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GDP'S (Gross Domestic Product) impact on stock market movement in India: A study on BSE SENSEX

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Abstract

The share market is a vital component of every nation's economic structure. It is crucial to the prosperity of any nation. In doing so, money is moved from savers to debtors. The stock market is referred to as a gauge of a nation's economic health. Any change in the stock market has a direct impact on the national economy. Any nation can flourish and prosper if the stock market operates well. Any country's stock market should be effective for its economy to thrive. Numerous researches have been conducted on the Indian stock market and on macroeconomic factors like GDP. This study focuses on monthly data between January 1, 2011, and December 31, 2020 to determine the link between the GDP and the BSE SENSEX. This study makes use of the Granger causality test and Johansen's co-integration test VAR model. According to the findings, there is a causal association between the GDP and the BSE SENSEX. Unidirectional causality exists. Any adjustments to GDP will impact the BSE SENSEX (stock market). The policy formulation benefits from this link.

Keywords: Share market, GDP, BSE SENSEX, unit root test, co-integration test, granger causality test

Introduction

In 1991, India's authority has delivered a sequence of coverage measures to liberalize its financial system to manage up with the continuing system of globalization everywhere in the global. Relaxation of licensing rule, explanation of tax structure, enhancement of the ceiling of overseas direct funding and personal participation are a number of the consequences of liberalization which has resultant effect with inside the integration of Indian financial system with relaxation of the economies round the global and has additionally led to extended proportion in worldwide change and extended overseas reserve (Ray, 2012) ^[13]. Inventory market is a big part of financial system of any nation. It has significant importance of any country's development. It transfers fund from savers to borrowers. Stock market is described as barometer of economic system of any country. If there is any movement in stock market, it directly affects the economy of any country (Srivastava, 2010) ^[15]. If stock market works proficiently, the growth and welfare of any country is possible. Stock market should be efficient for the economic growth of any country (Mohammad *et al.*, 2009) ^[11]. Stock marketplace performs an essential position in any country's financial boom and development. A financial system is stated to be efficient if it has a terrific banking device and a terrific inventory marketplace displaying upward trend (Tripathi & Seth, 2014) ^[16]. Consequently, the consequences of economic improvement on boom may be considered in 3 wonderful ways: The first is to increase the proportion of funds that are actually invested, which relies upon at the performance of economic intermediation with inside the economy. The consequences of inventory marketplace on funding, thru adjustments in inventory charges that mirror the marginal productiveness of capital, need to be definitely correlated with funding growth. A boom with inside the marginal productiveness of capital is immediately connected to a boom in funding activities. The 2nd is to have an effect on the personal saving rate, which matches through enhancing the allocation of capital (Greenwood & Jovanovic, 1990) ^[9]. The 3rd manner is to elevate the social marginal productivity, which may be achieved considering the fact that saving may work both manner. The improvement of a monetary marketplace is on one hand intently associated with the general improvement with inside the country wide economic system on one hand.

Well functioning monetary machine achieves efficiencies that offer good and without difficulty on hand information, decrease transaction prices and green useful resource allocation then boosts monetary growth. On the opposite hand, many macroeconomic variables have good sized consequences on a stock market place and its functions, improvement, and function with inside the country wide economic system (Abdelbaki, 2013)^[1].

The Macroeconomic factors, each actual and financial, do have substantial influence, superb as well as negative, at the overall performance of the company quarter of the financial system. Consequently, the inventory markets of the financial system were given laid low with such overall performance. Financial policy hyperlinks with inventory market place improvement thru affecting cash supply, rates of interest, activities of funding in shares in addition to the market place values of shares. Expansion financial policy increases cash supply, decreases hobby rates, increases funding in shares and marketplace values of shares. Similarly fiscal policy also affect the stock market directly through the rate of interest and investment (Abdelbaki, 2013)^[1].

