

An Impact of Macroeconomic Variables on the functioning of Indian Stock Market: A Study of Manufacturing Firms of BSE 500

Gurloveleen K* and Bhatia BS

Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, India

Abstract

The study investigated the impact of macroeconomic variables on the functioning of Indian Stock Market. The monthly data of ten macroeconomic variables, namely Broad Money, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Foreign Institutional Investors, Gross Fiscal Deficit, Index of Industrial Production, Inflation Rate and Trade Balance and one stock market index i.e. BSE 500 have been used to attain the objectives of the research. The Augmented Dickey Fuller (ADF) Test, Multiple Regression and Granger Causality Tests were employed to find out the results. It was found that Foreign Institutional Investors became stationary at level, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Gross Fiscal Deficit, Inflation Rate and Trade Balance at 1st difference and Broad Money and Index of Industrial Production at 1st difference. This stationary data has been applied to find out the significant macroeconomic variables through multiple regression technique. The two macroeconomic variables Foreign Institutional Investors and Exchange Rate were found significant. Granger causality test was used to check the causality relationship between these two significant variables and average closing prices of manufacturing firms of BSE 500. It has been observed that these variables have no relationship with closing prices of BSE 500 manufacturing firms. The study also revealed that the Indian Stock Market was a weak form efficient because no relationship was found amongst the variables during the study period.

Keywords: Economy; Macroeconomic variables; Stock market; BSE 500; ADF test; Multiple regression; Granger causality

JEL Classification : E44, E51, E62, F31, G10, G14

Introduction

The Indian stock market plays a pivotal role in the growth of Indian economy. Its every movement puts an impact on the performance of the economy. The stock market is a place at where investors, whether Indians or foreigners can invest or take the funds for capital appreciation. Their decision to invest or withdraw the funds depends upon the numerous factors. The various proponents opined that the macroeconomic variables are the one of them. Macroeconomics is the analysis of the nation's economy as a whole. It scrutinizes the cyclical movements and trends exists in economy such as Gross Domestic Production, Unemployment, Inflation, Money Supply, Budget Deficits, International Trade and Exchange Rate, etc. The various schools of thoughts like Classical theory by Adam Smith, David Ricardo, Thomas Robert Malthus and John Stuart Mill, Keynes theory by John Maynard Keynes, New Classical theory, New Keynesian theory and New Growth theory developed their own views about the role of macroeconomic variables in economy by considering different assumptions. But, they accepted that macroeconomic variables are the most remarkable variables and Government's can't make their policies, rules and regulations without contemplating them. So, Macroeconomic variables are the key indicators to show the prevailing trends in the economy. The various researchers did a remarkable work to evaluate the association between changes in macroeconomic variables and stock market returns by using different tools and techniques. The present study selected ten macroeconomic variables, i.e. Broad Money, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Foreign Institutional Investors, Gross Fiscal Deficit, Index of Industrial Production, Inflation Rate and Trade Balance to check its association with average monthly closing stock prices of BSE 500 manufacturing firms [1-7].

Relevance of selected macroeconomic variables

A brief description about the role of selected macroeconomic variables in Indian economy and its effect on the functioning of stock market is listed below [7-13]:

Money supply: It is an important variable to stabilize the economy because it can be used for immediate transactions. It acts as a medium between the exchanges of economic transactions, can be traded for its value in fact it is a store of its value. A lot of studies have been done to investigate the relationship between money supply and stock prices but it's still unclear. As defined by portfolio theory, an increase in money supply will change the portfolio structure from non interest bearing monetary assets to financial assets like stock.

Call money rate: It is probably the most observed variable in the daily conduct of monetary practices and frequently used as an operating target for policy creations. An increase in CMR will increase the holding money opportunity cost, thereby causing swap of stocks with interest bearing assets and would decrease the stock prices. It also affects the corporate profits of companies, demand for goods and services, attraction of financial securities like bonds, shares and other fixed interest bearing investments, companies financing modes and borrowing money cost to purchase shares.

Crude oil prices: The domestic need of India for crude oil is mostly fulfilled by importing it from other countries. So any change in its prices would automatically put an effect on its economy. Therefore, for oil importing countries like India, an increase in oil prices will lead to an increase in production costs, decrease future cash inflows and put a negative impact on the stock market. Therefore, an increase in the price of oil in the international market means lower real economic activity in all sectors which will cause the stock prices to fall.

