.000	-5213.000	2976.000	10619.500	40576.000
FII	63	2360.794	13379.21	-47571	-5213	2976	10619.5	40576
FDI	63	3638.778	1346.243	1210.00	2711.50	3346.00	4635.00	8004.00
LA	63	1.40E+07	2.03E+06	1.09E+07	1.23E+07	1.37E+07	1.57E+07	1.79E+07
CAB	63	398146	40767.61	348418	363001	397822	421415.5	505702
GFD	63	61950.587	81235.084	-206132.000	23266.000	63211.000	97525.500	279512.000

9. Preliminary Tests:

The prediction of coefficient value of dependent variables with the independent variables is very essential so as to identify the cross-sectional issues in the data of the variables. For this purpose, OLS has been used to outline the critical reverse causality that exists between the variables observed through the data present in the research.

Table: 2 - Result of coefficient between the variables from OLS Test

Dependent variable/Independent Variable	FII	FDI	LA	CAB	GFD
BSEENGY	0.0146	0.0318	0.0004	0.0188	0.002
BSEBM	0.0063	0.0662	0.0001	0.0054	0.0001
BSEFMCG	0.0178	0.0918	0.0007	0.0296	0.0029
BSECD	0.0716	0.4783	0.0023	0.106	0.0061
BSEIND	0.0063	0.0429	-3.76E-05	-0.0017	-0.0003
BSEFIN	0.0181	0.137	0.0004	0.0169	0.0012
BSEUTIL	0.0035	0.0311	2.48E-05	0.0009	-0.0001
BSEINFRA	0.0004	0.0043	-3.26E-05	-6.32E-05	-9.91E-07
BSEMANU	0.0009	0.0039	0.0086	0.0006	7.79E-05
BSEHC	0.0065	-0.1080	-0.0007	0.0180	0.0015

Here the result of the coefficient value from OLS Test confirmed that there is substantial multi-co linearity between the variables are taken into account. The coefficient values of the indices of BSE and all the selected macroeconomic variables have substantial relationship between them. From the result of R squire and lag likelihood and t statistics' the link between the variables has been found as extremely significant. From these observations it has been confirmed that FII have strong positive causality in connections of all the indices of BSE. FDI Has Negative relation with BSE Health care only where as LA has negatively correlated with BSE industrials, BSE Infrastructure and BSE Health care also, Except that CAB has negative relationship with BSE Industrial and BSE infrastructure. As in the case of GFD the existing relation is negative with BSE Industrial and BSE infrastructure in India during the period of study.

10. Unit Root (ADF Test) Analysis:

Before the formation of any statistical judgment through observations it is vital to understand the consistency of the data used in the study. The ADF Model is very helpful in determining the data's unit root. Once the data has been proved to have unit root, prolific statistical techniques can be purposeful to it with ease.

In the ADF model it is the 1st lag Y coefficient and is equal to 1.

Null hypothesis (H_0): alpha=1.

$$Yt = C + \beta t + \alpha Yt - 1 + \emptyset \Delta Yt - 1 + \varepsilon t$$

Where

Y (t-1) = lag 1 of the sequence

Δ Y (t-1) = first deference of the sequence at time (t-1)

If the coefficient of Y (t-1) is 1 the data becomes stationary and the Noll hypothesis is rejected. If it is not rejected the data is said to be non-stationary in the series.

Table: 3- Unit Root at Level.

	T-Statistics	P-Value	CV at 1%	CV at 5%	CV at 10%	series is
BSEENGY	-1.4148	0.5752	-3.571	-2.923	-2.599	Non Stationary
BSEBM	-1.3321	0.6144	-3.548	-2.913	-2.594	Non Stationary
BSEFMCG	-1.1725	0.6853	-3.553	-2.915	-2.595	Non Stationary
BSECD	-0.2854	0.9275	-3.553	-2.915	-2.595	Non Stationary
BSEIND	-1.812	0.3745	-3.548	-2.913	-2.594	Non Stationary
BSEFIN	-0.9478	0.7718	-3.548	-2.913	-2.594	Non Stationary
BSEUTIL	-1.5373	0.515	-3.548	-2.913	-2.594	Non Stationary
BSEINFRA	-1.2297	0.6607	-3.548	-2.913	-2.594	Non Stationary
BSEMANU	-1.1971	0.6749	-3.56	-2.918	-2.597	Non Stationary
BSE HC	-1.9122	0.3264	-3.548	-2.913	-2.594	Non Stationary
FII	-6.3998	0	-3.548	-2.913	-2.594	stationary
FDI	-2.4613	0.1252	-3.568	-2.921	-2.599	Non Stationary
LA	2.0252	0.9987	-3.571	-2.923	-2.599	Non Stationary
FER	2.1275	0.9988	-3.548	-2.913	-2.594	Non Stationary
GFD	-1.3366	0.6123	-3.578	-2.925	-2.601	Non Stationary

Except for FII all others of the variables are non-stationary at its significance level of deference, where the p-value is 0.00.

