

Macroeconomic Variables Vs. Stock Prices: An Analytical Study Of The BSE Sensex

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Abstract

Over the past few years, a multitude of investors have suffered significant financial losses due to erroneous stock market predictions. The inherent difficulty in forecasting market trends establishes the core objective of this research. Investor risk can be mitigated, and predictive accuracy enhanced, if market participants are equipped with comprehensive data regarding the fundamental determinants of equity pricing. Accordingly, this study aims to identify and analyze the critical factors driving stock price fluctuations.

Specifically, this research examines the impact of selected macroeconomic indicators—namely foreign exchange rates, money supply, and foreign exchange reserves—on the Bombay Stock Exchange (BSE) Sensex. The empirical analysis utilizes monthly data sourced from authoritative repositories, spanning the period from April 2021 to March 2026. Following a comprehensive review of existing literature, the dataset was subjected to unit root testing to evaluate its stationarity. Furthermore, the widely accepted Johansen co-integration technique was employed to establish long-term relationships between the dependent and independent variables, while the Granger causality test was applied to assess the direction of causal linkages among these factors.

Keywords: Macroeconomic variables, Stationary of data, Co-integration, Granger causality, BSE Sensex.

Introduction

The Indian stock market has become an inconspicuous share trading platform. The investors across the world have been interested in knowing the factors influencing the stock indices in stock market (BSE). The investors and investment strategy makers are in the pursuit of the accurate information about the factors causing fluctuations in stock indices. This study aims to explore various macroeconomic factors which extensively impact Indian stock market (BSE) and examine the macroeconomic factors and Bombay stock exchange to ensure the relationship between both. The researcher has selected few macroeconomic factors on the basis of their presence in the existing literature and experts' advices. This research study examines the data collected for 10 years from April 2021 to March 2026. Exchange rate, Money supply and foreign exchange reserve have been taken as independent factors.

Review of Literature

Kumar Saurabh (2022): The researcher analyzed the monthly return data and examined the impact of macroeconomic variables on variations in stock returns in stock market in India i.e. BSE Sensex. A plenty of macroeconomic variables were studied under this research study. The macroeconomic variables included real economic activity, wholesale price index, exchange rate, World gold price, domestic silver price, Crude oil prices and broad money etc. The adequacy of linear dependence was suggested by factor and regression analysis. The variations in stock returns were significantly impacted by World gold price and broad money. In this research study, monthly data was used and few macroeconomic factors were studied.

B. Venkatraja (2024): This research study aims at examining the dynamics of linkages among macroeconomic variables and share prices. To examine the data under study, co-integration propounded by Johansen and VECM model have been applied. Independent variables included wholesale price index, foreign institutional investment, gold price, index of industrial production and real effective exchange rate. The study proved stock price index and macroeconomic variables to be co-integrated. It was revealed that share prices were related to gold negatively. The researcher found that complete set of macroeconomic variables were determining prices of shares in a significant manner. In the study, causality test was preferably applied in analyzing the dynamic forces of relationship in short run and it was unearthed that foreign institutional investment, gold and real effective exchange rate were effecting the stock prices in BSE.

Atul Shiva & Monica Sethi (2025): This research has focused on relation between gold price and exchange rates in country (India). Application of co-integration test signified that price pertaining to gold and exchange rate were co-integrated. The variables were identified having equilibrium relationship in long period under the research study. Johansen co-integration test was applied for examination of data. The presence of unidirectional causality was confirmed by the Granger causality test. By and large the study witnessed the important role of stock market sprawled in country (India) in the discovery of prices of gold both in the long run and short run period.

The study considers gold market as insurance against the remarkable movements in the worth of assets during scruffy financial markets. The researcher emphasized the significance of gold in hedging against fluctuations in the US dollar in the International market. The study specified that if gold price plummets in the coming future then it would be sparking the improvement in the global conditions.