***Corresponding author:** Gurloveleen Kaur, Research Scholar, Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab, India, Tel: 01763 232 300; E-mail: gurlovemaan@gmail.com

Received September 24, 2015; **Accepted** October 17, 2015; **Published** October 21, 2015

Citation: Gurloveleen K, Bhatia BS (2015) An Impact of Macroeconomic Variables on the functioning of Indian Stock Market: A Study of Manufacturing Firms of BSE 500. J Stock Forex Trad 5: 160. doi:10.4172/2168-9458.1000160

Copyright: © 2015 Gurloveleen K, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Exchange rate: It is a medium of financial transactions between the countries. The entire import and export process of any country depends upon the exchange rate of his currency. If, the country currency will depreciate immediately increase its import value and decrease its exports value or vice versa. If the domestic currency is stronger, it adversely affects the export oriented companies and benefit to import oriented companies. The stock market will get benefit when the domestic currency value is appreciating.

Foreign exchange reserve: The central bank and other monetary authorities keep the reserves of various currencies like US Dollar, Euro, Pound Sterling and Japanese Yen and used to repay its liabilities. It acts as a shield against unanticipated emergencies and economic shock in a country. It keeps the currency stable, used as a mean of exchange rate and monetary policy. It has a positive relationship with the stock market. The investors would like to invest more if the position of a country is stronger in Foreign Exchange Reserves. More reserves mean more faith in an economy that automatically leads towards the more investment in the stock market by domestic and international investors.

Foreign institutional investors: FIIs plays an important role in the Indian economy. It is a short term investment made by international investors. It has bidirectional causation with the returns of other financial markets such as money market, stock market and foreign exchange market. It is really significant for an emerging economy as FII exerts a larger impact on the domestic financial markets in the short run and a real impact in the long run. Availability of foreign capital depends on number of firm specific factors, not only on economic development of the country.

Gross fiscal deficit: It is basically the difference between the money earns and money makes by a country. It has an adverse relationship with the stock market. If higher, it would increase inflation risk, minimize economy growth, affect sovereign rating of a country, doubt the government's ability to repay its liabilities and becomes a barrier for foreign investors to look India as an investment hub.

Index of industrial production: It personifies the status of production in the industrial sector. It influences the stock prices through its own effect on projected cash flows; it exhibits a positive relationship with stock price changes. In this study, it is used as a proxy of Gross Domestic Product due to unavailability of its monthly data.

Inflation rate: Inflation is not good for any economy because it affects all the segments, misrepresenting prices and threatens the clear relationship that is essential to exist between value and price of a product or service. It exhibits a negative relationship with stock markets. It curbs consumer savings and spending. When spendings are decreased, it automatically ruined the corporate profits. It adversely affects the domestic currency value in the foreign exchange markets.

Trade balance: It shows the difference between the monetary value of imports and exports of a country. It may be favorable or unfavorable for a country. It affects their currency relative value. The large trade deficits are perceived as problematic for an economy, but not the smaller ones. If it is favorable will generate a confidence among the investors. They would like to invest or vice versa. It is used as a proxy of Balance of Payment due to unavailability of its monthly data in the present study.

The section II of paper represents the review of literature, section III depicts the data methodology, section IV discusses data analysis and results and section V concludes the study.

A Birds Eye View of Literature

Relationship between macroeconomic variables and stock market movements

Many academic researchers, financial and industry analysts and practitioners have tried to envisage the relationship between macroeconomic variables and stock market movements from the past decades. They have done several empirical and descriptive studies to check the effect of macroeconomic variables on stock prices or vice-versa and the existing relationship between the two. The different conclusions have been provided by the various conducted studies according to the selection of variables, methodologies, techniques and tests used. Here, we discussed some previous research works and their conclusions that are related to our research work [13-21].

- Ahmed [1] analyzed the causal relationship between stock prices and macroeconomic variables in India. The quarterly data of index of industrial production, money supply, interest rate, exports, exchange rate, foreign direct investment, BSE Sensex and NSE Nifty were used from 1995 to 2007. ADF test, PP test and KPSS test have been applied to check the stationarity of data. Johansen cointegration test and Granger Causality test were used to check the existence of long runs and causal relationships among the variables. To explore the short run relationships, the BVAR modeling for variance decomposition and impulse response functions has been applied. The study revealed different causal relationships between selected macroeconomic variables and stock market indices in the long run, but similar causal pattern among the variables in the short run. The study reported bidirectional causality running from stock prices to index of industrial production, money supply, exports, exchange rate, and foreign direct investment and from interest rates to stock prices. It indicated that Indian stock market seems to be driven not only by actual performance, but also by anticipating probable performances. The authors opined that any change in stock prices was not the mere cause of selected macroeconomic variables, but might be the changes in other non selected macroeconomic variables.