Table: 4 Unit Root at 1st Difference.

	T-Statistics	P-Value	CV at 1%	CV at 5%	CV at 10%	series is
BSEENGY	-6.7745	0.0.	-3.56	-2.918	-2.597	Stationary
BSEBM	-7.3394	0.0.	-3.551	-2.914	-2.595	Stationary
BSEFMCG	-6.9422	0.0.	-3.553	-2.915	-2.595	Stationary
BSECD	-7.5261	0.0.	-3.553	-2.915	-2.595	Stationary
BSEIND	-4.1792	0.0007.	-3.555	-2.916	-2.596	Stationary
BSEFIN	-6.2658	0	-3.553	-2.915	-2.595	Stationary
BSEUTIL	-8.5365	0	-3.551	-2.914	-2.595	Stationary
BSETNFRA	-7.3372	0.00.	-3.551	-2.914	-2.595	Stationary
BSEMANU	-4.4751	0.0002	-3.56	-2.918	-2.597	Stationary
BSE HC	-5.0033	0	-3.56	-2.918	-2.597	Stationary
FII	-5.6531	0.0.	-3.566	-2.92	-2.598	stationary
FDI	-7.2654	0.0.	-3.568	-2.921	-2.599	Stationary
LA	-3.5456	0.0069	-3.568	-2.921	-2.599	Stationary
FER	-6.4501	0.0.	-3.551	-2.914	-2.595	Stationary
GFD	-10.2242	0.0.	-3.578	-2.925	-2.601	Stationary

The results in the table are based on the details of the ADF test at its 1st difference level of significance. In this study, it has been stated that the data collected for the study are stationary at its first difference and at different levels of critical value. Here the Test statistics value of the observation falls above the critical value, and therefore the Null Hypothesis is rejected.

11. Selection of Lag Order:

Table: 5 the result of lag order selection test

Lag order	AIC	BIC	FPE	HQIC
1	183.206	190.733	4.393	186.132
2	182.168	196.852	6.172e+79	187.861

From the result lag order 2 gives us lowest AIC value i.e. 186.14698, than the lag order one. Thus for this analysis lag order 2 is appropriate.

12. VAR analysis:

The VAR model is a stochastic process that signifies a group of time dependent variables as linear functions of their own past values as well as the past values of others selected to the analysis and an error term. As it is a wonderful technique in the process of research and quite embarrassing for the researcher to figure out which kind of time series data can be used in the analysis. While applying this method in the analysis of data, it is necessary to check the stationarity of the time series, i.e. their means and variances are constant over time. They do not have any trending behavior (show improper test statistics), which may lead to wrong conclusions. However one should always be careful with this approach as it has been a very important part of every time series analysis.

Table: 6 Result of the coefficient of the VER order equation BSEENGY

	BSEENGY	FII	FDI	LA	FER	GFD
BSEENGY	0.19766	-2.2188	1.39516	16.796	-2.2137	54.156
FII	-0.001	-0.4565	0.03009	-0.0432	-0.0106	0.60716
FDI	-0.0546	-3.6189	-0.2801	-3.0137	-0.4646	15.0384
LA	0.00028	-0.0187	0.00084	-0.2275	-0.0089	0.18628
FER	-0.0077	-0.4475	0.00304	2.42063	0.58508	7.4E-05
GFD	-0.0003	-0.0055	0.00095	-0.1352	-0.0059	-0.2482

It has been confirmed that the BSE Energy has been positively correlated with Foreign Direct Investment, Liquidity Aggregate and Gross Fiscal deficit where as the relationship is negative with Foreign Institutional investment and Foreign Exchange Reserves.

