# AN ANALYSIS OF THE MACROECONOMIC FACTORS - AN IMPACT ON INDIAN STOCK MARKET

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## ABSTRACT

India's economic process has positioned it together of the world's fastest-growing economies, with the country predicted to be among the highest three within the next decade. Despite a slowdown in Indian corporate earnings thanks to excess existing capacity and banks' inability to lend, the stock exchange, specifically the Bombay stock market, has performed well. The aim of this study is to ascertain if there's a link between the BSE Sensex and macroeconomic variables just like the Index of commercial Production (IIP), inflation, and rate of interest, gold price, rate of exchange, FII, and funds for the amount April 1999 to March 2017. Supported the tests of Johansen Co-integration, Granger Causality, and therefore the Vector Error Correction mechanism, the study also aims to work out the strength of the link between the independent parameters and therefore the dependent parameter, namely the BSE Sensex, within the short and end of the day. The Vector Error Correction Model (VECM) confirms that the Index of commercial Production (IIP), inflation, interest rates, gold prices, rate of exchange, international institutional investment, funds, and therefore the BSE Sensex have a long-run causal relationship. It proves that there's a short-run causality between inflation and therefore the BSE Sensex, also as between funds and therefore the BSE Sensex. The findings show that the BSE Sensex influences the rate of exchange, funds, FII, gold prices, and IIP.

***Keywords*****:** *Indian Stock Market, Bombay Stock Exchange, Macroeconomic variables, Johansen Co-integration.*

## INTRODUCTION

India's economic growth has positioned it as one of the world's fastest growing economies, with the country predicted to rank among the top three economies in the next ten years. In 2016-17, India's Gross Domestic Product rose by 7.1 percent, with a projected increase of 7% in 2016-17. In 2017-18, Indian corporate earnings are expected to increase by more than 20%. Moody's has upgraded India's sovereign rating to Baa2 after 14 years, citing a stable economic outlook. The financial and stock markets' strong performance has a positive impact on an economy's fundamentals and aids in the development of a country's financial and economic system. The performance of the stock markets is known to be influenced by macroeconomic factors such as the Index of Industrial Production (IIP), interest rates, inflation levels, gold price, rate of exchange, FII, and money supply.

Foreign Institutional Investors have been able to invest in Indian debt and equity markets since 1991, thanks to liberalization and privatization. The primary market helped Indian companies raise Rs 1.6 trillion (US$ 24.96 billion) in 2017. From April to October 2017, FIIs brought in USD 17.412 million, compared to US$ 43.4 billion in 2016-17 through Foreign Direct Investment (FDI). According to the mid-year Indian Economic Survey, India has earned the most equity inflow and is one of the world's most open economies as a result of liberalization and privatization measures. Investors are bullish and upbeat about the Indian economy as a result of the Indian government's slew of economic measures in recent months. The government's demonetization and implementation of the Goods and Services Tax measures have boosted investor trust in the Indian stock markets. Corporates have a positive outlook on the Indian economy, thanks to SEBI relaxing the rules for registered Foreign Portfolio Investments in India, allowing them to invest in infrastructure investment trusts and Real Estate Investment Trusts.

India's stock market is widely regarded as one of the most developed capital markets in the world. The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) are the two most important stock exchanges in India. The first Asian stock exchange, the Bombay Stock Exchange, was established in 1875. There are over 5000 companies listed on it. It's the BSE Sensex, the stock exchange's equity index, which is widely followed and widely agreed as a stock-market benchmark equity index. The BSE index is said to be a good indicator of the Indian economy's wellbeing. The BSE is India's largest stock market in terms of listed companies and market capitalization, with almost every major company listed. BSE became India's first publicly traded stock in February 2017. In November 1992, the National Stock Market Index was established, and in April 1993, it was recognized as a stock exchange. It is one of India's most important stock exchanges. The National Stock Exchange first opened its doors in 1994. According to (Singh A., 1997), stock markets play a crucial role in a country's economic development. The Indian stock market is known to have performed well, owing to the global economy's synchronized

recovery. Despite a slowdown in Indian corporate earnings due to excess existing capacity and banks' inability to lend, the stock market has done well.

Because volatility is a measure of risk, it should be kept to a minimum in any stock market. The arrival of new information about various macroeconomic factors or any kind of private information that can be incorporated into stock market prices drives volatility. Changes in inflation, interest rates, IIP, money supply, and other factors all contribute to volatility. The primary policy goal of the Reserve Bank of India is to keep inflation at around 4%. The RBI's emphasis on inflation targeting impacts its decision on whether or not to change the country's key interest rates. The industry's demand for interest rate cuts for capital formation also necessitates other measures to be taken by the government through reforms that can increase competitiveness.

