

# Long Run and Short Run Relationships Between Sensex Macro Economic Variables

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## ABSTRACT

This study delves into the intricate relationships between the Sensex, India's premier stock market index, and key macroeconomic variables, highlighting both long-term and short-term interactions. Macroeconomic variables such as GDP, inflation, interest rates, and foreign exchange reserves are analysed to understand their impact on the Sensex. Additionally, the study considers microeconomic variables, providing a comprehensive view of economic dynamics. By utilizing econometric methods like Vector Auto regression (VAR) and Johansen co integration tests, the research aims to distinguish between immediate economic shocks and sustained economic trends affecting the Sensex. The investigation focuses on Aditya Birla Money as a case study to explore financial market dynamics. The identified research gap emphasizes the need to consider the influence of emerging digital financial assets and fin tech innovations on traditional macroeconomic variables and market stability. By addressing this gap, the study aims to provide a deeper understanding of how technological advancements and digital transformation interact with established economic indicators to affect financial markets.

The primary objectives include examining the long-term and short-term relationships between the Sensex and key macroeconomic indicators, identifying the most significant factors influencing Sensex performance, and assessing the predictive power of these variables. Data collection involves both primary sources, such as interviews with financial experts, and secondary sources, including financial databases. The study's findings are expected to offer valuable insights for investors, policymakers, and financial analysts, aiding in informed decision-making and enhancing strategies for risk management in the ever-evolving economic landscape.

**Keywords:** Inflation, foreign exchange, Vector Auto regression, macroeconomic indicators.

## INTRODUCTION

The relationship between the Sensex and macroeconomic variables is a pivotal area of study in finance and economics, revealing insights into how market dynamics interact with broader economic indicators. In examining these relationships, it is crucial to differentiate between the short-run and long run perspectives to understand the immediate versus sustained impacts of economic changes on the stock market.

In the short run, the Sensex, which is a benchmark index of the Bombay Stock Exchange in India, often reacts to macroeconomic variables such as inflation rates, interest rates, GDP growth, foreign exchange rates, and monetary policies. These reactions are usually immediate and can be volatile, as investors respond to news and data releases. For instance, a hike in interest rates may lead to a short-term decline in

the Sensex as borrowing costs rise and economic growth expectations adjust.

Conversely, the long-run relationship between the Sensex and macroeconomic variables tends to stabilize and reflect underlying economic trends. Over extended periods, the Sensex is expected to mirror the country's economic growth, as corporate earnings, which are a significant component of stock prices, are closely tied to the overall economic health. Long-term investors often look at variables like GDP growth, long-term inflation trends, and structural changes in the economy to gauge the potential trajectory of the Sensex.

The study of these relationships involves various econometric methods to differentiate between short-term noise and long-term trends. Understanding these dynamics is essential for policymakers, investors, and analysts to make informed decisions. By analyzing how the Sensex interacts with key macroeconomic indicators over different time horizons, stakeholders can better predict market movements and align their strategies accordingly.

This exploration of the Sensex and macroeconomic variables offers a comprehensive view of the market's sensitivity to economic changes and provides a foundation for further research and analysis in the field of finance.

## REVIEW OF LITERATURE

**Prabhas Kumar Rath (2023)** This paper examines how macro-economic shocks (gdp, inflation, current account deficit, market capitalization to GDP ratio, US Treasury Yield, and foreign portfolio investment) affect asset returns volatility in six major segments of Indian financial markets: money, equity, gsec, forex, equity, and banking stocks. Four periods of considerable economic and financial market stress were studied from April 2002 to March 2021.

**Rashmi Chaudhary (2022)** This research uses monthly time series data from January 2013 to September 2020 to examine the sustainable stock market index and macroeconomic factors in developing market India. For macroeconomic indicators, proxies include Consumer Price Index, currency rate (USD/INR), foreign exchange reserves, and interest rate.

The sustainable market index is the S&P BSE Carbonex index. This research uses cointegration, Vector Error Correction Model, and Variance Decomposition analysis. capital creation. These indicators may also be used to diversify portfolios in the short and long term.