Table: 7 Result of the coefficient of the VER order equation BSEBM

	BSEENBM	FII	FDI	LA	FER	GFD
BSEENBM	0.039845	3.249699	1.676009	-0.24178	4.542077	60.70517
FII	0.002703	-0.47638	0.035952	0.063846	-0.03276	0.8426
FDI	-0.02941	-3.72288	-0.2964	-2.76155	-0.59692	14.50032
LA	0.000097	-0.0174	0.000762	-0.23249	-0.00736	0.182317
FER	0.002009	-0.49762	-0.00244	2.557933	0.52208	-0.16928
GFD	0.000183	-0.00706	0.001338	-0.1274	-0.00762	-0.23242

From the table-7 it has been confirmed that the BSE Basic Metal has been constructively correlated with Foreign Institutional investment, Foreign Direct Investment, Foreign Exchange Reserves and Gross Fiscal deficits, where as the relationship is unconstructive with Liquidity Aggregate in the economy.

Table: 8 Result of the coefficient of the VER order equation BSEFMCG

	BSEFMCG	FII	FDI	LA	FER	GFD
BSEFMCG	-0.0403	-0.52199	-0.16752	-8.18169	1.34265	19.46187
FII	0.008137	-0.46539	0.040607	0.144841	-0.03803	0.757118
FDI	-0.05178	-3.63167	-0.25322	-2.45643	-0.54807	15.09569
LA	0.000177	-0.01829	0.000351	-0.23636	-0.00761	0.179703
FER	-0.01466	-0.46263	0.015099	2.597031	0.560484	0.336304
GFD	0.000942	-0.00627	0.001686	-0.12273	-0.00771	-0.23448

The BSE First Moving Consumer goods have been positively correlated with Foreign Exchange Reserves and Gross Fiscal and its relationship is pessimistic with Foreign Institutional investment, Foreign Direct Investment and Liquidity Aggregates.

Table: 9 Result of the coefficient of the VER order equation BSECD

	BSECD	FII	FDI	LA	FER	GFD
BSECD	-0.03479	-0.51313	0.048764	-2.88543	1.121824	5.315909
FII	0.029176	-0.45719	0.037666	0.138739	-0.05395	0.812033
FDI	-0.09855	-3.56271	-0.26801	-2.2677	-0.6912	14.91449
LA	-5.6E-05	-0.01792	0.00042	-0.23173	-0.00852	0.169066
FER	-0.02849	-0.44202	0.01204	2.686281	0.516459	0.194138
GFD	0.00296	-0.00635	0.001569	-0.12623	-0.00741	-0.22552

From the table of BSE Consumer Durables, Foreign Direct Investment, Foreign Exchange Reserves and Gross Fiscal deficit has been positively correlated, where as its relationship are opposite with Foreign Institutional investment and Liquidity Aggregates.

Table: 10 Result of the coefficient of the VER order equation BSEIND

	BSEIND	FII	FDI	LA	FER	GFD
BSEIND	-0.06926	-7.22597	1.717843	-113.848	4.012638	80.64761
FII	0.003265	-0.44479	0.032807	0.469862	-0.03899	0.662886
FDI	-0.03149	-3.54525	-0.28483	-1.09323	-0.55612	14.64854
LA	0.000211	-0.01946	0.000769	-0.25478	-0.00746	0.186194
FER	0.001824	-0.38159	-0.00565	3.87397	0.520826	-0.49893
GFD	0.000526	-0.00412	0.001007	-0.08879	-0.0083	-0.25067

From the result of BSEINDs VER order equation it has confirmed that the coefficient value of the BSEIND has been favorable with Foreign Direct investment, Foreign Exchange Reserve and Gross Fiscal deficits where as its direction of relationship is negative with Foreign Institutional investment and Liquidity Aggregates.

Table: 11 Result of the coefficient of the VER order equation BSEFIN

	BSEFIN	FII	FDI	LA	FER	GFD
BSEFIN	0.007054	-7.25452	1.725929	-64.3682	1.389905	59.1712
FII	0.001544	-0.41643	0.026057	0.543874	-0.03504	0.509138
FDI	-0.03059	-3.56911	-0.27917	-2.03606	-0.51291	15.16231
LA	0.000099	-0.02085	0.001099	-0.25733	-0.00771	0.193248
FER	0.002369	-0.34702	-0.01389	3.604809	0.544638	-0.52953
GFD	0.00059	-0.00372	0.000911	-0.10214	-0.00748	-0.24655

The BSE Finance has been positively correlated with the selected macroeconomic variables from the Indian economy.