On the Bombay Stock Exchange (BSE) Sensex, (Chittedi, 2015) looked at the effect of money supply, foreign institutional investments, REER, IIP, interest rates, the Call Money Rate (CM), WPI, and gold prices. He looked into the connection between these macroeconomic factors and the BSE.

(Singh, 2014) investigated the relationship between macroeconomic drivers and the BSE, specifically the impact of the WPI, Money Supply, IIP, Interest Rate, Trade Deficit, Exchange Rate, FII, crude oil and gold prices on the BSE. The macroeconomic drivers had a significant effect on the Indian stock market, according to the study. Exchange rates and gold prices were seen as having a negative effect, while money supply and availability were seen as having a positive impact. The Granger causality test revealed a causal relationship between the exchange rate and the stock market.

## OBJECTIVES OF THE STUDY

Various factors such as IIP, inflation, rate of interest, gold price, rate of exchange, FII, and money supply, among others, could be influencing the stock market indices in India, such as the BSE Sensex.

a. For the period April 1999 to March 2017, the current research study examines the relationship between the BSE Sensex and macroeconomic variables such as the Index of Industrial Production (IIP), inflation, rate of interest, price of gold, rate of exchange, FII, and money supply.
b. Based on the Granger Causality test and the Vector Error Correction model, the study also aims to calculate the strength of the link between the independent parameters and the dependent parameter, i.e. the BSE Sensex, in the short and long run.

## LITERATURE REVIEW

(Gurloveleen & Bhatia, 2015) looked at the impact of economic variables like money supply, call money, crude oil prices, exchange rate, foreign exchange reserves, FIIs, gross fiscal deficit, IIP, inflation, and trade balance. They investigated this using the multiple regression method, the ADF test, and the Granger Causality test, and discovered that among all FFIs, the exchange rate was the most influential factor.

In the case of a link between Foreign Institutional Investors and the Indian stock market, (Hojatullah & Ramanarayana, 2011) used the Engle Granger test and Johansen Co-integration to determine that FII and the BSE stock index were co-integrated and that a bilateral causality existed. In their study of the causal relationship between stock prices and macroeconomic parameters (Hosseini, 2011), Prices of crude oil, money supply, inflation, and IIP were analyzed, and it was discovered that there is a link between the stock market index and macroeconomic variables in both the short and long run. The ADF test, Johansen Julius Multivariate Co-integration, and the Vector Error Correction mechanism were used.

In his study, (Ahmed, 2008) looked at the effect of broad money supply, IIP, interest rates, exchange rates, and FDI on the stock market index and discovered a causal link between certain macroeconomic parameters and the long run stock market index.
(2010, Srivastava) On the other hand, it was discovered that the wholesale price index and interest rate influence stock market indices, and that domestic variables have a greater impact than global variables. For analysis, they used the Johansen Co-integration test and the VECM method.

(Patel, 2012) investigated the effect of macroeconomic factors such as the rate of exchange, inflation, IIP, M3, gold, silver, and oil prices on the S&P CNX Nifty of the Bombay Stock Exchange. For the period January 1991 to December 2011, he used the ADF, Johansen Co-integration test, VECM, and Granger Causality test. He discovered that the macroeconomic parameters and the Sensex have a long-term relationship. He also discovered a causal relationship between the rate of exchange, stock market performance, IIP, and oil price.

(Sangmi & Hassan, 2013) investigated the effect of exchange rates, inflation levels, IIP, broad money supply, gold price, and interest rates on the stock exchanges, namely the BSE and Nifty, and discovered that the dependent and independent parameters have a significant relationship. In their research, (Shanken & Mark, 2006) discovered that IIP is a major influencing factor on the stock market.

(Bhunia, 2012) investigated the effect of changes in crude oil prices and the exchange rate on Indian economic growth levels and discovered that stock prices, oil prices, and the exchange rate all had an impact on GDP growth, but the rise in stock prices was the most significant of the three.

The relationship between the CRR, reverse repo rate, gold and silver prices, inflation, WPI, GDP, foreign exchange rates, and the Indian stock market was investigated by (Kalra, 2012). WPI, Forex, inflation, and gold prices were found to be the most important.

(Naik, 2012) investigated the link between stock market returns in the BSE Sensex and IIP, money supply, WPI, treasury bill rates, and exchange rates using the Johansen Co-integration, test of Granger Causality, and VECM model. He discovered a long-run relationship between macroeconomic variables and stock market returns, and discovered that stock prices, IIP, and money supply have a direct relationship, while price levels have an inverse relationship.
In the case of a link between Foreign Institutional Investors and the Indian stock market, (Hojatullah & Ramanarayana, 2011) used the Engle Granger test and Johansen Co-integration to determine that FII and the BSE stock index were co-integrated and that a bilateral causality existed.