**Miklesh Prasad Yadav (2021)** This research examines Indian stock market price behaviour and macroeconomic determinants. The BSESENSEX represents the Indian stock market, whereas Foreign Reserve, Exchange Rate (Indian vs. US Dollar), and CPI represent macroeconomic factors. The Johansen Cointegration Test and Vector Error Correction Model (VECM) were used to monthly data from Reserve Bank of India and Bombay Stock Exchange websites from January 2000 to February 2020.

**Joy Das (2021)** Knowing how domestic macroeconomic dynamics affect stock market performance is crucial as they do so consistently. The long-term and short-term link between domestic macroeconomic variables and equities market is examined using monthly information from India from January 2012 to December 2019. The research achieved its goal using autoregressive distributed lag (ARDL) bounds testing and pair-wise granger causality testing.

**Gottfrid Bylund (2021)** This research proposes a link between stock market sector indexes and macroeconomic factors. Stock market sector indices have been studied less than broad stock market indices and macroeconomic factors. We found that inflation, exchange rate, money supply, industrial output, and long-term interest rate affect the Basic Material, Consumer Product and Service, Financial,

and Industrial sector indexes over time.

**Rui Wang (2020)** this article investigates how the stock market affects China's industrial output growth, inflation, and long-term interest rate. We examine correlations and lead-lag interactions between them in the time-frequency domain using continuous wavelet analysis from 1995M01-2018M04. Stock returns positively affect industrial output growth and inflation, according to our results.

**Aditya Prasad Sahoo (2020)** Economists and financial experts are paying more attention to the stock market-real economy link. It's impossible to fathom life without stock markets. Today, with rising financial market integration and stock market reforms in India, stock market activities and their linkages with the macro economy are important. This research examines macroeconomic factors' effects on the share price index. The goal is to clarify the stock market- determinant link.**R.**

**Gopinathan (2019)** Due to their systematic impact on stock market performance, macroeconomic factors must be understood. This research examines the long-term link between the stock market and macroeconomic indicators using monthly Indian data from April 1994 to July 2018. The actual results imply that typical co integration tests do not detect a link between these variables. However, using the alternating conditional expectations approach of (J Am Stat Assoc 80:580–598, 1985) to determine the true functional relationship between these variables shows considerable co integration and long-run nonlinearity. The continuous partial wavelet coherency model shows high coherency at a lower frequency for the converted variables,

**Vaibhav S Arwade (2019)** This research examined the dynamic impact of exchange rates on BSE Sensex return from April 2002 to March 2017. The research examines the long-term and short-term effects of currency rates on BSE Sensex return. The research used ADF, Correlation, OLS Regression, Co-integration, Granger Causality, VAR, and GARCH tests. A country's stock market and economy are affected by exchange rate depreciation and BSE Sensex returns.

**Jawad Khan (2018)** Macroeconomic factors affect stock markets differently depending on nation economic circumstances and government policies, influencing investment choices. The research analyses monthly data from May 2000 to August 2016 to see how macroeconomic factors affect Pakistani stock prices. As all variables are stationary at initial difference, ideal ARDL bound testing is used to examine short- and long-term macroeconomic variable co integration on stock prices.

## RESEARCH GAP

Prabhas Kumar Rath (2023) presents a comprehensive analysis of the relationship between macroeconomic shocks and asset returns volatility across various segments of the Indian financial markets. While the study addresses the significant economic and financial market stresses and their impact on financial stability, it overlooks the potential effects of newer digital financial assets and technologies on market volatility. Similarly, Rashmi Chaudhary (2022) and Miklesh Prasad Yadav (2021) focus on traditional financial market indices and macroeconomic variables but do not extend their analysis to the burgeoning fin tech sector's influence. Joy Das (2021) and Gottfrid Bylund (2021) explore sector-specific relationships but fail to consider how digital transformation reshapes these interactions. There remains a significant research gap in understanding how emerging digital financial assets and fin tech innovations interact with traditional macroeconomic variables to influence asset returns and market stability in rapidly evolving financial markets.

