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Statistical forecasting of Market Indices: Applying Linear Trend Equations to Annual Sensex Data

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***Abstract*—The study confirms a robust upward secular trend in the Indian stock market. With an annual average increment of nearly 5,000 points, the data suggests that despite yearly volatility, the long-term trajectory of the Sensex remains firmly positive. This model demonstrates that time is a significant predictor of Sensex value within this specific 15-year window. In this study, an attempt is made to analyze the performance and long-term behavior of the BSE Sensex, which is considered a key indicator of the Indian stock market. The Sensex represents 30 well-established companies and reflects the overall economic condition, investor sentiment, and financial stability of the country. The study focuses on identifying the trend values of the Sensex over a period of fifteen years and forecasting future values using the least squares method. It also examines the relationship between the Sensex and major macroeconomic variables such as GDP and inflation to understand their influence on stock market movements and economic growth.**

***Keywords*— BSE Sensex, Correlation, GDP, Inflation, Linear trend.**

I. Introduction

In this study, an attempt is made to analyze the performance and long-term behavior of the BSE Sensex, which is considered a key indicator of the Indian stock market. The Sensex represents 30 well-established companies and reflects the overall economic condition, investor sentiment, and financial stability of the country. The study focuses on identifying the trend values of the Sensex over a period of fifteen years and forecasting future values using the least squares method. It also examines the relationship between the Sensex and major macroeconomic variables such as GDP and inflation to understand their influence on stock market movements and economic growth.

II. Statement Of The Problem

The stock market plays an important role in economic development, but its movements are highly volatile and influenced by multiple economic and non-economic factors. Although the Sensex is widely used as a benchmark for measuring market performance, predicting its future trend remains a challenging task.

In addition, there is uncertainty regarding the relationship between the Sensex and key macroeconomic variables such as GDP and inflation. Therefore, the problem of the study is to analyze the trend and future movement of the Sensex and to examine whether GDP and inflation have a significant impact on stock market performance.

III. Research Questions

- What is the trend pattern of the BSE Sensex over the last fifteen years?
- Does the Sensex show a consistent upward or downward movement?
- Can the least squares method effectively predict future Sensex values?
- What is the relationship between Sensex and inflation rate?
- Does inflation negatively affect stock market growth?

IV. Objectives Of The Study

1. To model the secular trend of the Sensex index and forecast future market movements using the Method of Least Squares.
2. To examine the statistical correlation between the SENSEX market index with GDP growth rate and inflation rate to determine the extent of their macroeconomic interdependency

V. Significance Of The Study

This study is significant as it helps in understanding the long-term growth and behavior of the Indian stock market through the analysis of the Sensex. It provides valuable insights for investors, researchers, and policymakers regarding market trends, future expectations, and investment decisions. The study also highlights the relationship between macroeconomic variables such as GDP and inflation with stock market performance. This understanding can help investors make better financial decisions and assist policymakers in designing effective economic strategies for stable growth.

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VI. VI RESEARCH METHODOLOGY

Nature of the Study

The study is analytical in nature and is based on quantitative techniques.

Research Design

The study adopts a descriptive and causal research design:

- Descriptive, as it explains historical trends of the Sensex
- Causal, as it examines the relationship between Sensex, GDP, and inflation

Variables of the Study

Dependent Variable: BSE Sensex (Stock Market Index)

Independent Variable: GDP Growth Rate and Inflation Rate (CPI)

Sources of Data

Secondary data has been used for the study. Period of Study: 15 years (2011–2025)

Frequency: Annual data

Tools and Statistical Techniques Used

1. *Trend Analysis:* The Least Squares Method is used to estimate the long-term trend of the Sensex

A linear trend equation is fitted:

Y = a + bX
Where:
Y = Trend value
X = Time variable
A = Intercept
B = Slope (growth rate)

2. *Forecasting Technique:* Future values of Sensex are predicted using the derived trend equation. Assumes continuity of past trends into the future.
3. *Correlation Analysis:* Karl Pearson's Coefficient of Correlation (r) is used. Data has been analysed using MS excel. Measures the strength and direction of relationship between:
   - Sensex & GDP
   - Sensex & Inflation
4. *Graphical and Tabular Analysis:* Data is presented using tables and charts. It helps in visual interpretation of trends and relationships.