Table: 12 Result of the coefficient of the VER order equation BSEUTIL

	BSEUTIL	FII	FDI	LA	FER	GFD
BSEUTIL	-0.12632	1.358543	2.744353	-79.8945	5.579381	272.6815
FII	0.001489	-0.47223	0.035609	0.16037	-0.03144	0.619895
FDI	-0.01256	-3.67055	-0.2981	-1.64522	-0.57546	12.00593
LA	0.00001	-0.0179	0.00072	-0.24082	-0.00766	0.198991
FER	-0.00064	-0.46689	0.010991	2.650394	0.56067	0.111246
GFD	0.000114	-0.00656	0.001607	-0.12793	-0.0069	-0.22161

Here the BSE Utilities has been constructively correlated with Foreign Institutional investment, Foreign Direct Investment, Foreign Exchange Reserves and Gross Fiscal deficit and its relationship is adversely with Liquidity Aggregates.

Table: 13 Result of the coefficient of the VER order equation BSEINFRA

	BSEINFRA	FII	FDI	LA	FER	GFD
BSEINFRA	0.037274	-51.9925	37.35912	-1290.28	57.17336	1925.499
FII	0.000165	-0.45963	0.031069	0.335247	-0.03671	0.545147
FDI	-0.00231	-3.55548	-0.32856	-0.38451	-0.60269	12.2789
LA	0.000011	-0.01871	0.000915	-0.24913	-0.00751	0.195275
FER	-5E-06	-0.43993	-0.00396	3.184526	0.539424	-0.50363
GFD	0.000024	-0.00619	0.001318	-0.11805	-0.00735	-0.2373

In this equation it has been confirmed that the BSE Infrastructure has positively correlated with Foreign Direct Investment, Foreign Exchange Reserves and Gross Fiscal deficit where as its relationship is negative with Foreign Institutional investment, and Liquidity Aggregates.

Table: 14 Result of the coefficient of the VER order equation BSEMANU

	BSEMANU	FII	FDI	LA	FER	GFD
BSEMANU	0.101807	-13.1922	13.83965	-120.855	43.4014	203.9923
FII	0.000257	-0.46352	0.031528	0.128135	-0.04791	0.841563
FDI	-0.00419	-3.61538	-0.29744	-2.43617	-0.61589	15.27593
LA	0.00002	-0.01826	0.000656	-0.2344	-0.00755	0.173675
FER	-0.00051	-0.4565	0.005046	2.635897	0.538433	0.299373
GFD	0.000042	-0.00609	0.001093	-0.1231	-0.00849	-0.23062

It has been confirmed that the BSE Manufacturing' indexes relation is positive with Foreign Direct Investment, Foreign Exchange Reserves and Gross Fiscal deficit, where as its relationship is opposite with Foreign Institutional investment, and Liquidity Aggregates in the economy.

Table: 15 Result of the coefficient of the VER order equation BSEHC

	BSEHC	FII	FDI	LA	FER	GFD
BSEHC	-0.215497	0.078563	0.240139	-19.3311	-0.1505	13.56872
FII	0.009826	-0.47035	0.039661	0.005363	-0.02512	0.991553
FDI	-0.07378	-3.65424	-0.26803	-2.08637	0.491829	15.35646
LA	0.000136	-0.01808	0.000308	-0.22246	-0.00817	0.16336
FER	-0.003380	-0.46546	0.013697	2.600024	0.567642	0.403798
GFD	-0.00103	-0.00652	0.001733	-0.13896	-0.00702	-0.2152

According to the result of this equation the BSE Healthcare has positively correlated with Foreign Institutional investment, Foreign Direct Investment, and Gross Fiscal deficit and the relationship is unconstructive with Liquidity Aggregates and Foreign Exchange Reserves.

13. Ganger Causality test:

Granger causality test is an useful technique for assessing the short run causality of relationship that exists between the variables selected from BSE Indices such as S&P BSE Energy, S&P BSE Basic Metals, S&P BSE First Moving Consumer Goods, S&P BSE Consumer Durables, S&P BSE Industrials, S&P BSE Finance, S&P BSE Utilities, S&P BSE Infrastructure, S&P BSE Manufacturing, and S&P BSE Healthcare, and the macroeconomic indicators like Foreign institutional Investment, Foreign Direct investment, Liquidity Aggregates, Foreign Exchange Reserve, Gross Fiscal Deficit.

Table: 16 Result for the equation Ganger causality Test.