## NEED OF THE STUDY

The study of the relationships between the Sensex and macroeconomic variables in both the short and long

run is essential to understand how India's leading stock market index reacts to changes in the economic environment. This research aims to identify and analyze the interplay between the Sensex and key macroeconomic indicators such as GDP growth, inflation, interest rates, and foreign exchange rates. By distinguishing between short-term fluctuations and long-term trends, the study will provide valuable insights into the resilience and sensitivity of the stock market to economic shocks and policy changes. Such knowledge is crucial for investors, policymakers, and financial analysts to make informed decisions. Additionally, this research will contribute to the broader academic understanding of financial markets, enhancing predictive models and strategies for risk management in an increasingly interconnected global economy.

### **PURPOSE OF THE STUDY**

The purpose of this study is to explore and analyze the long-run and short-run relationships between the Sensex and key macroeconomic variables. By examining these relationships, the study aims to uncover the extent to which macroeconomic indicators such as inflation, interest rates, GDP growth, foreign exchange rates, and others influence the movements of the Sensex over different time horizons. This research will employ econometric models to identify and quantify the dynamics between the Sensex and these macroeconomic variables in both the short and long term. The findings will provide insights into how macroeconomic changes impact the financial markets, specifically the Sensex, enabling investors, policymakers, and financial analysts to make more informed decisions. Additionally, the study seeks to contribute to the broader understanding of financial market behavior in the context of economic fluctuations, enhancing the predictive models used for investment and policy formulation.

### **PROBLEM STATEMENT**

The goal of this research is to explore and analyze the relationships between the Sensex, a benchmark stock market index in India, and various macroeconomic variables over different time horizons. Specifically, the study seeks to distinguish the nature of these relationships in both the short run and the long run. Macroeconomic variables of interest include inflation rates, interest rates, GDP growth, foreign exchange rates, and others that significantly impact the financial markets. The research will utilize econometric models and statistical analysis to discern the immediate (short-term) effects of changes in these macroeconomic indicators on the Sensex, as well as the sustained (long-term) impacts. This investigation will provide insights into how immediate economic events and longer-term economic trends influence the stock market, aiding investors and policymakers in making informed decisions. The study's findings could further enhance the understanding of market dynamics in emerging economies like India.

### **OBJECTIVES OF THE STUDY**

- To investigate the long-term and short-term connections between Sensex and key macroeconomic indicators.
- To analyze how macroeconomic variables influence Sensex performance over varying timeframes.
- To identify critical macroeconomic factors impacting Sensex trends in the short and long run.
- To assess the predictive power of macroeconomic variables on Sensex fluctuations.
- To explore the dynamic relationship between Sensex and macroeconomic variables through empirical analysis.

## RESEARCH DESIGN

The research will employ a quantitative approach using time-series data analysis to explore the short-run and long run relationships between the Sensex and key macroeconomic variables. Econometric methods like Vector Auto regression (VAR), Johansen co integration tests, and Granger causality will be applied to monthly data spanning several years. This will help identify correlations and causations between the Sensex and variables such as GDP growth, inflation, interest rates, and foreign exchange rates. The study will differentiate between immediate and prolonged effects, using statistical software for rigorous data analysis and ensuring robustness through sensitivity checks and model validations.

## DATA COLLECTION METHODS

There are Two types

**Primary Data:** Conducting interviews with economists, financial analysts, or market experts to gain insights into the interpretation of data and the perceived impact of macroeconomic changes on the Sensex.

**Secondary Data:** Collected from financial databases like Bloomberg, Reuters, or the Bombay Stock Exchange (BSE) website, providing daily, weekly, or monthly closing values of the Sensex over several years.

Sensex data 2014-24

Macro-economic variables are taken for analysis

- Gross Domestic Product (GDP)
- Inflation Rate
- Interest Rates
- Unemployment Rate
- Foreign Exchange Reserves
- Current Account Balance
- Fiscal Deficit

## HYPOTHESIS:

**H0:-** There no significance relation between the exists a stable long-run relationship between the Sensex and the selected macroeconomic variables.