(Hosseini, 2011) investigated the causal relationship between stock prices and macroeconomic parameters, looking at crude oil prices, money supply, inflation, and IIP, and discovered that there is a link between the stock market index and macroeconomic variables both in the short and long run. The ADF test, Johansen Julius Multivariate Co-integration, and Vector Error Correction mechanisms were used.

In his study, (Fama, 1981) looked at economic variables, while (Connor & Korajczyk, 1986) looked at financial variables to see how they affect stock market performance.

## RESEARCH GAP

Based on the literature review, it was determined that there is a link between macroeconomic factors and stock market performance. The current research, on the other hand, aims to add to the existing literature in the Indian context for the period April 1999 to March 2017. The purpose of this research is to see if there is a link between the BSE Sensex and macroeconomic variables like the Index of Industrial Production (IIP), inflation, interest rates, gold prices, exchange rates, FII, and money supply. Furthermore, the strength of the relationship between macroeconomic drivers and the BSE Sensex will

be determined using the Johansen Co-integration, Granger Causality, and Vector Auto-regression / Vector Error Correction models. The study's findings will have significant policy consequences.

## RESEARCH METHODOLOGY

The Economic Survey, worldbank.org, tradingeconomic.com, and indiastats.com were used to collect quarterly data from April 1999 to March 2017. Index of Industrial Production (IIP), inflation, interest rate, gold price, rate of exchange, FII, and money supply were all considered independent variables. The software E-views was used for mathematical and statistical analysis.

## TEST AND TOOLS APPLIED

Given the time series nature of the data, it is critical to test for Unit Root / determine whether the data is stationary or not using the Augmented Dickey Fuller test on each independent parameter. If a Unit Root exists, the series must be differentiated and checked for station aryness. The Johannsen Co-integration test was used in the case of co-integration. Furthermore, a Granger Causality test was performed to see whether there was any causal effect between each independent parameter and the dependent parameter, the BSE Sensex. After that, if there is co-integration, the Vector error Correction model (VECM) should be used instead of the unrestricted vector autoregressive model (VAR). The statistical and mathematical analysis was carried out by E-views.

Thus, the model can be defined as:

**BSE = C1+C2+C3+C4+C5+C6+C7+C8+et**

Where:

C1 + C2 – IIP, C3 – Inflation, C4 – Interest Rate, C5 – Gold Price, C6 – Exchange Rate, C7 – Foreign Institutional Investment, C8 – Money Supply.

## DATA ANALYSIS & INTERPRETATION

On the level data, the Augmented Dickey Fuller test revealed that FII was stationary while the other independent variables were not. The data was then differentiated and tested for the Augmented Dickey Fuller test, after which it was determined that the data was either stationary or had no unit root. Thus, for each of the variables other than FII, the first difference of the series was computed. The Johannsen

Co-integration test was used after the Augmented Dickey Fuller test to see if the variables had a long-term relationship. The Johannsen Co-integration test determines whether or not the parameters have a long-term relationship or are co-integrated. The variables must be non-stationary in order for Johansen co-integration to work. The Johansen Co-integration test revealed that there are five co-integrating equations and a long run association between the variables at the 5% level. If the variables are co-integrated, it is recommended that a Vector Error Correction model be run. If they are not co-integrated, then, a VAR model can be used. As a result, the sample was run through the Vector Error Correction model.

***Long Run-Causality***

The error correction terms or speed of adjustment towards equilibrium are C(1), C(2), C(3), C(4), and C(5). C(1), C(2), C(3), C(4), and C(5) must be negative in sign and important for long run causality. Because it is important and has a negative sign, it indicates that there is long-run causality between the independent variables of the Index of Industrial Production (IIP), inflation, interest rates, gold prices, exchange rate, foreign institutional investment, money supply, and the BSE Sensex.

***Short Run-Causality***

The Wald test was used to determine whether the independent and dependent parameters were causal in the short run. The rule of thumb is that for causality to occur in the short run, Chi Square in the Wald test must be less than 5%. In the short run, the test revealed no causality between the rate of exchange and the BSE Sensex, FII and the BSE Sensex, Gold prices and the BSE Sensex, IIP and the BSE Sensex, and Interest Rate and the BSE Sensex. However, there is a short-term causality between inflation and the BSE Sensex, as well as between money supply and the BSE Sensex.

***Granger Causality Test***

Following that, the Granger causality test revealed that exchange rate changes cause an effect of change in the BSE with four lags, but inflation does not cause changes in the BSE Sensex and vice versa. BSE causes changes in exchange rate and money supply with 2 lags, 6 lags cause BSE to cause a change in FII, 5 lags cause BSE to cause a change in gold prices, and 4 lags causes BSE to make a change in gold prices.

