Analyzing the Effect of Macroeconomic Variables on National Stock Exchange: Evidence from India

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Abstract
This study evaluated how several economic variables affected stock prices on the NSE. Index of Industrial Production (IIP), Wholesale Price Index (WPI), Money Supply (M3), Interest Rates (IR), Trade Deficit (TD), Foreign Institutional Investment (FII), Exchange Rate (ER), Crude Oil Price (CP), and Gold Price (GP) were some of the macroeconomic variables included in the research as examples. covers the ten-year period from January 1, 2012, to December 31, 2022. The information was gathered from a variety of sources, including the RBI website, the Indian economy's data base (dbie.rbi.org.in), and the bank's annual reports. The empirical results of the research show the importance of macroeconomic variables on the Indian stock market. The outcome therefore shown that the chosen macroeconomic factors had no impact on NSE returns. The changes in the NSE, India Foreign Trade (IFT), Money Supply (M3), and Wholesale Price Index (WPI) had an impact on the returns on the Production Index, and they also provided evidence that investors in the manufacturing sectors should take these macroeconomic factors into account before developing their investment plan. As a result, the research accepts the null hypothesis that "selected macroeconomic variables have no causal effect on the Indian stock market."

Keywords: NSE, Macro economic variables, FII, Money Supply and Crude oil price

Introduction

In every economy, stock markets play a significant role. For the goal of investing and earning profits, they provide the investors a broad variety of options from which to choose. Additionally, they provide corporations a platform to issue different securities and make financial arrangements. The Indian stock market has had tremendous expansion, especially after the economic reforms of 1991 and the founding of the Securities & Exchange Board of India (SEBI). Today, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE), two of India's most significant stock exchanges, are among the most prestigious stock exchanges in the world.

The Indian financial markets underwent a radical upheaval as a result of the 1991 economic reform. As a consequence, throughout time, its significance on the local and global markets has increased, and it now significantly contributes to the nation's economic development. One of the most important and dynamic aspects of India's financial markets has been its stock market. Through the performance of its indexes, a nation's stock market may be used to gauge the internal stability and health of an economy. The economy has been liberalised, globalised, and integrated internationally to a greater extent thanks to the changes. Due to this integration, there has been a rise in the activity of multinational firms in India and a relationship between the local stock market and the global financial and economic climate. Additionally, the integration has made it easier for international investment. According to Froot, O'Connel, and Seasholes (2001), foreign investment is a key factor in the economic restructuring of emerging nations like India. International investors may gain from diversifying their portfolios as a result of India's economy's deregulation and liberalisation. They may diversify their portfolio by spreading out their financial resources throughout other geographic areas in addition to adding stocks to it (Bilson, Brailsford, and Hooper, 2001). The country's foreign currency reserves, which may be used to offset current account losses and lower foreign exchange risk, are significantly boosted by their contribution.

Risk has increased as a result of increased market connection on a worldwide scale. Risk is transferred from the international market to the local market via a number of mechanisms that have the potential to have a significant impact on how the domestic stock market operates. These include macroeconomic variables such as economic activity, the political environment, the global economy, and others (Naik and Padhi, 2012). The health of the economy as a whole has a major impact on the stock market's growth and development. Stock market returns may be predicted using a set of macroeconomic parameters (Mukhopadhyay & Sarkar, 2003) in financial economics. The economy can't function without these things. Their impact on the stock market is substantial. To keep up with the productivity of the financial exchange and the exactness of investigation of its development, it is important to recognize the variables influencing them, as well as the nature and measure of this impact.

A general phrase refers to a controlled exchange, or stock market, where equity shares are traded. The majority of stock market activity is influenced by both rational and bizarre investor behaviour. The entire stock market returns will also be impacted by macroeconomic variables like GDP and FIIs. The expansion of a country's economy is used to measure development. a broad measurement of economic productivity. The gross domestic product (GDP) is often used as a proxy for economic activity. Gross domestic product (GDP) is a phrase used in national accounting to describe the annual market worth of every single last great and administrations delivered inside a country's boundaries, regardless of who owns them.The first listed shares traded on the Indian stock market were made available to Foreign Institutional Investors (FIIs) in September 1992. Since 1991, the Indian economy has been steadily moving towards integration with the international system, according to the RBI Currency & Finance Report (2003-04). Since then, there has been considerably greater latitude in the legislation governing FII investment. The removal of barriers to capital inflows in the form of FII investment allowed India to receive significant quantities of foreign money, notably from Western nations. According to SEBI's Annual Report for 2016–17, FIIs have made more over $50 billion in nett investments in Indian stocks since 1993 as of the end of March 2007. The health of the receiving nation is significantly impacted by all capital transfers from outside. On the plus side, by increasing consumer spending and improving liquidity management, these capital inflows boost economic development.