Model Specification

The study uses the following models:

a. Trend Model : Y = a + bX

b. Correlation Model: R = f (Sensex, GDP, Inflation)

VII. SCOPE OF THE STUDY

- The study focuses on the BSE Sensex as a representative of the Indian stock market.
- It covers a period of 15 years (2011–2025).
- The study examines only two macroeconomic variables: GDP and inflation.
- It provides both past analysis and future forecasting of the Sensex.

VIII. LIMITATIONS OF THE STUDY

- The study is based only on secondary data, which may have limitations in accuracy.
- Only GDP and inflation are considered; other factors affecting the Sensex are not included.
- The least squares method assumes a linear trend, which may not always reflect real market conditions.
- External factors such as political events, global crises, and investor psychology are not fully considered.

IX. LITERATURE REVIEW

Recent empirical studies further strengthen the understanding of the relationship between macroeconomic variables and stock market performance in India. **Kittur, Bolla, and Jahan (2025)** examined the influence of macroeconomic variables such as Consumer Price Index (CPI), repo rate, foreign exchange reserves, and crude oil prices on stock market performance using Granger causality and correlation analysis. The study found that inflation, interest rates, and oil prices negatively affect stock market returns, whereas foreign exchange reserves have a positive influence. The results confirm that macroeconomic indicators possess predictive power over stock price movements, emphasizing their importance in investment decision-making. **Hedau (2024)** analyzed the impact of both domestic and global macroeconomic factors on the NIFTY 50 index. Using regression analysis combined with expert opinion, the study revealed that exchange rate fluctuations and global indices such as the Dow Jones significantly influence Indian stock markets. Additionally, political stability and international economic conditions were found to play an indirect but critical role in determining stock price movements. **Mittal, Sharma, and Manya (2023)** investigated the relationship between macroeconomic indicators and stock indices such as BSE Sensex and NIFTY 50 using co-integration and error correction models.

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The findings indicated that among various variables, crude oil prices have a statistically significant impact, while other variables like exchange rate and industrial production showed weaker influence. The study highlights that not all macroeconomic variables equally affect stock markets, indicating the need for selective variable analysis. **Shukla and Bohra (2025)** applied co integration and Vector Error Correction Models (VECM) to examine long-run and short-run relationships between macroeconomic variables and stock market performance. The study confirmed that foreign institutional investment (FII), GDP growth, and interest rates significantly drive short-term market fluctuations, while a stable long-run equilibrium exists between macroeconomic variables and stock indices. **Nidamaluri et al. (2024)** explored the combined influence of domestic and international macroeconomic factors on stock market performance. Their findings suggest that exchange rates and global market indices are dominant determinants, while investor perception, political environment, and global economic conditions further shape stock price behavior. The study highlights the increasing globalization of financial markets and its implications for Indian stock indices. **Ahuja (2024)** examined the impact of key macroeconomic variables such as inflation, money supply, interest rate, and exchange rate on stock market performance in India. The study concluded that all major macroeconomic indicators significantly influence stock market movements, reinforcing the importance of economic fundamentals in financial market analysis.

Rajshree and Kethan (2024) used time-series econometric models such as Vector AutoRegression (VAR) and Granger causality to analyze the relationship between macroeconomic variables and asset prices. The results indicated that inflation and GDP growth are strong predictors of stock market movements, while interest rates and exchange rates exhibit relatively weaker short-term effects. A number of empirical studies have examined the relationship between macroeconomic variables and stock market performance in India, highlighting both long-run equilibrium relationships and short-run dynamics. **Kumar and Goel (2024)** analyzed the long-term relationship between Indian stock prices and macroeconomic indicators using advanced econometric techniques such as Johansen co integration and Vector Error Correction Models (VECM). The study found a significant long-run equilibrium relationship between stock market performance and variables such as inflation, money supply, industrial production, interest rates, and exchange rates. The results further indicated that exchange rate movements and overall economic activity are key determinants of stock price fluctuations in India.