## CONCLUSION

India's stock market is known for being a well-developed and stable capital market. In terms of listed companies and market capitalization, the Bombay Stock Exchange (BSE) is India's largest stock exchange, with almost all corporates listed there. It's the BSE Sensex, the stock exchange's equity index, which is widely followed and widely agreed as a stock-market benchmark equity index. The BSE index is said to be a good indicator of the Indian economy's wellbeing. (Patel, 2012) investigated the impact of variables such as the rate of exchange, inflation, IIP, broad money supply, gold, silver, and oil prices on the S&P CNX Nifty of the Bombay Stock Exchange. For the period January 1991 to December 20, he used the ADF, Johansen Co-integration test, VECM, and Granger Causality test. He discovered that the macroeconomic parameters and the Sensex have a long-term relationship. He also discovered a causal link between the exchange rate, stock market indices, and IIP and oil prices.

Other than FII (data was stationary), the other independent variables had a unit root or were not stationary, according to quarterly data from April 1999 to March 2017. The Johansen Co-integration revealed the existence of five co-integrating equations and a long-run association between the variables at a 5% level. Following that, using VECM, it was validated that the independent variables of Index of Industrial Production (IIP), inflation, interest rates, gold prices, exchange rate, international institutional investment, money supply, and BSE Sensex have a long run causal relationship. The model's R square is 64.90 percent, and the Prob (F statistic) is 0.005, indicating that it is meaningful at the 5-level. This supports the findings of the study conducted by (Patel, 2012). With a long-term relationship emerging between macroeconomic parameters such as IIP, inflation, interest rates, gold prices, exchange rate, foreign institutional investment, money supply, and the BSE Sensex, and India being viewed as a rising economic power with enormous potential by investors, it is critical that the government maintains a stable environment.

Furthermore, thanks to the government's strong support, FII investments have been strong and are expected to continue to increase in the near future. Foreign institutional investors have been active and coherent, according to Mr Bharat Iyer, MD, Global Research, JP Morgan India. Since November 2013, India has stood out in the Asian region as well as other emerging markets. The consumption story, demographic dividends, realistic valuations, competitive business positions, and increasing private entrepreneurship will be the primary drivers of these PE investments. A tightening of US monetary policy, on the other hand, would damage portfolio inflows into emerging markets like India. The Federal Reserve is expected to raise interest rates in the United States immediately. In addition, the Indian stock market benefits from strong domestic liquidity support, thanks to dedicated money flowing into mutual funds each month through systematic investment plans.

The Wald test was used to verify the causality formed in the short run between the independent and dependent parameters. According to the test results, there is no evidence of a short-run causal relationship between exchange rates and the BSE Sensex, FII and the BSE Sensex, Gold prices and the BSE Sensex, IIP and the BSE Sensex, and Interest Rate and the BSE Sensex.

The Wald test was used to verify the causality formed in the short run between the independent and dependent parameters. According to the test results, there is no evidence of a short-run causal relationship between exchange rates and the BSE Sensex, FII and the BSE Sensex, Gold prices and the BSE Sensex, IIP and the BSE Sensex, and Interest Rate and the BSE Sensex. However, an analysis of data from April 1999 to March 2017 reveals that there is a short-run causality between inflation and the BSE Sensex, as well as between money supply and the BSE Sensex.

Exchange rate changes cause an effect or change in the BSE with four lags, but inflation does not cause changes in the BSE Sensex and vice versa, according to the Granger causality test. As a result, the RBI's primary focus should be on maintaining a stable exchange rate, which has a positive impact on stock market performance. BSE triggers changes in the exchange rate and money supply with 2 lags, 6 lags results in a change in FII, 5 lags results in a change in gold prices, and 4 lags results in a change in IIP. The author used the Granger Causality approach to look into it. The findings show that the BSE Sensex influences the exchange rate, money supply, FII, gold prices, and IIP. Keeping the government's policies in mind, the emphasis should be on boosting corporate earnings and giving the stock markets a positive vibe, which will have a positive impact on the IIP. Policymakers should make informed decisions in order to promote industrial development. Investing in gold is done largely because it is a less risky investment. As a result, in the event of a slowdown, the government should attempt to design policies that boost investor trust in businesses and corporations, re-directing investments away from gold and toward corporate markets.

Giving the BSE Sensex a boost would have a positive effect on the exchange rate by lowering gold imports and thereby strengthening the currency. A positive change in the BSE Sensex would have a positive effect on the flow of FII money into India because the return on investment in India will be greater for foreign institutional investors, which will benefit the Indian economy. Top-line numbers have been small, and corporate returns on equity and investment in new capacity have been poor. Change in global portfolio flows on the one hand, and improvements in corporate financials on the other, are the most important issues for investors in Indian equities. Finally, regulatory authorities, economists, and policymakers can all help to improve the Indian stock market's efficiency and performance by making appropriate policy decisions.

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