- Srivastava [18] demonstrated the effect of Macroeconomic factors like IPI, WPI, Interest Rate, Foreign Exchange Rate and MSCI World Equity Index on the Indian Stock Market by using Johansen's Cointegration analysis and Vector Error Correction mechanism. It was concluded that IPI, WPI and Interest Rate are the most effecting variables in the long run. The impact of domestic variables on the performance of the stock market was more as compared to global variables.

- Hojatallah and Ramanarayana [3] opined on the impact of Foreign Institutional Investment on the Indian Stock Market Volatility during the World Financial Crisis. The Engle-Granger, Johansen and Granger tools were used to inspect the cointegration and causality between the Foreign Institutional Investment and BSE 500. The monthly data were employed to get the results. It has been found that BSE 500 and FII were cointegrated with each other and bilateral causality exists. So the investors, institutional investors, etc. can use the available information of one variable to predict about the performance of the second variable.

- Hosseini [4] investigated the nature of the causal relationships between the stock prices and the key macroeconomic variables of India and China for the period January 1999 to January 2009 using monthly data. The selected variables were the Bombay Stock Exchange (BSE) stock prices, Shanghai Stock Exchange (SSE) stock prices, Crude oil price, Money supply (M2), Industrial production and Inflation rate.

Augmented Dickey Fuller (ADF) unit root test, Johansen-Juselius Multivariate Cointegration and Vector Error Correction Model techniques have been applied to explore the long-run and short-run relationships. The results of the study revealed both long-run and short-run linkages between the macroeconomic variables and stock market indices of both countries.

- Mishra and Harminder [9] checked the non-linear relationship of macroeconomic variables with stock market returns and also on its variability by using semi-parametric approaches. The selected macroeconomic variables, i.e. Exchange Rate, Interest Rate, Industrial production, Foreign Institutional Investors and Inflation explained volatility at 26 percent in Sensex and followed by Nifty with 11 percent.

- Tripathy and Nalinprava [19] examined the weak form market efficiency and casual relationship between the selected macroeconomic variables and the Indian stock market by employing Ljung-Box Q test, Breusch-Godfrey LM test, Unit Root test and Granger Causality test from January 2005 to February 2011. The weekly observations of BSE Sensex, WPI, Treasury bill rate, Exchange rate, S and P 500 and BSE trading volume were used to find out the results. The presence of autocorrelation was found in Indian stock market after using appropriate tests, i.e. employing Ljung-Box Q test and Breusch-Godfrey LM test. The bidirectional relationship between interest rate and stock market, international stock market and BSE volume, exchange rate and stock market and exchange rate and BSE volume were observed. It also found unidirectional causality among the international stock market and domestic stock market, interest rate and stock market, exchange rate and stock market and inflation rate and stock market. The study further revealed that Indian stock market was not a weak form efficient and investors could earn abnormal profits by considering changes in the macroeconomic variables and historical prices of stocks.

- Bhunia [2] opined on the shock of crude oil price, stock price and exchange rate on the growth of Indian economy. It is found that the growth rate of Gross Domestic Production was crucially impacted by the rate of stock price, the rate of oil price and rate of exchange rate but the more influential variable is the growth rate of stock price.

- Kalra [6] applied multiple correlation, multiple regression and Anova test to study the impact of Macroeconomic variables on Indian Stock Market. The monthly data of selected variables like Cash Reserve Ratio, Reverse Repo Rate, Gold Price, Silver Price, Inflation Rate, Whole Sale Price Index, GDP and Forex Rate was analyzed to achieve the objectives. It was observed that Forex Rate, Whole Sale Price Index, Inflation Rate and Gold Price were the most significant variables.