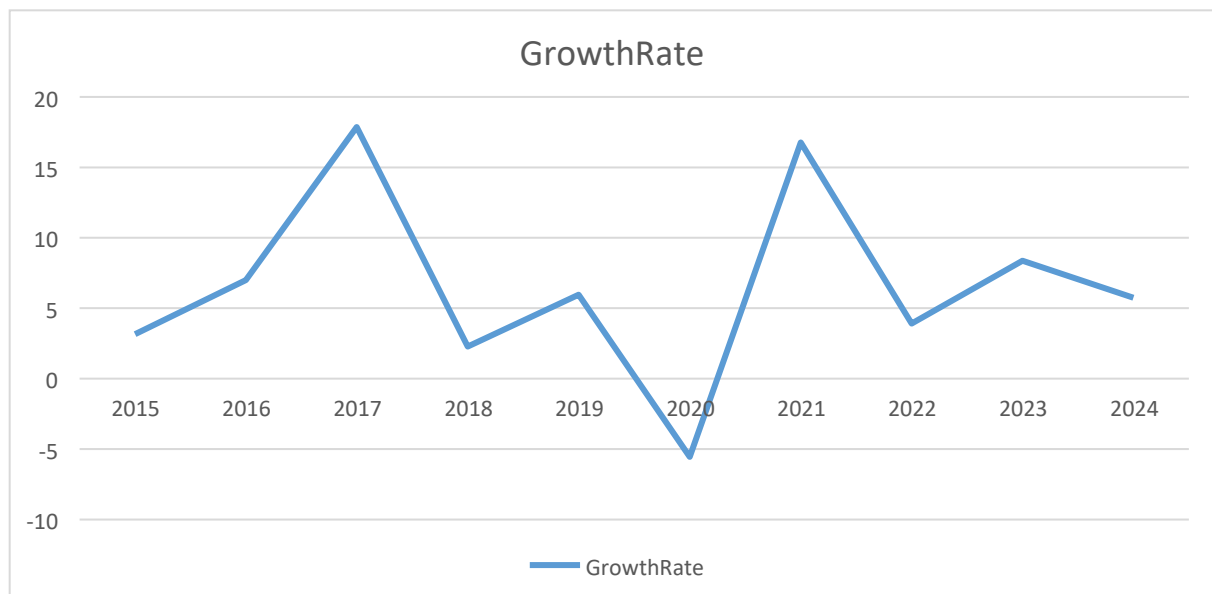
**H1:-** There a significance relation between the exists a stable long-run relationship between the Sensex and the selected macroeconomic variables.

Macro-economic variables are taken for analysis

- Gross Domestic Product (GDP)
- Inflation Rate
- Interest Rates
- Unemployment Rate
- Foreign Exchange Reserves
- Current Account Balance
- Fiscal Deficit

## DATA ANALYSIS

Year	Gross Domestic Product (GDP) (in \$ Billion)	Growth Rate
2014	2039.13	
2015	2103.59	3.161152
2016	2250.83	6.999463
2017	2652.75	17.85652
2018	2713.54	2.291584
2019	2875.14	5.95532
2020	2715.58	-5.54964
2021	3170.46	16.75075
2022	3294.31	3.906373
2023	3570	8.368672
2024	3775	5.742297
	Avg growth	6.548249
	Standard Deviation	6.47624