Similarly, Shukla and **Bohra (2025)** investigated the linkage between macroeconomic variables and stock market performance using monthly data and cointegration techniques. Their findings confirmed the presence of stable long-term relationships, while short-run fluctuations were primarily driven by foreign institutional investments (FII), GDP growth, and interest rate changes. The study also observed that markets adjust gradually toward equilibrium, indicating partial efficiency. **Khurana et al. (2025)** extended this perspective by incorporating both domestic and global macroeconomic variables. Using regression analysis and expert validation, the study identified exchange rates and global indices (such as Dow Jones) as significant predictors of Indian stock market performance. Additionally, qualitative insights emphasized the role of political stability and international economic conditions in shaping investor sentiment and market trends. **Saravanan et al. (2024)** focused on the causal relationship between macroeconomic variables and stock market indices by applying statistical tools such as correlation analysis and Granger causality tests. The study revealed that variables like inflation, gold prices, and interest rates exhibit varying degrees of influence, with some variables showing causality while others demonstrated weak or indirect relationships with stock market movements. A broader perspective is provided by **Chaurasia et al. (2023),** who conducted a systematic review of macroeconomic determinants of stock market development. The study concluded that economic growth positively influences stock market expansion, whereas inflation negatively impacts market performance. It also highlighted that different econometric methods—such as regression, VAR, and cointegration—are commonly used to establish these relationships across studies. **Nidamaluri et al. (2024)** emphasized that stock market performance is influenced not only by domestic variables but also by international economic linkages and investor expectations. Their study highlighted that macroeconomic indicators alone are insufficient unless combined with behavioral and global factors to explain market movements.

X. Analysis And Discussion

A simple correlation method will be used to analyze the relationship between the Sensex and inflation to determine how changes in price levels influence stock market performance. In addition, the relationship between GDP and SENSEX will be analyzed using simple correlation to understand whether economic growth has a significant impact on market movements. This chapter will focus on the analysis part of objectives.

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Objective 1: To model the secular trend of the Sensex index and forecast future market movements using the Method of Least Squares.

TABLE I
TABLE SHOWING SECULAR TREND VALUES OF THE SENSEX INDEX FROM 2011-2025

Year	Annual Sensex (Y)	X	X^2	XY
2011	15454	-7	49	-108178
2012	19427	-6	36	-116562
2013	21170	-5	25	-105850
2014	27499	-4	16	-109996
2015	26118	-3	9	-78354
2016	26626	-2	4	-53252
2017	34057	-1	1	-34057
2018	36068	0	0	0
2019	41254	1	1	41254
2020	47751	2	4	95502
2021	58254	3	9	174762
2022	60841	4	16	243364
2023	72240	5	25	361200
2024	78485	6	36	470910
2025	85220	7	49	596540
	ΣY=650464	ΣX=0	ΣX²=280	ΣXY=137728

Source: collected from primary data

$$Y=a+bX$$

$$Y=43364.27+4918.87\,X$$

Interpretations: This trend analysis of the BSE Sensex from 2011 to 2025 utilizes the Method of Least Squares to determine the line of best fit. This statistical approach is used to model the relationship between time and the stock market index, allowing to quantify the underlying growth trajectory.

Explanation of Variables

To understand the model Y = a + bX, we must first define the components used in the calculation:

Year: The independent chronological period of the study (2011–2025).

Annual Sensex (Y): The dependent variable, representing the closing values of the Sensex for each respective year.

Time Variable (X): To simplify calculations, the years are "coded." Since there are n = 15 years (an odd number), the middle year (2018) is set as the origin (X=0). Years before 2018 are negative, and years after are positive, ensuring that Sigma X = 0.

Trend Value: The estimated value of the Sensex for a specific year based on the linear equation, representing where the Sensex should be if it followed the long-term average perfectly.

Statistical Constants and Their Interpretations

The analysis derived two critical constants that define the movement of the Sensex over the 15-year period.

The Intercept (a = 43,364.27)

In a coded time series where Sigma X = 0, the constant a represents the arithmetic mean of the Sensex values over the study period (a = Sigma Y / n). This value (43,364.27) represents the "average" level of the Sensex at the center of the study (the year 2018). It serves as the baseline from which all growth is measured.

The Slope/Growth Rate (b = 4,918.87)

The value b represents the gradient of the trend line (b = Sigma XY /Sigma X^2). This is the most significant value for investors. It indicates that, on average, the Sensex has increased by approximately 4,918.87 points per year between 2011 and 2025. This reflects a strong, positive linear growth trend in the Indian equity market.

Analysis of Trend Values vs. Actual Values

The trend equation is formulated as:

$$Y = 43,364.27 + 4,918.87X$$

Undervaluation vs. Overvaluation: In the earlier years (e.g., 2011), the Actual Sensex (15,454) was significantly higher than the Trend Value (8,932.18). By 2025, the Actual Sensex (85,220) is also higher than the predicted Trend Value (77,796.36).

Market Momentum: Since the actual closing values in 2023, 2024, and 2025 are consistently above the trend line, it suggests that the market has been experiencing "bullish" momentum that exceeds the 15-year average growth rate.