- Naik [10] employed the Johansen's co-integration, vector error correction and Granger Causality models to examine the relationship between stock market returns in BSE Sensex and a set of 5 macroeconomic variables such as the Index of Industrial production, money supply, Wholesale price index, treasury bill rates and exchange rates using monthly data since 1994 : 2004 to 2006:2011. The analysis revealed that a long run equilibrium relationship between stock market index and macroeconomic variables exist because these were co-integrated with each other. It is found that the stock prices positively relate to the industrial production and money supply but negatively relate to inflation. The short-term interest rate and exchange rate were insignificant to determine stock prices. The bidirectional causality exists between industrial production index and stock prices, whereas,

unidirectional causality from stock prices to inflation, interest rates to stock prices and money supply to stock prices were found.

- Patel [14] analyzed the effect of Macroeconomic Determinants on the Performance of the Indian Stock Market from January 1991 to December 2011. The monthly data on Interest Rate, Inflation, Exchange Rate, IIP, Money Supply, Gold Price, Silver Price and Oil price used to show their effect on the performance of two major stock market indices i.e. Sensex and Nifty. ADF Unit Root Test, Johansen Cointegration test, Granger Causality Test and Vector Error Correction Model applied to find the co-integration, long run and short run equilibrium relationship and Causality among the variables. It was found that a long run equilibrium relationship between stock market indices and all macroeconomic variables exists. The study also confirmed the evidence of causality among the variables.

- Walia [21] studied and analyzed the impact of the Global Financial Crisis on Indian economy. The scholar exposed the various reasons of initiation and its impact on various Indian sectors like agriculture, manufacturing, construction, finance, insurance, real estate, etc. The total nine sectors were taken to calculate the GDP, Growth rate of exports and imports, Balance of payment position, Foreign Investments, Income flow in India and the cumulative change in equity indices were studied to find the results. The entire study is divided into two parts, i.e. pre meltdown and post meltdown periods. It was found that initially, India was not affected by this crisis, but later at the bankruptcy of Lehman Brothers and occurrence of some other events shivered the Indian economy

- Kumar [8] opined on the effect of Macroeconomic factors on the performance of Indian Stock Market. The twelve internal and external macroeconomic variables along with stock prices of CNX Nifty were selected to establish this relationship. The average monthly data of thirteen years have been gathered from the reliable sources. Out of these twelve selected variables, three factors were sorted out through data reduction technique labeled as Macro Environment, Policy Rates and Industrial Growth. It was investigated that favorable macro environment, passive growth pattern and effective policy rates existed and positively affect the Indian Capital Market. The multiple regression was used to establish the causal relationship between the selected factors and dependent variable i.e. CNX Nifty stock prices. The positive and significant Nifty, but positive and insignificant in case of Policy Rates and Nifty. The author concluded that apart from the macroeconomic variables, the other factors like firm's performances and unseen factors also affected the Indian Stock Market.

- Sangmi [16] examined the effect of macroeconomic variables on the Indian stock prices. Six variables inflation, exchange rate, industrial production, money supply, gold price, interest rate was selected to check its effect on the performance of three indices Sensex, Nifty and BSE 100. Multiple regression has been applied on monthly data which indicated a significant relationship between the dependent and independent variables i.e. stock market prices and macroeconomic variables.

Data and Methodology

Need of the study

Stock market of any economy plays a pivotal role in its development and growth. It affects every sector of an economy, whether financial sector, industrial sector, etc. It helps the investors to turn their dreams into reality. It brings the sellers and buyers together on one place for trading and investment. It provides ample opportunities to investors to

earn profits and enhance their investments worth. It becomes the basis for the government and regulatory authorities to plan their policies. It plays an important role in the mobilization of capital from the domestic as well as from foreign investors [15-18].

The importance of this research stems from the crucial role played by the Indian stock market in developing Indian economy. The utmost task done by this is a collection of money from investors and encourage them to invest. So, this work was conducted to check the influence of some macroeconomic variables on the performance of BSE 500 manufacturing firms.

Secondly, this work would be helpful to the investors at the time of their investment decisions because they can consider all those affecting variables and take suitable actions. Individual investors, institutional investors, portfolio managers and foreign investors may be used this study as an assistant in their work. Thirdly, all the firms whether already listed or going to be listed on any stock exchange might refer the affecting variables [20].

Objectives of the study

This work was executed with the objective to check whether macroeconomic variables are actually putting an effect on the functioning of Indian Stock Market or not after the Global Financial Crisis. Thus, the objectives are:

- To analyze the impact of various macroeconomic variables on the functioning of Indian Stock Market after the Global Financial Crisis.
- To check whether the Indian Stock Market is a weak form market efficient or not.