Stock marketplace is taken into consideration because the barometer for the financial fitness of any country. The numerous stages of commercial enterprise and financial cycle also are contemplated with inside the motion of inventory marketplace index. The epoch making modifications with inside the inventory marketplace substantiates the relationship among the financial elements of a rustic and inventory marketplace motion. Thus the motion of macroeconomic elements performs a critical function in influencing the motion of any inventory marketplace index. Movements of inventory prices are visible to depend upon macroeconomic factors; home and worldwide monetary, social or political events; marketplace sentiments / expectancies about destiny monetary increase trajectory, financial and economic coverage bulletins etc. The relationship among macro financial elements and inventory marketplace movements has influenced the educational and practitioners' literature due to the fact long. There is voluminous empirical study on the impact of macroeconomic indicators on inventory market place indices and the relation among the inventory marketplace and the economic system has been studied comprehensively throughout the world. Different variables were used in different studies to find the impact of these indicators on inventory market movement. The aim of this findings is to find the impact of GDP on stock market movement in India. GDP and BSE SENSEX is being used of Monthly data with time period from 2011 to 2020. In this study we test co-integration and granger causality relationship between macroeconomic indicators and share market movement.

This paper is classified in different section: section 2 describes different review of literature on the study of impact of macroeconomic indicators on stock market movement, section 3 explains objectives and hypothesis of research, section 4 explains Research methodology and data, section 5 Data analysis and result, section 6 explains limitations of the findings and section 7 explains conclusion.

Literature Review

Several researches hasbeen conducted to find the relationship between macroeconomic factors and stock

market index by using different model.

Nisha (2015), "Impact of Macro Economic Indicators in stock returns: Evidence from Bombay stock Exchange"

In order to determine the link between stock returns and macroeconomic variables, this article will include both international and local factors. Data analysis uses vector autoregressive time series analysis (VAR). This analysis concludes that the BSE stock return is significantly influenced by interest rate, gold price, exchange rate, and money supply. It is evident that global macroeconomic forces have a significant impact.

Singh (2014), "An Empirical Relations between Selected Indices of Indian stock Market and Macro economic Factors"

This study sought to determine the link between macroeconomic factors and the Indian Stock Market. To determine the effect, multivariate stepwise regression and Pearson's correlations are used. The Granger Causality Test is used to determine the direction of the causality. IIP, WPI, Money Supply (M3), Interest Rate (IR), Trade Deficit, FII, Exchange Rate, Crude Oil Prices, and Gold Price are utilised as explanation factors in addition to the average monthly closing prices of the CNX 100 and BSE 100. January 2011 through December 2012 used monthly data. The results of this study demonstrate the enormous influence that macroeconomic factors have on the Indian stock market. The share market's stock prices are significantly impacted by foreign money. Granger causality denotes the causal chain connecting the FII and stock market. There is no causal connection between the variables in this research. The stock market is influenced by foreign investment. The stock market is negatively impacted by exchange rates. In relation to the US dollar, the stock market lowers when the value of the rupee falls.

Tripathi, Seth (2014) ^[16], "Stock Market Performance and Macro Economic Variables: The Study of Indian Inventory Market"

This study establishes a causal link between six macroeconomic factors and stock market performance. Monthly data from 1997 to 2011 were used in the study. For data analysis in this work, the granger causality test, regression analysis, ARCH model, factor analysis, ADF, PP unit root test, and Johansen test were utilised. This study finds a strong relationship between macroeconomic conditions and stock market performance. This study came to the conclusion that stock prices are not only influenced by changes in macroeconomic conditions, but also by changes in the stock market.

Kumar (2013), "The Effect of Macro Economic Indicators on Indian Inventory Market Performance: An Approach of Factor Analysis"

The intention of this paper is to look at how these variables affect the Indian stock market. There are 13 macroeconomic variables utilised. The CNX Nifty Index was taken into account. To identify the factors, data reduction techniques of factors analysis are applied. 13 macroeconomic factors' average monthly data from 2001 to 2013 are utilised. This study proved that there is a strong correlation between

numerous macroeconomic parameters. This study demonstrates how a positive macroeconomic climate benefits the stock market and how trading with a high price-earnings ratio increases investor confidence in the market. The stock market reacts quickly to macroeconomic conditions.

Malarvizhi, Thenmozhi (2012) ^[10], "Impact of Gross Domestic Product on Indian Stock Market: An Empirical Study"

The goal of this study was to determine how the GDP affected the Indian stock market. The nifty index and GDP were compared using quarterly data from June 2000 to March 2010 in this report. Data analysis employs the paired Granger Causality test and co-integration. This analysis discovered a two-way causal relationship between GDP and Nifty. According to the study's findings, changes in the stock market will impact the GDP and vice versa.