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Reliability: The steady increase in X^2 and XY totals confirms a consistent direction in the data, making this linear model a useful tool for forecasting short-term future performance.

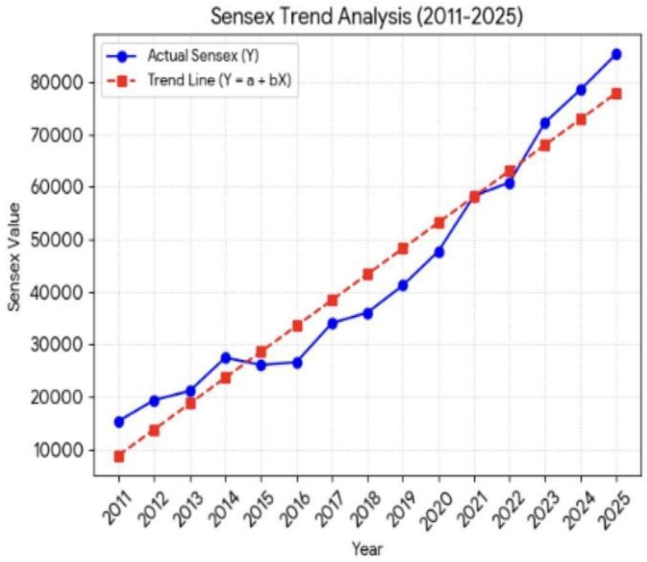

FIGURE I

Sources: plotted using primary data

This graph illustrates two key components of time series analysis actual sensex and trend line. **Actual Sensex (Y),** the blue line shows the real yearly closing values of the Sensex. It reflects the market's natural volatility, with periods of rapid growth and occasional stabilization. **Trend Line (Y = a + bX),** the red dashed line represents the linear trend calculated using the method of least squares. This line "smooths" out the yearly fluctuations to show the underlying long-term growth trajectory. The upward slope of the red trend line confirms a steady annual increase in the Sensex. Specifically, the slope (b = 4918.87) indicates that the market has grown by an average of approximately 4,918.87 points per year over this 15-year period (**Long-Term Growth)**.

Market Acceleration: Note that in the final years of the study (2024–2025), the Actual Sensex values (78,485 and 85,220) are positioned significantly above the Trend Line(72,877.49 and 77,796.36). This suggests that the market performance in recent years has exceeded the historical 15-year average growth rate.

The Origin Point: The point where the trend line reaches 43,364.27 corresponds to the middle of your study period (the year 2018, where X=0), serving as the statistical baseline for your model.

TABLE II
TABLE SHOWING TREND VALUES USING THE METHOD OF LEAST SQUARES

Year	X	Annual Sensex(Y)	Trend Values
2011	-7	15454	8932.18
2012	-6	19427	13851.05
2103	-5	21170	18769.92
2014	-4	27499	23688.79
2015	-3	26118	28607.66
2016	-2	26626	33526.53
2017	-1	34057	38445.4
2018	0	36068	43364.27
2019	1	41254	48283.14
2020	2	47751	53202.01
2021	3	58254	58120.88
2022	4	60841	63039.75
2023	5	72240	67958.62
2024	6	78485	72877.49
2025	7	85220	77796.36

ΣX=0 ΣY=650464

Source: primary data

The provided table illustrates a time-series analysis of Annual Sensex values and their corresponding trend values from 2011 to 2025 using the method of least squares. The data reveals a consistent and significant long-term upward trajectory in the stock market index, with the actual Sensex value rising from 15,454 in 2011 to a projected 85,220 by 2025. The trend values, calculated based on the linear equation where the middle year (2018) serves as the origin (Sigma X=0), act as a smoothed representation of this growth, filtering out short-term market volatility to highlight the underlying economic momentum.

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Notably, the gap between the actual values and trend values narrow significantly in the later years (such as 2021), indicating that the market's recent performance aligns closely with the long-term mathematical growth projections. Overall, the total aggregate Sensex value (Sigma Y) of 650,464 over this fifteen-year period reflects a robust bullish sentiment and a steady expansion of the equity market, providing a reliable basis for future financial forecasting.