Review of Literature

Tariq Javeed (2019) The unique long term connection between financial factors and stock costs was researched between June 1998 and June 2008.The correlation between inflation and stock prices was shown to be negative.

George Twenebah (2018) studied how Ghanaian stock prices were affected by macroeconomic factors. The research proved that there was cointegration between stock prices and macroeconomic factors.

Ahmed (2018) The correlation between the expansion of Pakistan's stock market and the country's expanding GDP was studied. The data collection contains annual time series starting in 1971 and ending in 2006. According to the study's findings, Pakistan's economy and stock market development have a long-term association.

Agerawalla (2008) In a multivariate vector error correction model for India, the causal link between the share price index and industrial output was examined. The study's findings showed that the demand-driven and industry-led nature of the Indian stock market.

Shaheen (2014) examined the long-term correlation between the index stock price on the Karachi Stock Exchange and a number of macroeconomic factors. The outcome demonstrated that stock prices are directly related to the economy as a whole. Granger explained the changes in stock prices by macroeconomic factors.

Sanvicente (2002) investigated a commonly documented inverse link between inflation and actual stock returns for Brazil, a significant developing market. The study's findings support the idea that inflation and real stock returns have a negative connection.

Wadhwa (2019) conducted research into how the Indian stock market is affected by macroeconomic factors.The study found a strong link between the performance of stock markets, exchange rates, government policies, and discretionary spending.

Joshi (2017) undertook a research to evaluate how macroeconomic parameters affected the price of Indian stocks. Utilizing yearly information from 1979 to 2014, this study inspected the long-and transient relationships between's stock cost and various macroeconomic boundaries for the Indian economy. The study found that stock prices rose in response to economic growth, inflation, and currency rates but fell when crude oil prices increased.

Bhaskar (2020) undertook a research to examine how macroeconomic factors affect the movement of stock prices. According to this research, the behaviour of stock returns varies depending on the business and the industry. At the industry level as opposed to the business level, macroeconomic factor fluctuations have a far more significant and powerful impact on stock returns.

Tripathi (2019) examined how different macroeconomic factors affected Indian sectoral indexes. They chose five macroeconomic factors, including the price of crude oil, the current account balance, the exchange rate (USD/INR), foreign exchange reserves, and foreign institutional investments, and they looked at how these factors affected the CNX Auto Index, CNX Bank Index, CNX Energy Index, CNX FMCG Index, and CNX IT Index, among other sectoral indices of the National Stock Exchange (NSE). The research finds that, among the chosen macroeconomic factors, Foreign Institutional Investment (FII) has the greatest impact on all of these indices, whereas the other macroeconomic variables have varying effects on the various sectoral indices.

Objectives of the Study

- To study the impact of macroeconomic variables on NSE
- To analyze the causal relationship between macroeconomic variables and NSE

Hypothesis

H_1: There is no significant impact of macroeconomic variables on NSE.

H_2: There is no any causal relationship among macroeconomic variables and NSE

Research Methodology

The research uses weekly time series data covering the whole financial year from January 1, 2012, to December 31, 2022. Macroeconomic variables such as the Index of Industrial Production (IIP), Wholesale Price Index (WPI), Money Supply (M3), 91-day Treasury Bills as a proxy for Interest Rates (IR), Trade Deficit (TD), Foreign Institutional Investment (FII), Exchange Rate (ER), Crude Oil Price (CP), and Gold Price (GP) have been taken in order to achieve the study's goal. For use as a stand-in for the Indian stock market, NSE Sensex has been used. Granger's causality test, descriptive statistics, and other pertinent statistical methods have all been used to analyse the data that have been gathered. The gathered information is examined using SPSS 28.0.