Narwal, Mittal (2011) ^[12], "Impact of Macro Economic Factor on Capital Market of India"

The long-term link between the Indian stock market and macroeconomic issues will be investigated in this study. Data from quarterly time series were utilised from January 1995 to December 2008. The GDP, interest rates, inflation rates, and currency rates have all been taken into account. Long run and short run relationships have been discovered using the unit root test, co-integration, and error correction model. This study discovers a long-term co-integration link between macroeconomic issues and the Indian stock market.

Srivastava (2010) ^[15], "Relevance of Macro Economic Factors for the Indian Stock Market"

The impact of macroeconomic factors on the movement of the Indian inventory market is discovered by this study. The goal of the study was discovered by the investigators using both quantitative and qualitative data. The co-integration link was discovered using Johansen's co-integration model. The dynamic association is discovered using a vector error correction model. Both the Philip-Person test and the Augmented Dickey Fuller test are used to analyse data and test stationary. Six variables have been used: the Industrial Production Index (IPI), the Whole Sale Price Index (WPI), the Interest Rate, the Foreign Exchange Rate, and MSCI incorporating BSE SENSEX. This study demonstrates how local macroeconomic issues have a greater long-term impact on rising countries like India.

Muhammad, Hussain, Jalil, Ali (2009) ^[11], "Impact of Macro Economic Variables on Stock Prices: Empirical Evidence in case of Karachi Stock Exchange"

This study aims to determine the relationship between several macroeconomic variables and the share price of the KSE in Pakistan. This research takes into account 6 macroeconomic variables, including the Gross Fixed Capital Formation (GFCF), Industrial Production Index, Broad Money, Foreign Exchange Reserve, and Whole Sale Price Index (WPI), (M3). The information is gathered from the years 1986 to 2008. Data analysis techniques include descriptive statistics, unit root test, and auto regressive integrated moving average (ARIMA) model. The stationarity is tested using an enhanced Dickey Fuller

analysis. According to this study, stock prices are significantly impacted by both foreign exchange rate and foreign exchange reserve. The stock prices are only little impacted by other factors.

Singh (2013),"Study of the impact of Macro Economic variable & their role as An Indicators for the S & P CNX Nifty"

Finding the influence of macroeconomic variables on stock market movement was the study's main goal. The macroeconomic variables GDP, inflation, exchange rate, industrial production, foreign institutional investment, unemployment, crude oil, and gold prices were employed in this study. The dependent variable employed in this analysis is the S & P CNX Nifty index. Data for the 12-year period from 1997 to 2009 has been collected. This study came to the conclusion that other macroeconomic components of every country's economy also contribute to stock market volatility, not just the behaviour of macroeconomic variables.

Objectives of the study

- To determine the connection between the GDP and the BSE SENSEX
- To examine the causal link between the GDP and the BSE SENSEX.

Hypothesis

- The GDP has no measurable impact on the BSE SENSEX.
- The Indian stock market's BSE SENSEX index does not predict changes in GDP.

Research Methodology

The finding basically uses the secondary data for the aim of data analysis. The data related to GDP (in US \$) were obtained from world bank website and SENSEX figures (closing price) were collected from BSE India website for time spanning from 2011 to 2020 on a monthly basis. To analyze the long run and The Unit Root Test, Johansen's Co-integration Test, and Granger Causality are used to determine the causal link between variables using time series analysis test.

Data Analysis and Interpretation

Unit Root Test

Unit root test is necessary before going to find co-integrating and causality relationship between series. If p value (Augmented Dickey Fuller statistics) is less than its critical value, then series is to be stationary order to zero i.e. 1(0). If this is not less than its critical value, the ADF test is used to check the stationary on first difference. If series is not stationary then series is integrated to order 1 i.e. 1(1).

Augmented Dickey Fuller test has been performed to test the stationarity of series by using E-View software. ADF test has been calculated on all variables.

To test the stationarity of series there is precondition before going to test co-integration and causality relationship. The lag value was chose by VAR lag estimation SIC criteria in E-View software. Stationarity are tested at level with trend and without trend. The findings indicates that series are not stationary at level. These series are stationary at difference.