TABLE III
COMPARISON: ACTUAL VS. TREND VALUES

Year	Actual Sensex(Y)	Trend Line Value	Difference (Actual-Trend)
2011	15454	8932.18	6521.82
2015	26118	28607.66	-2489.66
2018	36068	43364.27	-7296.27
2022	60841	63039.75	-2198.75
2025	85220	77796.36	7423.64

Source: collected from primary data

The trend line serves as a "smoothed" version of the actual market performance, filtering out yearly volatility to show the long-term direction. **(Positive Correlation)** The trend line has a positive slope (b = 4918.87), indicating a consistent long-term upward trajectory for the Sensex over the 15-year period. In 2024 and 2025, the Actual Sensex (78,485 and 85,220) is significantly higher than the Trend Values (72,877.49 and 77,796.36). This suggests that the market is currently growing faster than its 15-year historical average. Between 2015 and 2022, the actual Sensex mostly stayed below the calculated trend line, showing a period of steady but "below-average" growth compared to the start and end of the study.

TABLE NO: IV
TABLE VALUE SHOWING THE FUTURE SENSEX INDEX USING THE METHOD OF LEAST SQUARES

Year	X	Annual Sensex(Y)	Trend Values
2026	8	-	82715.23
2027	9	-	87634.10
2028	10	-	92552.97
2029	11	-	97471.84
2030	12	-	102390.71
2031	13	-	107309.58
2032	14	-	112228.45
2033	15	-	117147.32
2034	16	-	122066.19
2035	17	-	126985.06
2036	18	-	131903.93
2037	19	-	136822.80
2038	20	-	141741.67
2039	21	-	146660.54
2040	22	-	151579.41

Source: collected from primary data

The Model: The forecast uses a linear growth model, assuming that the economic factors driving the market over the last 15 years will continue at a similar average rate.

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The Time Variable (X): For the year 2026, the coded value starts at X=8 and increments annually to X=22 for the year 2040.

The Growth Constant (b): Every forecasted value increases by exactly 4,918.87 points per year. This represents the "slope" or the expected annual absolute gain based on historical performance.

TABLE V
TABLE SHOWING SEVERAL SIGNIFICANT PSYCHOLOGICAL AND FINANCIAL MILESTONES FOR THE INDIAN EQUITY MARKET FROM THE FORECASTED DATA

Milestone Year	Forecasted Trend Value	Interpretation
2026	82715.23	The immediate short-term expectation for the index.
2030	102390.71	The model predicts the Sensex will cross the 100,000 (1 Lakh) mark by the year 2030.
2040	151579.41	By the end of this 15-year forecast, the index is expected to reach over 1.5 Lakh points.

Source: primary data

Secular Bullish Trend: The steady rise from 82,715.23 in 2026 to 151,579.41 in 2040 indicates a strong "secular trend"—a long-term direction that ignores short-term market "noise" or volatility.

The "Six-Figure" Milestone: Crossing the 100,000 mark in 2030 is a significant finding. It suggests that if the Indian economy maintains its current momentum (b = 4918.87), the market will enter a new "digit" era within the next four years.

Model Limitations (Ceteris Paribus): Academically, it is crucial to note that this forecast assumes "all other things remain equal." It does not account for black swan events (like pandemics- or geopolitical shifts) but provides a baseline expectation based strictly on the 2011–2025 data.

Over the 15-year forecast period (2026–2040), the Sensex is projected to grow from roughly 82,715 to 151,579. This represents a total projected increase of 68,864 points, nearly doubling the baseline average (a = 43364.27) calculated for the year 2018

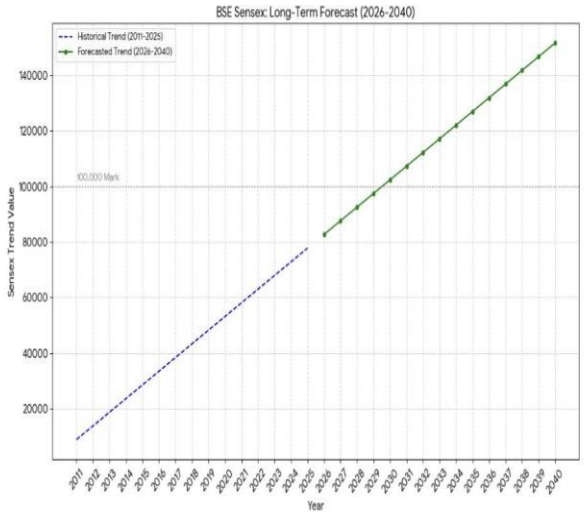

FIGURE II
Source: plotted from primary data

Continuous Linear Growth: The trend line maintains a steady positive slope, reflecting an average annual growth of 4,918.87 points. This indicates a projected long-term confidence in the market's expansion.