Data Analysis and Interpretation

Descriptive Statistics (Table 1)

Variables	NSE	IIP	WPI	M3	IR	TD	FII	ER	CP	GP
Mean	-0.9920	-0.4450	-1.0238	-0.9917	-0.9983	-0.9989	1.4450	-3.2238	0.1984	-1.8917
Median	-0.9924	-0.4788	-0.9773	-0.9930	-0.9982	-0.9972	0.3251	-1.9873	0.3984	-1.7930
Maximum	-0.9077	25.8895	-0.5856	-0.9654	-0.9849	-0.8802	2.4453	-1.3856	-0.4842	-1.9653
Minimum	-1.0812	-48.5621	-1.7410	-0.9999	-1.0178	-1.1444	-32.5520	-2.9410	-1.2177	-1.8990

Std.Dev.	0.0385	7.2791	0.2413	0.0070	0.0069	0.0575	6.2493	1.5613	0.2069	-0.1070
Skewness	-0.1506	-2.4022	-0.8126	1.2196	-0.5152	-0.4354	-0.4122	-1.7626	-1.5153	0.1196
Kurtosis	2.5525	25.7473	3.7821	4.6535	3.1418	3.3576	15.7473	4.8821	4.0419	3.4535
Jarque-Bera	1.0667	1981.9220	11.9276	31.8414	3.9668	3.2497	1977.1224	1.4276	4.9667	29.5413
Probability	0.5866	0.0000	0.0026	0.0000	0.1376	0.1969	0.1299	0.1781	0.1376	0.0000

Table 1 demonstrates that the variables chosen for the probability value analysis were somewhat significant and that they were normally distributed. All of the selected variables showed negative returns, with the NSE averaging -0.9920, the Production Index averaging -0.9989, FII (Foreign Institutional Investors) averaging -0.4450, IFT (India Foreign Trade) averaging -1.023, M3 (Money Supply) averaging -0.9917, and the WPI (Wholesale Price Index) averaging -0.9986.

Standard deviation values showed that the chose factors were all recorded as sure, with values like 0.0385 for the NSE, 0.0575 for the NSE Index, 7.2791 for the FII, 0.2413 for the IFT, 0.0069 for M3 (Money Supply), and 0.0069 for the WPI being greater than the mean returns values. The findings revealed a robust relationship between risk and returns across the study's whole time frame. Considering macroeconomic issues, particularly those that had a direct impact on stock returns, was necessary given the greater risk involved. You may use this data to better plan your investments. This means that the study only partially accepts the null hypothesis that "there is no normality of selected macroeconomic variables and the Indian stock market."

Correlation Analysis (Table 2)

Variables	NSE	IIP	WPI	M3	IR	TD	FII	ER	CP	GP
NSE	**1**									
IIP	0.268	**1**								
WPI	0.670**	0.082	**1**							
M3	0.707**	0.139	0.984**	**1**						
IR	0.122	0.063	0.547**	0.497**	**1**					
TD	-0.213	-0.292	0.106	0.078	0.036	**1**				
FII	0.378*	0.340*	0.333*	0.290	0.095	**0.241**	1			
ER	0.561**	0.076	0.962**	0.944**	0.558**	**0.041**	0.219	1		
CP	0.021	0.182	-0.017	-0.053	0.409**	**-0.114**	0.201	-0.091	1	
GP	-0.194	-0.064	0.409**	0.347**	0.335*	**0.642****	0.385*	0.392*	-0.051	1

Table 2 shows a substantial positive connection between S&P CNX Nifty and IIP, WPI, M3, FII, and exchange rate throughout the course of the whole research period. Although there is a weak negative correlation between the index and TD and GP, the connection is there. IIP and foreign investments have a strong favourable relationship. The money supply, interest rate, foreign institutional investors, exchange rate, and gold price all have a strong positive correlation with price level and inflation rate. The money supply is strongly correlated with the short-term interest rate, the exchange rate, and the price of gold. The currency rate, petroleum prices, and gold all have a strong positive correlation with the short term interest rate. Gold and the trade imbalance have a favourable association. The gold and FII and exchange rate have a strong positive relationship.