Gurloveleen Kaur (2026): The research study included macroeconomic variables influencing share market (India). Under this research study, an investigation of macroeconomic variables having effect on the behaviour of Indian stock market took place. To reach to the objectives of study, the data (collected on monthly basis) of ten macroeconomic variables were considered and analyzed. The depended variable on which the impact of these aforesaid variables was examined was BSE 500 index. To process with data and find the outcomes, ADF test and one another test multiple regression i.e. econometric test were employed. As per the research study Foreign Institutional Investors were found stationary at level i.e. I (0). Further, this data was examined through regression technique and finally Granger causality test was applied to examine the causality relationship between dependent and independent variables. The study notified no significant relationship between financial macro-economic factors and closing share prices of BSE 500. Moreover, this study indicated the weak form of efficient market in India in view of absence of relationship between dependent & independent factors.

Antonette Fernando (2018): This research study is related to Sri Lankan stock market and examines the established relationship between yields in stock market and macroeconomic variables. The data covers the span of period from 1998 to 2016 and monthly data has been considered for examination. Vector error correction model has been applied under research study. J. Juselius co-integration test signifies a long term relationship between macroeconomic variables and stock returns. As per this research study, Treasury bill rate and foreign exchange rate having negative effect on stock returns were found while Money supply and inflation were significant factors influencing stock returns in long run. It supports the weak form of market efficiency in the Colombo Stock Exchange, Sri Lanka.

Objectives

The researcher has set the objectives of this research study assuming the relationship among Indian stock market and financial macro-economic factors. The objectives of this study focus on the problem of investors regarding prediction of stock market in India.

Accordingly, the objectives of the present study have been set as followed:

- To explore and identify the factors influencing stock market (BSE) in India.
- To study the causal relationship b/w stock market (BSE) and key macroeconomic variables
- To determine the most influencing macro-economic factors affecting the prices of share at Bombay stock exchange.

Research Methodology

Data source and Collection

To carry out the research study, the secondary data for the span of 10 years has been collected from reliable source. Yahoo finance, Moneycontrol.com and other authentic websites have been considered in this process of data collection. The macroeconomic factors have been taken under this study on the basis of the frequent presence of factors in existing literature. BSE Sensex has been taken as dependent factor.

Econometric Specification

Considering the set of objectives of this study, the econometric techniques have been used. The data has been analyzed with the help of econometric software E-views. Stationary test (Dickey fuller test), Co-integration test (Johansen Co-integration test), VAR, and causality test by Granger have been applied in the present study.

Test of stationary

The first condition for data to be examined under research study is that data should be stationary. If the data is found stationary, then it may be processed. To determine whether data is stationary or not, augmented dickey fuller test may be applied. For the data to be stationary, mean and variance calculated of data series must be constant over a time period. The

non-stationary data is characterized by unit root problem. The present study gains its momentum by applying unit root test (ADF test) in direction of ensuring the status of data to be stationary or non-stationary. The outcome of unit root test determines the direction for the data to be further analyzed.

Johansen's Co-Integration Test

On the basis of result of augmented dickey fuller test, if the data is found stationary and it signifies to be integrated at the same order then to study the existence of long run causal relationship b/w dependent and independent variables, Johansen co-integration test has its significance. This test may be conducted if data is found I (0) or I (1).

Vector Regression Model (VAR)

The long term relationship is tested by using Johansen test. In the short period there is possibility of disequilibrium. In the absence of co-integration among variables, with intention to examine the short term relationship between all the variables (dependent and independent variables), Vector auto regression test has been applied in the present study.

Granger Causality Test

Having conducted the co-integration test to identify the co-integration between dependent and dependent factors, the causality test propounded by Granger was also carried out to measure and ensure the causal relationship b/w factors. The Granger Causality Test ensures the predictability of changes made in one variable by other one.

Analysis of Data

Table 1: Results of ADF unit root test

UNIT ROOT TEST				
Variables	At Level		At First Difference	
	t-Statistic	Prob.	t-Statistic	Prob.
Forex	-1.420898	0.5683	-9.072803	0.0000
Forexres	-0.157993	0.9386	-7.55252	0.0000
Ms	-1.914911	0.3241	-10.74929	0.0001
Sen	-0.604476	0.8631	-9.46424	0.0000

The results present that variables irrespective of being dependent or independent, pose issue of unit root and such in the way become non-stationary at level. But, converting data at first differencing time series variables attain stationary. Hence, the null hypotheses (H0) (Data has unit root) of the study is accepted.

Down the line of ensuring the stationarity of the data, co-integration test was put into action by using Johansen test to check whether there exists any equilibrium relationship (long term) between the dependent and independent variables. For this objective Johansen test is administered and the following hypotheses are tested in this study.