Null Hypothesis	Prob.	Result
BSEENGY does not ganger cause FII	0.0182	Rejected
FII does not ganger cause BSEENGY	0.1327	Accepted
BSEBM does not ganger cause FII	0.0000	Rejected
FII does not ganger cause BSEBM	0.4507	Accepted
BSEFMCG does not ganger cause FII	0.0107	Rejected
FII does not ganger cause BSEFMCG	0	Rejected
BSECD does not ganger cause FII	0	Rejected

FII does not ganger cause BSECD	0	Rejected
BSEIND does not ganger cause FII	0	Rejected
FII does not ganger cause BSEIND	0.0247	Rejected
BSEFIN does not ganger cause FII	0	Rejected
FII does not ganger cause BSEFIN	0.0017	Rejected
BSEUTIL does not ganger cause FII	0	Rejected
FII does not ganger cause BSEUTIL	0.0505	Rejected
BSEINFRA does not ganger cause FII	0	Rejected
FII does not ganger cause BSEINFRA	0.014	Rejected
BSEMANU does not ganger cause FII	0.0367	Rejected
FII does not ganger cause BSEMANU	0.0047	Rejected
BSEHC does not ganger cause FII	0.0004	Rejected
FII does not ganger cause BSEHC	0.0008	Rejected
BSEENGY does not ganger cause FDI	0.0351	Rejected
FDI does not ganger cause BSEENGY	0	Rejected
BSEBM does not ganger cause FDI	0.0002	Rejected
FDI does not ganger cause BSEBM	0.1721	Accepted
BSEFMCG does not ganger cause FDI	0.0006	Rejected
FDI does not ganger cause BSEFMCG	0.0002	Rejected
BSECD does not ganger cause FDI	0.0021	Rejected
FDI does not ganger cause BSECD	0.0321	Rejected
BSEIND does not ganger cause FDI	0	Rejected
FDI does not ganger cause BSEIND	0.0768	Rejected
BSEFIN does not ganger cause FDI	0.1636	Accepted
FDI does not ganger cause BSEFIN	0.0004	Rejected
BSEUTIL does not ganger cause FDI	0	Rejected

FDI does not ganger cause BSEUTIL	0.1804	Accepted
BSEINFRA does not ganger cause FDI	0	Rejected
FDI does not ganger cause BSEINFRA	0.0968	Rejected
BSEMANU does not ganger cause FDI	0.0076	Rejected
FDI does not ganger cause BSEMANU	0.0011	Rejected
BSEHC does not ganger cause FDI	0.0002	Rejected
FDI does not ganger cause BSEHC	0.0041	Rejected
BSEENGY does not ganger cause LA	0.0001	Rejected
LA does not ganger cause BSEENGY	0.1406	Accepted
BSEBM does not ganger cause LA	0.0301	Rejected
LA does not ganger cause BSEBM	0.664	Accepted
BSEFMCG does not ganger cause LA	0.1713	Accepted
LA does not ganger cause BSEFMCG	0.2677	Accepted
BSECD does not ganger cause LA	0.1019	Accepted
LA does not ganger cause BSECD	0.0525	Rejected
BSEIND does not ganger cause LA	0.0046	Rejected
LA does not ganger cause BSEIND	0.4503	Accepted
BSEFIN does not ganger cause LA	0.4082	Accepted
LA does not ganger cause BSEFIN	0.0141	Rejected
BSEUTIL does not ganger cause LA	0.0685	Rejected
LA does not ganger cause BSEUTIL	0.1793	Accepted
BSEINFRA does not ganger cause LA	0.0325	Rejected
LA does not ganger cause BSEINFRA	0.4408	Accepted
BSEMANU does not ganger cause LA	0.0687	Rejected
LA does not ganger cause BSEMANU	0.2769	Accepted
BSEHC does not ganger cause LA	0.0005	Rejected