The 100,000 Milestone: A key takeaway for your project is that the Sensex is projected to surpass the psychologically significant 100,000 (1 Lakh) mark in the year 2030(102,390.71).

Expansion Target: By the year 2040, the mathematical model predicts the Sensex will reach approximately 151,579.41, nearly doubling the forecasted value from 2025

Objective 2: To examine the statistical correlation between the SENSEX market index with GDP growth rate and inflation rate to determine the extent of their macroeconomic interdependency

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TABLE NO: VI
TABLE SHOWING THE SENSEX AND GDP DATA FROM 2011 TO 2024

Year	SENSEX	GDP rate(%)	Karl person's co efficient of correlation
2011	15454	5.24	
2012	19427	5.46	
2013	21170	6.39	
2014	27499	7.41	
2015	26118	8.00	**0.02231021**
2016	26626	8.26	
2017	34057	6.80	
2018	36068	6.45	
2019	41254	3.87	
2020	47751	-5.78	
2021	58254	9.69	
2022	60841	6.99	
2023	72240	8.15	
2024	78485	6.46	

Source: World bank, IMF World Economic Outlook(April 2025)

Source: primary data

This analysis interprets the relationship between the Sensex (Indian Stock Market Index) and the GDP Growth Rate based on the provided dataset. **Correlation Coefficient** (r): 0.022310211.This value indicates an extremely weak or negligible relationship.

In statistical terms, a correlation near zero suggests that there is almost no linear relationship between the two variables in this specific timeframe. The value is positive (+0.022), suggesting a very slight tendency to move together, but it is too low to be considered a reliable trend.

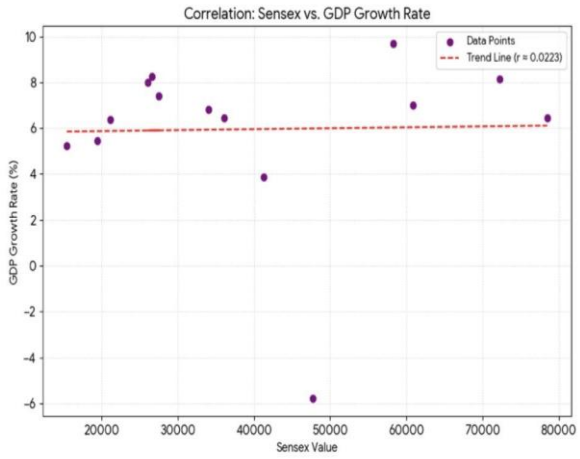

FIGURE III

Source: plotted using analyzed values

From the figure it reveals why the correlation is so low:

• *The Decoupling Effect:* While the Sensex shows a massive and consistent long-term growth—rising from 15,454 to 78,485—the GDP Growth Rate has been highly volatile, fluctuating between -5.78\% and 9.69\%.

• *Market Divergence (2020 Insight):* One of the most significant data points shows the GDP rate falling to its lowest point of -5.78\% while the Sensex reached a high of 47,751. This illustrates a "market-economy disconnect," where the stock market continued to rise despite a severe contraction in economic growth.

• *High Growth vs. Market Peaks:* The highest GDP growth of 9.69\% occurred when the Sensex was at 58,254. However, when the Sensex climbed further to 78,485, the GDP rate actually moderated to 6.46\%, further weakening the mathematical link.

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TABLE NO: VII
TABLE SHOWING THE SENSEX AND INFLATION DATA FROM 2011 TO 2024

Year	SENSEX	Inflation rate(%)	Karl person's co efficient of correlation
2011	15454	8.91	
2012	19427	9.48	
2013	21170	10.02	
2014	27499	6.67	
2015	26118	4.91	
2016	26626	4.95	
2017	34057	3.33	**-0.4034542**
2018	36068	3.94	
2019	41254	3.73	
2020	47751	6.62	
2021	58254	5.13	
2022	60841	6.7	
2023	72240	5.65	
2024	78485	4.95	

Source: World bank , IMF World Economic Outlook(April 2025)

Correlation Coefficient (r): -0.4034541998. The value is negative, which indicates an inverse relationship. Generally, as the Sensex value increases, the inflation rate tends to decrease. A correlation of -0.40 is considered a moderate negative correlation. This suggests that while there is a visible trend, other external factors also significantly influence these variables.