Scope of the study

The scope of the study is limited to 150 manufacturing firms listed at BSE 500. BSE 500 is constructed by BSE Ltd. in August, 1999 after taking into consideration the changing pattern of the economy and market. It represents nearly 93% of the total market capitalization on BSE. It covers all 20 major industries of the economy. Moreover, its calculation methodology was decided to be free-float on August 16, 2005 before the global financial crisis. Its base year is 1999. The market capitalization position represented by this index shown most reliable and valid values as compared to those indices whose base years are 1995-96 (NSE) and 1978-79 (BSE).

The sample size of 150 manufacturing firms has been selected on the basis of higher closing prices of stocks on 31st March 2015. All the manufacturing firms traded on BSE 500 were identified as per the classification given by NIC, 2008. It was found that 258 firms belong to manufacturing industry. Out of this 258 firms, 124 firms fall in small cap, 46 firms in mid cap and 88 firms in large cap categories. Proportionately, 150 firms were picked as 72 from small cap, 27 from mid cap and 51 from large cap.

A time span of ten years from April 2006 to March 2015 has been chosen for the research. The monthly data against the yearly and quarterly data were employed to depict a larger prospect of the relationship between macroeconomic variables and BSE 500. The monthly closing prices of all the selected manufacturing firms were collected and then average values calculated to do the further research.

The ten macroeconomic variables Broad Money, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Foreign Institutional Investors, Gross Fiscal Deficit, the Index of Industrial Production, Inflation Rate and Trade Balance were selected for the work

on the basis of their importance and literature studied. The domestic as well as international macroeconomic variables were chosen to do the research.

The secondary data was used for the entire study. The data related to the closing prices of manufacturing firms were collected from the website of money control. The database of RBI was used to gather the monthly data of all macroeconomic variables except crude oil prices which is taken from index mundi.

Table 1 indicates symbols and proxies used for selected macroeconomic variables and stock index in the study.

Techniques used

The Augmented Dickey Fuller (ADF) Test, Multiple Regression and Granger Causality Test were used through Eviews to untangle the linkage between macroeconomic variables and stock market prices.

The ADF Test was employed to check the stationarity of data. When the data became stationary, then Multiple Regression has been applied to find out the significant variables. Granger causality test was used after multiple regression to check the casual relationship between the dependent and independent variables. The causal relationship was confirmed for those which found significant after the results of multiple regression.

Empirical Results

It is a recognized fact that the financial time series contains a unit root. The data may be random walk or non stationary. Test of unit root is necessary for BSE500 index and macroeconomic variables as the presence of unit root may give invalid inferences in the analysis. In other words, before testing the impact of the selected macroeconomic variables on the BSE500 index, it is necessary to test the presence of a unit root in the series. Augmented Dickey-Fuller (ADF) Test is the popular test for unit root testing of time series. If y_t is the time series to be tested for unit-root, then the test statistic for ADF unit root testing will be given by τ statistics, which is OLS estimates of coefficient of y_{t-1} in equation (1), divided by its standard error:

$$\Delta y_t = \rho y_{t-1} + \mu + \lambda_1 + \alpha \sum_{i=1}^n y_{t-i} + u_t, \dots$$

Table 2 shows the results of Unit Root Test for the BSE 500 and macroeconomic variables by using the ADF Test with intercept. The results indicated that BSE 500 average closing stock prices of 150 manufacturing firms along with ten macroeconomic variables are non-

Name of Variables	Symbol Used	Proxy Used
Money Supply	MS	Broad Money (M3) in Rs. Billion
Call Money Rate	CMR	Weighted Average Call Money Rates
Crude Oil Price	CO	Indian Rupee per Barrel
Exchange Rate	ER	Average Rupees per unit of US \$
Foreign Exchange Reserve	FER	Total Foreign Exchange Reserve in Rs. Billion
Foreign Institutional Investors	FII	Net Investment in Rs. Billion
Gross Fiscal Deficit	GFD	Centre Gross Fiscal Deficit in Rs. Billion
Index of Industrial Production	IIP	General Index Numbers of Industrial Production
Inflation Rate	IR	Wholesale price Index-Inflation
Trade Balance	TB	Trade Balance in Rs. Billion
Stock Index	BSE 500	Average Monthly closing prices

Table 1: Description of data.