ADF test at level 1(0)**Table 1:** Augmented Dickey Fuller test of monthly series data

Variables	Without Trend			With trend		
	Critical Value	Significant Level 5%	P value	Critical Value	Significant Level 5%	P Value
GDP	-0.84295	-2.885863	0.8028	-1.835435	-3.448021	0.6813
SENSEX	-0.589931	-2.885863	0.8676	-2.884703	-3.448021	0.1712

ADF test at Difference 1(1)**Table 2:** Augmented Dickey Fuller test of monthly series data

Variables	Without Trend			With trend		
	Critical Value	Significant Level 5%	P value	Critical Value	Significant Level 5%	P Value
GDP	-11.00860	-2.886074	0.0000	-10.96955	-3.448348	0.0000
SENSEX	-11.21368	-2.886074	0.0000	-11.16507	-3.448348	0.0000

Interpretation

Non stationarity is observed of series at ADF 1(0).calculated value of ADF is lower than significant values and p value is greater than 0.05 which shows the acceptance of null hypothesis, the series is non-stationary Table (1). So ADF test is performed at first difference i.e. 1(1) from Table (2), calculated value of variables are greater than significant value and p value is less than 0.05, so null hypothesis is rejected and it proves the stationarity of series. This shows the stationarity at 1(1). So co-integration and causality test can be performed.

Co-integration Test

The co-integration test is used to find long run relationship among variables. Johansen co-integrating test is used for co-integrating relationship. Co-integration analysis is important for error correction models for estimation. If series are co-integrating, there is more chance of long run relationship between variables. Then VECM models can be used for long run and short run relationship. If series is not co-integrating it means long run relationship does not exist. VECM model cannot be used. In this case VAR model is applied for short run relationship.

**Trend assumption: Linear deterministic trend in data
Lag interval (in first difference): 1 to 2****Table 3:** Co-integration test between Nifty and GDP

Max. Eigen Value	5% Criteria	Probability	Hypothesized No. of CE(s)
0.020550	14.26460	0.9773	None
0.002128	3.841465	0.6176	At most

Computed from secondary data

None category of hypothesis represent that there is no co-integrating relationship and At most 1 category of hypothesis represent that there is at least one series is co-integrated. But p value is greater than 0.05 and Eigen value is less than critical value. So there is not co-integrating relationship. Long run relationship does not exist. So short run relationship is investigated among GDP and SENSEX (closing price) by using VAR model.

Close = 0.887107* Close (-1) + 245E-09* GDP__Current_US\$_(-1) -2233.119

From this equation it can be concluded that 1 unit increase

in GDP will cause sensex to increase by 2.45E-09. It can be summarizing that GDP has significant impact on BSE SENSEX.

Granger Causality Test

Granger Causality test is test to find the causality relationship between series. This test is used to determine whether one time series is helpful to predict other time series.

(GDP and BSE SENSEX)

Sample: Jan 2011-Dec 2020

Lag: 1

Table 4: Pairwise Granger Causality Test

Null Hypothesis	Observation	F-Statistics	Probability	Decision
GDP does not granger cause BSE SENSEX (Closing price)	119	5.83079	0.0173	Reject
BSE SENSEX (closing price) does not granger cause GDP		0.00086	0.9766	Accept

Source: Computed from secondary data

Interpretation

Table 3 shows the findings of granger causality test. The first null hypothesis that GDP does not granger cause BSE SENSEX has been rejected as p value is less than the 0.05, so it shows the GDP granger cause BSE SENSEX movement. Second Hypothesis that BSE SENSEX does not granger cause GDP has been accepted because p value is greater than 0.05. So this shows a unidirectional causality between them. If any changes in GDP will influence the BSE SENSEX movement (Appendix 5).

Limitations of the study

1. Only one macroeconomic indicator has been considered for this research.
2. BSE SENSEX index has been used for this findings. In other study, different index can be used.
3. Only 10 years monthly data has been used for data analysis.

Conclusion

The long run, short relationship, and causality relationships were the main topics of this study. There is no long-term link between the variables, according to the results of the application of Johansen's co-integrating test. Short run relationships have been examined using the SoVAR model. The causation between GDP and BSE SENSEX has been examined using the Granger Causality test. According to the findings, there is a causal association between the GDP and the BSE SENSEX. Unidirectional causality exists. Any adjustments to GDP will impact the BSE SENSEX (stock market). The policy' formulation benefits from this link.\

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