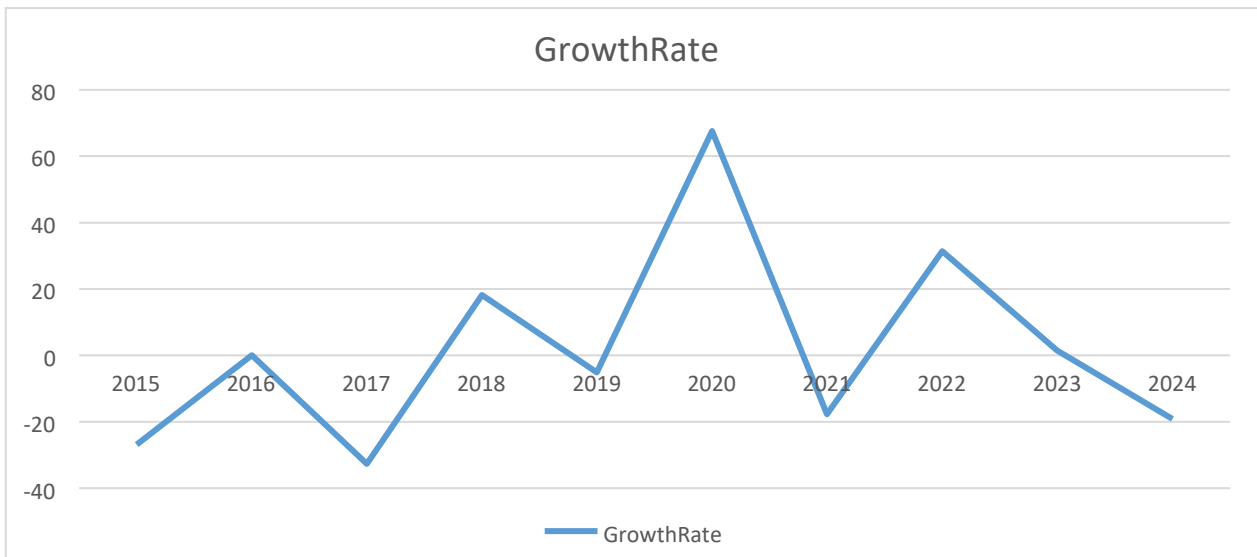


**INTERPRETATION:** -The given data presents the Gross Domestic Product (GDP) of a country from 2014 to 2024, measured in billions of dollars, alongside its annual growth rate. From 2014 to 2015, there was a modest increase in GDP with a growth rate of approximately 3.16%. This growth accelerated significantly in 2016 and peaked in 2017 at nearly 17.86%, reflecting a robust economic expansion during this period. Following this peak, the growth rate moderated but remained positive until 2019. However, in 2020, the GDP saw a significant decline of -5.55%, indicative of a recessionary phase possibly triggered by external shocks such as the global COVID-19 pandemic. This downturn was followed by a strong recovery in 2021 with a growth rate of 16.75%, suggesting effective economic measures or a rebound effect.

Subsequent years, from 2022 to 2024, showed more stable but positive growth rates, averaging around 6%. This suggests a stabilization of economic growth post-recovery.

The average growth rate over the ten-year period is approximately 6.55%, indicating a generally healthy economy despite the volatility observed in specific years. The standard deviation of 6.48% highlights the fluctuations in growth rates, particularly the extremes seen in 2017 and 2020, emphasizing the economic resilience and challenges faced over the decade. This data is crucial for policymakers and economists to understand long-term trends and plan for sustainable economic strategic

Year	Inflation Rate (%)	Growth Rate
2014	6.7	
2015	4.9	-26.8657
2016	4.9	0
2017	3.3	-32.6531
2018	3.9	18.18182
2019	3.7	-5.12821
2020	6.2	67.56757
2021	5.1	-17.7419
2022	6.7	31.37255
2023	6.8	1.492537
2024	5.5	-19.1176
Avg growth	5.245455	1.710795
Standard Deviation	1.201033	28.89238



**INTERPRETATION:** -The data illustrates the inflation rates and growth rates from 2014 to 2024. Initially, in 2014, the inflation rate stood at 6.7%, but the growth rate is not indicated. Over the following years, there is a fluctuating pattern in both inflation and growth rates.

From 2015 to 2017, inflation rates decreased from 4.9% to 3.3%, and corresponding growth rates showed a significant decline, with 2017 marking a -32.65% growth, indicating a sharp contraction in economic activity or adjustments. However, in 2018, as inflation slightly increased to 3.9%, growth rates rebounded to 18.18%, suggesting some recovery or stabilization in economic conditions.