Variables	Level	I st Difference	II nd Difference	Null Hypothesis (Ho)	Result
BSE 500	3.394868 (1.0000)	-5.683849 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Money Supply(M3)	2.971852 (1.0000)	-1.923393 (0.3204)	-7.412518 (0.0000)	Rejected at II nd difference	Variable is stationary at II nd difference
Call Money Rate (CMR)	-2.345269 (0.1601)	-5.288582 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Crude Oil Price (CO)	-2.050301 (0.2653)	-6.294278 (0.0000)	–		
Exchange Rate (ER)	-0.438107 (0.8975)	-7.472253 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Foreign Exchange Reserve (FER)	-0.127608 (0.9428)	-10.01588 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Foreign Institutional Investors(FIIs)	-7.196381 (0.0000)	–	–	Rejected at level	Variable is stationary at level
Gross Fiscal Deficit (GFD)	1.544632 (0.5069)	-7.489183 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Index of Industrial Production (IIP)	-2.000359 (0.2863)	-2.762860 (0.0676)	-7.812011 (0.0000)	Rejected at II nd difference	Variable is stationary at II nd difference
Inflation Rate (IR)	-1.108949 (0.7098)	-5.518630 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference
Trade Balance (TB)	-2.250618 (0.1901)	-16.60672 (0.0000)	–	Rejected at I st difference	Variable is stationary at I st difference

Null Hypothesis (Ho): Selected variable is not stationary

Alternative Hypothesis (H_a): Selected variable is stationary

Source: Author’s own work

Table 2: Augmented Dickey Fuller Test with intercept.

stationary at level except Foreign Institutional Investors. They became stationary at their first difference or second difference as shown in table.

The results of the Augmented Dickey Fuller (ADF) Test are given in Table 2.

From the Table 2, it is clear that all the variables except FIIs were non-stationary at level with intercept. It attained stationarity at 5% significance level; however, the actual p-value of all other variables was greater than the critical P-value hence found non-stationary at level. BSE 500 Sensex, Call Money Rate, Crude Oil price, Exchange Rate, Foreign Exchange Reserve, Gross Fiscal Deficit, Inflation Rate and Trade Balance became stationary at Ist Difference and Broad Money and Index of Industrial Production at IInd difference.

Regression analysis provides a tool that can integrate the relationship of intentions with two, three, or more variables simultaneously. This technique was used to investigate the effect of selected macroeconomic variables on the closing prices of selected manufacturing firms of BSE 500. The results are given in Table 3 which shows the relationship between the ten macroeconomic variables and BSE 500.

From Table 3, it can be concluded that all the macroeconomic variables except Exchange Rate and Foreign Institutional Investors had no significant relationship with the closing prices of selected manufacturing firms listed at BSE 500 at 5% significance level. Broad Money, Call Money Rate, Crude Oil Price, Foreign Exchange Reserve, Gross Fiscal Deficit, Index of Industrial Production, Inflation rate and Trade Balance found insignificant in building any relationship with its dependent variable. The p-value of Exchange Rate is 0.0259 that is lesser than its critical value i.e.0.05 and in the similar way FIIs p-value is 0. So, Exchange Rate and Foreign Institutional Investors exhibited the significant relationship with the closing prices of selected manufacturing firms of BSE 500.

Granger causality test

A statistical approach proposed by Clive W Granger to infer cause

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Results
MS	-0.57274	0.705729	-0.81156	0.419	Accepted H ₀
CMR	0.015208	0.022573	0.673717	0.5021	Accepted H ₀
CO	0.005906	0.078477	0.075252	0.9402	Accepted H ₀
ER	-0.84521	0.373546	-2.26266	0.0259	Rejected H ₀
FER	0.083003	0.252933	0.328161	0.7435	Accepted H ₀
FIIs	0.000411	8.49E-05	4.836972	0	Rejected H ₀
GFD	-0.00513	0.005315	-0.96542	0.3368	Accepted H ₀
IIP	-0.06716	0.115514	-0.58137	0.5624	Accepted H ₀
IR	-0.01323	0.017298	-0.76459	0.4464	Accepted H ₀
TB	-0.00889	0.021605	-0.41124	0.6818	Accepted H ₀

Null Hypothesis (H₀): No significant relationship between BSE 500 Sensex and selected macroeconomic variable