H0: There is absence of co-integration b/w Sensex and macroeconomic factors.

H1: The co-integration exists between Sensex and macroeconomic variables.

Table 2: Outcomes of Johansen Co-integration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.255771197...	45.06888965...	47.85612715...	0.089270151...
At most 1	0.133150126...	21.14094201...	29.79707334...	0.348918439...
At most 2	0.101645683...	9.566894623...	15.49471287...	0.315525976...
At most 3	0.010859687...	0.884445792...	3.841465502...	0.346986010...

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.255771197...	23.92794763...	27.58433778...	0.137252321...
At most 1	0.133150126...	11.57404739...	21.13161629...	0.590002687...
At most 2	0.101645683...	8.682448830...	14.26460015...	0.313537651...
At most 3	0.010859687...	0.884445792...	3.841465502...	0.346986010...

As per the analysis under co-integration test, it was signified the absence of co-integration among the variables. After examining the co-integration among factors, The Vector auto-regression tool is adopted to test and determine the short term relationship among the variables.

Table 3: Results of Vector Auto-regression model

	SEN	FOREX	FORRES	MS
SEN(-1)	0.857880 (0.11447) [7.49437]	-0.001066 (0.00015) [-7.32492]	0.002171 (0.00050) [4.30998]	-1.38E-05 (0.00013) [-0.10483]
SEN(-2)	0.051589 (0.11967) [0.43108]	0.001066 (0.00015) [7.00696]	-0.001491 (0.00053) [-2.83228]	-3.11E-06 (0.00014) [-0.02259]
FOREX(-1)	138.7557 (82.8376) [1.67503]	0.970743 (0.10532) [9.21730]	-0.515238 (0.36448) [-1.41363]	0.003746 (0.09515) [0.03936]
FOREX(-2)	-87.62420 (81.8837) [-1.07011]	-0.003535 (0.10410) [-0.03395]	0.464320 (0.36028) [1.28877]	-0.078613 (0.09406) [-0.83581]
FORRES(-1)	37.25341 (28.6190) [1.30170]	-0.017924 (0.03639) [-0.49260]	1.036963 (0.12592) [8.23501]	0.033971 (0.03287) [1.03338]
FORRES(-2)	-41.61375 (27.4859) [-1.51400]	0.012352 (0.03494) [0.35347]	-0.097593 (0.12094) [-0.80698]	-0.042927 (0.03157) [-1.35966]
MS(-1)	-164.6767 (108.724) [-1.51463]	-0.076009 (0.13823) [-0.54988]	-0.619151 (0.47838) [-1.29428]	0.543223 (0.12489) [4.34970]
MS(-2)	119.1908 (114.132) [1.04433]	-0.051869 (0.14510) [-0.35746]	0.903493 (0.50217) [1.79918]	0.098530 (0.13110) [0.75157]
C	1119.344 (3105.62) [0.36043]	5.722533 (3.94840) [1.44933]	4.134790 (13.6645) [0.30259]	12.05249 (3.56731) [3.37859]

The result of VAR shows that Data series are not co-integrated in short term period. The independent factors emerged having no substantial effect on BSE Sensex.

The granger causality test is applied to examine the causality between macro- economic variable and BSE Sensex. The following hypothesis have been formulated under the study in order to fulfill the objectives set for research work.

H0: Sensex does not granger cause Money supply.

H1: Sensex granger cause macroeconomic variable Money supply.

H0: Money Supply does not granger cause Sensex.

H1: Money Supply granger cause Sensex.

Table 4: The granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
SEN does not Granger Cause MS	144	6.58449	0.0113
MS does not Granger Cause SEN		5.15047	0.0248

According to the result of the granger causality test it is indicated that BSE Sensex causes Money Supply and Money Supply granger cause the BSE Sensex as Null hypothesis are rejected.

Granger causality test applied to Sensex and Foreign exchange rate:

H0: The foreign exchange is not granger caused by Sensex.

H1: Foreign Exchange Rate is granger caused by Sensex

H0: Sensex is not granger caused by Foreign Exchange Rate

H1: Sensex is granger caused by Foreign Exchange Rate

Null Hypothesis:	Obs	F-Statistic	Prob.
SEN does not Granger Cause FOREX	82	28.3731	6.E-10
FOREX does not Granger Cause SEN		3.46762	0.0361

According to causality test results it is noteworthy that BSE Sensex granger causes Forex and Forex granger causes BSE Sensex.