LA does not ganger cause BSEHC	0.0246	Rejected
BSEENGY does not ganger cause FER	0.0078	Rejected
FER does not ganger cause BSEENGY	0.501	Accepted
BSEBM does not ganger cause FER	0.0135	Rejected
FER does not ganger cause BSEBM	0.0442	Rejected
BSEFMCG does not ganger cause FER	0.0275	Rejected
FER does not ganger cause BSEFMCG	0.0001	Rejected
BSECD does not ganger cause FER	0.0372	Rejected
FER does not ganger cause BSECD	0	Rejected
BSEIND does not ganger cause FER	0.0051	Rejected
FER does not ganger cause BSEIND	0	Rejected
BSEFIN does not ganger cause FER	0.0014	Rejected
FER does not ganger cause BSEFIN	0.0001	Rejected
BSEUTIL does not ganger cause FER	0.0001	Rejected
FER does not ganger cause BSEUTIL	0	Rejected
BSEINFRA does not ganger cause FER	0.0234	Rejected
FER does not ganger cause BSEINFRA	0	Rejected
BSEMANU does not ganger cause FER	0.0339	Rejected
FER does not ganger cause BSEMANU	0.0021	Rejected
BSEHC does not ganger cause FER	0.0001	Rejected
FER does not ganger cause BSEHC	0.0202	Rejected
BSEENGY does not ganger cause GFD	0.1205	Accepted
GFD does not ganger cause BSEENGY	0.0002	Rejected
BSEBM does not ganger cause GFD	0.0793	Accepted
GFD does not ganger cause BSEBM	0	Rejected
BSEFMCG does not ganger cause GFD	0	Rejected

GFD does not ganger cause BSEFMCG	0	Rejected
BSECD does not ganger cause GFD	0.006	Rejected
GFD does not ganger cause BSECD	0	Rejected
BSEIND does not ganger cause GFD	0.0461	Rejected
GFD does not ganger cause BSEIND	0	Rejected
BSEFIN does not ganger cause GFD	0.01	Rejected
GFD does not ganger cause BSEFIN	0	Rejected
BSEUTIL does not ganger cause GFD	0.0838	Accepted
GFD does not ganger cause BSEUTIL	0	Rejected
BSEINFRA does not ganger cause GFD	0.246	Accepted
GFD does not ganger cause BSEINFRA	0	Rejected
BSEMANU does not ganger cause GFD	0.0091	Rejected
GFD does not ganger cause BSEMANU	0	Rejected
BSEHC does not ganger cause GFD	0.002	Rejected
GFD does not ganger cause BSEHC	0.0002	Rejected

As seen in the Table the granger causality Test, reveals that FII displays no causality with the BSE Energy and BSE Basic Metal. just as there is with FDI, FDI does not ganger cause BSE Basic Metals and BSE Utility. As in case of LA the relationship has no causality with BSE Energy, BSE Basic Metals BSE first Moving consumer Goods, BSE Industrials, BSE Utility, BSE Infrastructure and BSE Manufacturing. On the other hand FER does not ganger cause BSE Energy only and GFD has found significant causality all the selected sectoral indices of Bombay stock exchange.

14. Findings:

The existence of the link between the macroeconomic variables selected for the study and the indices of Bombay stock exchange in India has been confirmed. During the research this relationship also revealed that there exists multiple co-linearity between them for short run and long run also. Consequently, it is evident that depending on the market demand the causality between the chosen macro-economic variables and the BSE indices of this era is either positive or negative.

15. Conclusion:

The study accomplishes that the macro-economic variables and their link with the stock indices have always been the hidden weapon in an empty magic box that may influence the values of shares and other assets of the security market. However, the study reveals that the intensity of the link, along with the chosen macro-economic variables and BSE indices, is either bi-directional or unidirectional in nature. From the VER model it has been indicated that the variables connected to BSE indices are either positive or negative depending on open market demand in the country. The findings have also proved the existence of a critical relationship between the BSE indices and the macroeconomic variables in India. The study also shows that the existing relationship varies from one index to other indexes, even in the economies with a lot of similarities.

As observed from the Coefficient of VER Order analysis, the new macro-economic variable "Liquidity Aggregates" which has been taken for the study also proves that the variable has its influence on the stock market of the country and the nature of relationship is negative, except for the BSE Energy. From this observation it has been again confirmed that the investors must not overlook the influences of macro-economic variables before taking any decisions related to investment in the stock market.

16. Implications:

This study, on the other hand, will provide investors with useful information for making timely investment and investment diversification decisions. This research suggests that other Macroeconomic Indicators that have an impact on stock values should be investigated further. Essentially, the investor should focus more on liquidity assets and their ability to provide market-moving results. Apart from the aforementioned variables, it is clear that Macroeconomic indicators have not only an impact on the performance of market indices. There are still certain known and unknown elements, such as socio-economic decisions and political reactions of the relevant department/agency of society that transfer their influence and affect the stock market performance producing potential for investors, should be considered.

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