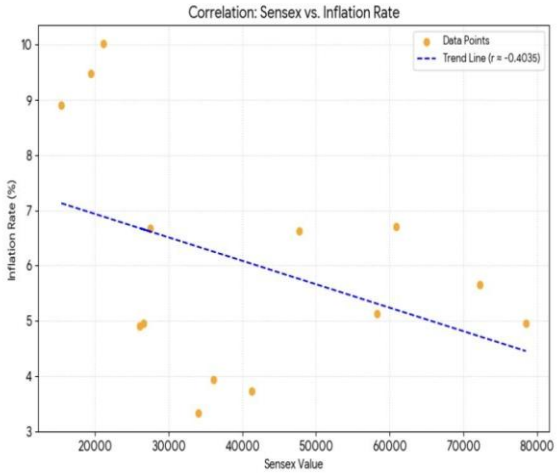

FIGURE IV

This analysis interprets the relationship between the Sensex (Stock Market Index) and the Inflation Rate based on the provided dataset. In the early stages of the dataset, when the Sensex was at its lowest points (between 15,454 and 21,170), inflation was at its peak, ranging from 8.91\% to 10.02\%. As the Sensex climbed significantly toward the 78,485 mark, the inflation rate generally cooled down, staying largely between 3.33\% and 6.70\%. A notable point occurred when the Sensex was at 47,751 and inflation spiked back up to 6.62\%. This indicates that market growth does not always guarantee low inflation, especially during periods of global economic shocks. In the final data points, the Sensex reached record highs of 72,240 and 78,485, while inflation remained relatively controlled at 5.65\% and 4.95\%, respectively.

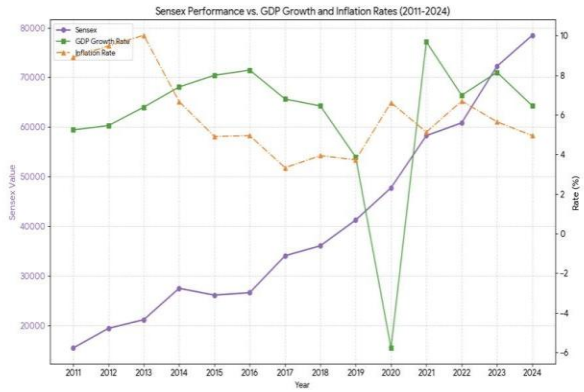

FIGURE V

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This graph provides a comprehensive visual comparison of the Sensex, GDP Growth Rate, and Inflation Rate from 2011 to 2024.

• *The Bullish Trajectory of the Sensex (Purple Line):* The stock market shows a powerful, almost continuous upward trend over the 14-year period. Starting from 15,454 in 2011, it more than quadrupled to reach 78,485 by 2024.

• *GDP Volatility vs. Market Growth (Green Line):* While the Sensex grew steadily, the GDP rate experienced significant swings. The most dramatic moment was in 2020, where GDP plummeted to -5.78%, yet the stock market continued to rise, reaching 47,751. This highlights a "disconnect" between market sentiment and immediate economic output.

• *Cooling Inflation (Orange Line):* In the early years (2011–2013), inflation was at its peak, staying near or above 10%. As the decade progressed, inflation generally trended downward, settling into a more stable range of 4% to 7%, which coincided with the most aggressive growth phase of the Sensex.

TABLE 4.8
TABLE SHOWING THE KEY STATISTICAL INSIGHTS

Indicator	Starting Value (2011)	Peak Value	Ending Value (2024)
SENSEX	15454	78485(2024)	78485
GDP rate	5.24%	9.69%(2021)	6.46%
Inflation rate	8.91%	10.02%(2013)	4.95%

• *Inverse Relationship with Inflation:* The moderate negative correlation (r -0.40) between Sensex and Inflation is visible; the market's strongest gains occurred as inflation eased from its double-digit highs of 2013.

• *GDP Resilience:* The data confirms that the Sensex is a "forward-looking" indicator. Even in the face of the 2020 economic contraction, the market remained resilient, anticipating the sharp GDP recovery to 9.69% seen in 2021.

• *Economic Maturity:* By 2024, the indicators show a maturing economy: stable market growth, normalized GDP rates (6.46%), and controlled inflation (4.95%).

XI. FINDINGS

Objective 1. To model the secular trend of the Sensex index and forecast future market movements using the Method of Least Squares.