Granger Causality test applied to Sensex and Foreign exchange reserve.

H0: Sensex does not granger cause macroeconomic variable (Foreign Exchange Reserve).

H1: Sensex granger cause macroeconomic variable (Foreign Exchange Reserve).

H0: Foreign Exchange Reserve does not granger cause Sensex.

H1: Foreign Exchange Reserve granger cause Sensex.

Null Hypothesis:	Obs	F-Statistic	Prob.
SEN does not Granger Cause FOREXRES	82	12.1955	3.E-05
FOREXRES does not Granger Cause SEN		0.10830	0.8975

As per the causality test results it is to notify that BSE Sensex granger causes Forex reserve and Forex reserve do not granger cause BSE Sensex.

Findings

Having gone through various existing literature, the researcher found the abundance of macroeconomic variables causing the variations in returns of stocks in different share markets. The various macroeconomic factors included under previous studies are as followed:

GDP, CPI, Gold price, Money supply, FDI, FPI, Foreign exchange rate, Foreign exchange reserve, Crude oil prices, Index of industrial production, Interest rates, GNP per capita, WPI, CRR, reverse repo rate, Silver prices, Call money rate, Industrial growth rate, Gross fiscal deficit etc.

The outcome of Augmented Dicky Fuller test asserted that data is the combination of stationary and non-stationary data. The data was found to have unit root. As per the analysis under Johansen co-integration test, it was revealed that there is no co-integration among the variables.

The result of VAR shows that Data series are not co-integrated in short term period. The variables being independent emerged having no substantial effect on BSE Sensex.

The output of granger causality test signify that BSE Sensex granger causes Money Supply & Money Supply granger cause the BSE Sensex as Null hypothesis are rejected.

The output of granger causality test signifies that BSE Sensex granger causes Forex and Forex granger causes BSE Sensex.

The output of granger causality test signify hat BSE Sensex granger causes Forex reserve and Forex reserve do not granger cause BSE Sensex.

Conclusion

This research study began with the objective of exploring and identifying numerous macroeconomic factors influencing predictability of share market in India. Having gone through intensive existing literature, the researcher came across various macroeconomic factors studied in relation to variations in stock returns at stock markets. Gross domestic product, Inflation rate (CPI), Gold price, Money supply, Foreign direct investment, Foreign portfolio investment, Foreign exchange rate, Foreign exchange reserve, Crude oil prices, Index of industrial production, Interest rates, GNP per capita, WPI, CRR, Call money rate, Industrial growth rate, Gross fiscal deficit etc. were found few important macro-economic factors during the study. The study emphasized on examining the causal relationship among various macroeconomic factors and BSE Sensex as proxy of Indian stock market. Having formulated various hypothesis and conducted various econometrics tests in order to reach to a conclusion, plenty of facts came to fore. The outcome of tests depicted that there was no long term co-integration among foreign exchange rate, foreign exchange reserve, money supply and BSE Sensex. The vector auto-regression test revealed that there is no substantial relationship between variables at macroeconomic level and BSE in short term. The output of granger causality test

signify that BSE Sensex granger causes Money Supply and Money Supply granger cause the BSE Sensex as Null hypothesis are rejected. As per the result of causality test it is to signify that BSE Sensex granger causes macro factor Foreign exchange rate and Foreign exchange rate granger causes BSE Sensex. As per the result of causality test, it is to note down that BSE Sensex granger causes Foreign exchange reserve and Foreign exchange reserve is not significant causing BSE Sensex.

Recommendation & Suggestions

This research study will ensure whether analyzed factors are essential and immensely helpful in investment decision making process or not. Hence, the reported outcome may have significant interpretation for investors in their process of decision making while investing their fund. Following are given two valuable suggestions for the investors and other people having interest in making investments in share market in India.

- The investors are recommended to consider various macroeconomic factors and their movement before taking investment decisions.
- The stakeholders are recommended to be wide awake of money supply and foreign exchange rate while formulating investment strategies as these two factors have significant effect on stock indices at BSE.

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