Alternative Hypothesis (H_a): Significant relationship between BSE 500 Sensex and selected macroeconomic variable

Source: Author’s own work

Table 3: Multiple Regression.

and effect relationship between two or more time series is known as Granger Causality. Granger Causality is based on the simple logic that effect cannot precede cause. It is important to note that the statement “x Granger causes y” does not imply that y is the effect or the result of x. In other words, Granger Causality is a technique for determining whether one time series is useful in forecasting another. This section analyzed the causal relationship between the stock prices of 150 manufacturing firms of BSE 500 and macroeconomic variables like Broad Money, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Foreign Institutional Investors, Gross Fiscal Deficit, Index of Industrial Production, Inflation Rate and Trade Balance from April 2006 and March 2015.

To study the stationary of the data series, ADF has been conducted above. The direction of the causal relationship between the variables

Null Hypothesis:	Observation	F-Statistic	Prob. (p Value)	Result	Relationship
FII does not Granger Cause BSE 500 BSE 500 does not Granger Cause FII	105	0.41325 0.01872	0.6626 0.9815	Accepted H_0 Accepted H_0	No relation
ER does not Granger Cause BSE 500 BSE 500 does not Granger Cause ER	105	2.25551 1.16861	0.1101 0.315	Accepted H_0 Accepted H_0	No relation
BSE 500 does not Granger Cause FII FII does not Granger Cause BSE 500	105	0.39468 1.98586	0.6749 0.1426	Accepted H_0 Accepted H_0	No relation

Null Hypothesis (H_0): No causal relationship between BSE 500 and selected macroeconomic variable

Alternative Hypothesis (H_a): causal relationship between BSE 500 and selected macroeconomic Variable.

Source: Author's own work

Table 4: Pairwise Granger Causality Tests for BSE 500.

has been tested by applying Granger Causality Test. The various hypotheses have been developed for the purpose as shown in the Table 4. If calculated p-value is less than the significant value of 0.05, the null hypothesis is rejected which implies x Granger cause y. The results of the Granger Causality Test are presented in Table 4.

Table 4 presents the results of granger causality test for two macroeconomic variables, i.e. Foreign Institutional Investors and Exchange Rate have been found significant after applying multiple regression and average closing price of 150 manufacturing firms of BSE 500. It has been found that Foreign Institutional Investors and Exchange Rate do not granger cause BSE 500. The calculated p-value for FIIs is 0.6626 and Exchange Rate is 0.1101 was found greater than the critical p-value i.e. 0.05. It's exhibited no causality relationship between the macroeconomic variables and BSE 500 average closing stock prices. The same result has been found when the causality relationship between the BSE 500 average closing prices and Foreign Institutional Investors and Exchange Rate was checked. The calculated p-values found greater than critical p-value. The results shown that no unidirectional and bidirectional relationship between the variables have been detected after 2006.

Limitations and Scope for Further Research

- The study has been done for the limited time period from 1st April 2006 to 31st March 2015. The research period might be extended for further studies.
- It considered only 150 manufacturing firms listed on the BSE 500 Index. Further, these were chosen from the three caps, i.e. large cap, medium cap and small cap. The ten macroeconomic variables only became part of this study. More Indices and macroeconomic variables can be selected to do the further research work. Banking and Insurance companies and other allied services companies, etc. may be chosen along with manufacturing firms. Even, the impact of macroeconomic variables on different sectors can be checked.
- The monthly data of ten macroeconomic variables and closing prices of 150 firms has been taken from the secondary sources; it may contain some limitations that were inherent in the collection sources. The primary study can be done to attain the same objectives.
- The results were drawn on the basis of ADF test with intercept, Multiple Regression and Granger Causality. The different statistical techniques can be used to do the same study.