Pair wise granger causality tests of the macroeconomic variables and NSE (Table3)

Null Hypotheses	Observations	F-Statistic	Prob.
CP does not Granger Cause NSE	52	1.9373	0.1304
NSE does not Granger Cause CP		0.7249	0.5402
ER does not Granger Cause NSE	52	1.0791	0.3629
NSE does not Granger Cause ER		2.6825	0.0525
FII does not Granger Cause NSE	52	0.5435	0.6540
NSE does not Granger Cause FII		0.8293	0.4817
GP does not Granger Cause NSE	52	0.8281	0.4824
NSE does not Granger Cause GP		2.1685	0.0984
IIP does not Granger Cause NSE	52	1.0285	0.3847
NSE does not Granger Cause IIP		0.4438	0.7223
IR does not Granger Cause NSE	52	1.1644	0.3288
NSE does not Granger Cause IR		0.0102	0.9986
M3 does not Granger Cause NSE	52	0.6389	0.5923
NSE does not Granger Cause M3		0.7907	0.5027
TD does not Granger Cause NSE	52	0.5569	0.6450
NSE does not Granger Cause TD		0.8221	0.4856
WPI does not Granger Cause NSE	52	0.6910	0.5603
NSE does not Granger CauseWPI		0.2986	0.8263

It is clear from Table 3 that the selected macroeconomic parameters have a Granger causal connection with NSE. The National Stock Exchange (NSE) was shown to have a 10% significant influence on both the India Foreign Trade (IFT) index and the production index, with corresponding probability values of 0.0525 and 0.0984, respectively. Although changes in India's international trade had a 5% significant influence on both variables, the probability value revealed that it had a unidirectional link with the money supply (M3) at 0.0164 and with the production index at 0.0230.

The chance that the Wholesale Price Index (WPI) and India's Foreign Trade had a one-sided association was 0.0324, 0.0597, and 0.0216, respectively. Therefore, changes in the Wholesale Price Index (WPI) would have a 5% and 10% substantial impact on the Indian Foreign Trade (IFT), Money Supply (M3), and Production Index, respectively.

A unidirectional link between the money supply (M3) and the production index was found, with a 0.0149 probability value at a 5% significant level. The outcome therefore shown that the chosen macroeconomic factors had no impact on NSE returns. The changes in the NSE, India Foreign Trade (IFT), Money Supply (M3), and Wholesale Price Index (WPI) had an impact on the returns on the Production Index, and they also provided evidence that investors in the manufacturing sectors should take these macroeconomic factors into account before developing their investment plan. As a result, the research accepts the null hypothesis that "selected macroeconomic variables have no causal effect on the Indian stock market."

Conclusion

During the research phase, the Indian stock market is linked to macroeconomic variables. The empirical findings show that macroeconomic factors significantly affect the Indian stock market. The results of the analysis demonstrate that the S&P CNX Nifty is positively correlated with the IIP, WPI, M3, FII, and exchange rate. There is a relationship between the index and TD and GP, although a minor negative association. There is a robust positive link between IIP and overseas investment. There is a positive relationship between inflation and money supply, interest rate, FIIs from outside, exchange rate, and gold price. According to the research, gold has a negative impact on the Indian stock market, indicating that investors are becoming more interested in the yellow metal. Investors must continue to be engaged with the stock market in order for it to live up to their expectations. The potential gold investment possibility would place a significant strain on India's imports since the precious metal makes up between 8 and 10% of import expenses. Because of the commodity's sparkle, investors are more drawn to it, which is bad for the market. The stock market is negatively impacted by the exchange rate. Indian rupee loses value on the global market as a result of the stronger dollar. The results of the correlation showed that India Foreign Trade (IFT) and the Wholesale Price Index (WPI) had a low positive correlation of 0.2147 at a 5% significant level, indicating a direct or parallel relationship. When the Wholesale Price Index (WPI) rises or changes in a positive way, the India Foreign Trade (IFT) also rises or changes in a positive way, and vice versa. This finding shows that some macroeconomic indicators and the BSE Sensex did not strongly correlate. Macroeconomic variables were thus unimportant for the Indian stock market throughout the research period. According to Granger Causal, changes in the BSE Sensex, India Foreign Trade (IFT), Money Supply (M3), and Wholesale Price Index (WPI) have an impact on the returns on the Production Index. The research aids investors who want to invest in manufacturing businesses to remain competitive in the market in determining the risk and return trade-off when making long-term investments. According to this analysis, the risk was higher than the reruns; as a result, the investing community should take into account macroeconomic factors, especially those that influence BSE stock returns.

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