- The study confirms a robust upward secular trend in the Indian stock market. With an annual average increment of nearly 5,000 points, the data suggests that despite yearly volatility, the long-term trajectory of the Sensex remains firmly positive. This model demonstrates that time is a significant predictor of Sensex value within this specific 15-year window.
- In early years (2011–2013), the actual Sensex values were above the trend, showing stronger performance than the average growth.
- In the middle period (2015–2022), the actual values were slightly below the trend, indicating slower growth compared to the long-term average.
- In the recent years (2023–2025), the actual Sensex values are again above the trend line, showing accelerated market growth.
- The analysis shows that the Sensex follows a steady upward linear trend. The model predicts continuous growth in the index from 82,715.23 in 2026 to 151,579.41 in 2040, indicating strong long-term expansion in the Indian stock market.
- The forecast model indicates that the Sensex increases by approximately 4,918.87 points per year. This constant increase represents the slope of the trend line and reflects the average yearly growth based on historical data.
- According to the trend values, the Sensex is expected to cross the 1,00,000 mark around the year 2030 with a predicted value of 102,390.71. This is considered a significant psychological and financial milestone for investors.
- Over the 15-year forecast period (2026–2040), the index is projected to grow by approximately 68,864 points, which indicates substantial expansion and increasing investor confidence in the market.

Objective 2. To examine the statistical correlation between the SENSEX market index with GDP growth rate and inflation rate to determine the extent of their macroeconomic interdependency

- The correlation coefficient (r = 0.0223) is very close to zero. This indicates almost no linear relationship between the SENSEX and GDP growth rate during the period studied. Changes in the stock market index do not strongly correspond with changes in GDP growth.

- The stock market (Sensex) often prices in future expectations and global liquidity rather than current GDP performance. This explains why the index tripled in value while the GDP rate remained within a similar range as the starting period.
- The near-zero correlation suggests that the Sensex is driven by factors other than domestic GDP growth, such as foreign institutional investment (FII), corporate earnings of specific large-cap companies, and global market sentiments.
- Based on this data, one cannot use the Sensex performance to accurately predict the GDP growth rate, or vice versa. This result confirms that for this specific period, the "real economy" (GDP) and the "financial economy" (Sensex) operated on different trajectories.
- There is a moderate negative correlation (approximately –0.40) between Sensex and inflation. This suggests that lower inflation generally supports higher stock market growth, while high inflation may slow down market performance.
- Inflation was relatively high in the early years (2011–2013), reaching about 10.02% in 2013, but gradually declined and stabilized around 4–6% in later years, which coincided with stronger growth in the Sensex.
- The negative correlation suggests that lower inflation environments are generally more favorable for stock market growth. Stable prices often lead to lower interest rates, which can boost corporate profitability and investor confidence.
- The Sensex has shown the ability to grow substantially even as inflation fluctuates, suggesting that the stock market's upward trajectory is driven by long-term corporate growth and capital inflows rather than just price stability.
- This relationship often reflects the impact of monetary policy. When central banks successfully manage to lower inflation from double digits (as seen in the early data) to a moderate 4-6% range, it creates a conducive environment for a prolonged bull market in the Sensex.

XII. Conclusion

The analysis of the first objective shows that the BSE Sensex has experienced a strong and consistent upward trend over the past 15 years.

The trend equation indicates that the Sensex increased by approximately 4,918 points per year on average, reflecting steady long-term growth in the Indian stock market. The base year of the trend was taken as 2018, and comparison between actual and trend values shows that while the market experienced slight fluctuations in the middle years, it regained momentum in the recent period. Based on this trend model, the future projection suggests that the Sensex will continue to grow steadily, potentially crossing the 1,00,000 mark around 2030 and reaching much higher levels by 2040. This indicates strong investor confidence and long-term expansion in the Indian equity market.

The analysis of the second objectives highlights the relationship between Sensex, GDP growth rate, and inflation. The correlation between Sensex and GDP growth rate is extremely weak ($r = 0.0223$), indicating that changes in the stock market do not closely correspond with short-term changes in economic growth. However, the Sensex still showed strong overall growth from 15,454 in 2011 to 78,485 in 2024, even when GDP growth fluctuated significantly, including the sharp decline in 2020. In contrast, the relationship between Sensex and inflation shows a moderate negative correlation (around –0.40), suggesting that lower inflation generally supports stronger stock market performance. Overall, the findings indicate that while the Sensex reflects long-term market expansion and investor expectations, it is influenced by multiple economic factors rather than GDP growth alone.

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