Conclusion

This paper has inspected the impact of various macroeconomic variables like Broad Money, Call Money Rate, Crude Oil Price, Exchange Rate, Foreign Exchange Reserve, Foreign Institutional Investors, Gross Fiscal Deficit, Index of Industrial Production, Inflation Rate and Trade

Balance on the performance of closing prices of 150 manufacturing firms listed at BSE 500 after the Global Financial Crisis, 2006. No doubt, this crisis has left severe impact on every sector of Indian economy. The purpose of this study was to find out whether Indian Stock Market is being affected by any changes in macroeconomic variables. To check this effect ADF test along with multiple regression and granger causality has been used. The stationary data was used to unearth the significant macroeconomic variables through multiple regression technique. Only two macroeconomic variables, i.e. Foreign Institutional Investors and Exchange Rate out of ten variables have been found significant. The causality relationship between these two significant variables and average closing prices of manufacturing firms of BSE 500 was tested with Granger Causality technique. It has been extracted that these variables have no unidirectional and bidirectional relationship with closing prices of BSE 500 manufacturing firms. The study revealed that Indian stock market was weak form efficient during the period of study. The entire information about the stock market is available in the market. It can be concluded that investors would not be able to gain abnormal profits by using historical information.

References

1. Ahmed S (2008) Aggregate Economic Variables and Stock Market in India. International research Journal of Finance and Economics 14: 141-165.
2. Bhunia A (2012) The Shock of the Shock of Crude price, Stock price and Selected Macroeconomic Variables on the Growth of Indian Economy. Sumedha Journal of Management 1: 82-89.
3. Hojatallah G, Ramanarayana CS (2011) Empirical Analysis of the impact of Foreign Institutional Investment on the Indian Stock Market Volatility during World Financial Crisis. International Journal Economics of and Finance 3: 214-226.
4. Hosseini MA (2011) The Role of Macroeconomic Variables on Stock Market Index in China and India. International Journal of Economics and Finance 3: 233-243.
5. Jha AK, Shing NK (2014) Predicting the Volatility of Stock Markets and Measuring its Interaction with Macroeconomic variables: Indian Evidence, Case Study of NIFTY & SENSEX. International Journal of Sciences: Basic & Applied Research 13: 371-393.
6. Kalra R (2012) Impact of Macroeconomic Variables on Indian Stock Market. IUP Journal of Financial Risk Management IX: 43-54.
7. Kumar A (2011) An Empirical Analysis of Causal Relationship between Stock Market and Macroeconomic Variables in India. International Journal of Computer Science and Management Studies 11: 8-14.
8. Kumar R (2013) The Effect of Macroeconomic Factors on Indian Stock Market Performance: A Factor Analysis Approach. IOSR Journal of Economics and Finance 1: 14-21.
9. Mishra S (2012) Do Macroeconomic Variables explain Stock Market Returns? Evidence using a Semi-Parametric Approach. Journal of Asset Management 28: 1-13.
10. Naik KP (2012) The Impact of Macroeconomic Fundamentals on Stock Price Revisited: Evidence from Indian Data. Eurasian Journal of Business and Economics 5: 25-44.

11. Naka A, Mukherjee T, Tufte D (1998) Macroeconomic variables and the performance of the Indian Stock Market 1-26.
12. Mohanamani P, Sivagnanasithi T (2012) Indian Stock Market and Aggregates Macroeconomic Variables: Time Series Analysis. *IOSR Journal of Economics and Finance* 3: 68-74.
13. Parmar C (2013) Empirical Relationship among various Macroeconomic Variables and Indian Stock Market. *International Journal of Advance Research in Computer Science and Management Studies* 1.
14. Patel S (2012) The Effect of Macroeconomic Determinants on the performance of the Indian Stock Market. *NMIMS Management Review* 22: 117-127.
15. Ray S (2012) Foreign Exchange Reserve and its impact on Stock Market Capitalization: Evidence from India. *Research on Humanities and Social Sciences* 2: 46-60.
16. Sangmi MUD, Hassan MM (2013) Macroeconomic variables on Stock Market Interactions: The Indian Experience. *IOSR Journal of Business and Management* 11: 15-28.
17. Singh D (2010) Causal Relationship between Macroeconomic Variables and Stock Market: A Case Study for India. *Pakistan Journal of Social Sciences* 30: 263-274.
18. Srivastava A (2010) Relevance of Macro Economic factors for the Indian Stock Market. *Decision* 37: 69-89.
19. Tripathy N (2011) Casual Relationship between Macro-Economic Indicators and Stock Market in India. *Asian Journal of Finance & Accounting* 3: 208-226.
20. Victor Z (1992) Major Macroeconomic Variables and Leading Indexes. In Z. Victor, *Business Cycles: Theory, History, Indicators and Forecasting* 357-382.
21. Walia S (2012) Impact of Global Economic Crisis on Indian Economy: An Analysis. *International Journal of Latest Trends in Engineering and Technology* 1: 31-36.