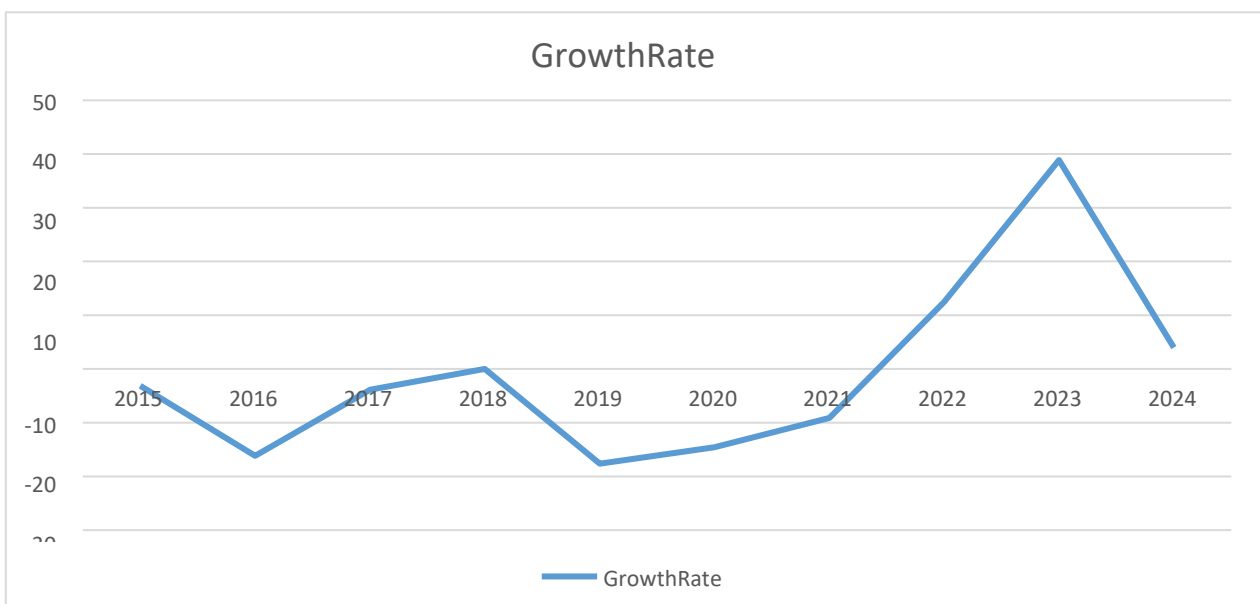
The year 2020 stands out with a substantial increase in the inflation rate to 6.2% and a dramatic surge in the growth rate by 67.57%, possibly reflecting a response to external shocks or policy changes aimed at

economic stimulation. However, this was followed by a decline in 2021, where the inflation rate moderated to 5.1% and the growth rate decreased by -17.74%.

From 2022 onwards, inflation rates stabilized around 6.7% and 6.8%, with growth rates experiencing fluctuations, ending with a -19.12% in 2024, signaling a downturn or economic adjustment.

The average inflation rate over these years is approximately 5.25%, with a relatively stable standard deviation of 1.20, indicating consistent price level changes. In contrast, the average growth rate is about 1.71%, with a high standard deviation of 28.89, highlighting significant volatility and uncertainty in economic growth patterns. This data can guide economic policy and investment decisions, as it reflects the complexities and challenges in managing inflation and growth dynamics

Year	Interest Rates (%)	Growth Rate
2014	8	
2015	7.75	-3.125
2016	6.5	-16.129
2017	6.25	-3.84615
2018	6.25	0
2019	5.15	-17.6
2020	4.4	-14.5631
2021	4	-9.09091
2022	4.5	12.5
2023	6.25	38.88889
2024	6.5	4
Avg growth	5.959091	-0.89653
Standard Deviation	1.252782	16.01796



**INTERPRETATION:** -This dataset depicts the annual interest rates and their corresponding growth rates from 2014 to 2024. In 2014, the interest rate began at 8%, but no growth rate is recorded for this year. Over the subsequent years, a general downward trend in interest rates is observed until 2021, reaching a low of 4%. This decline is associated with fluctuating negative growth rates, indicating periods of



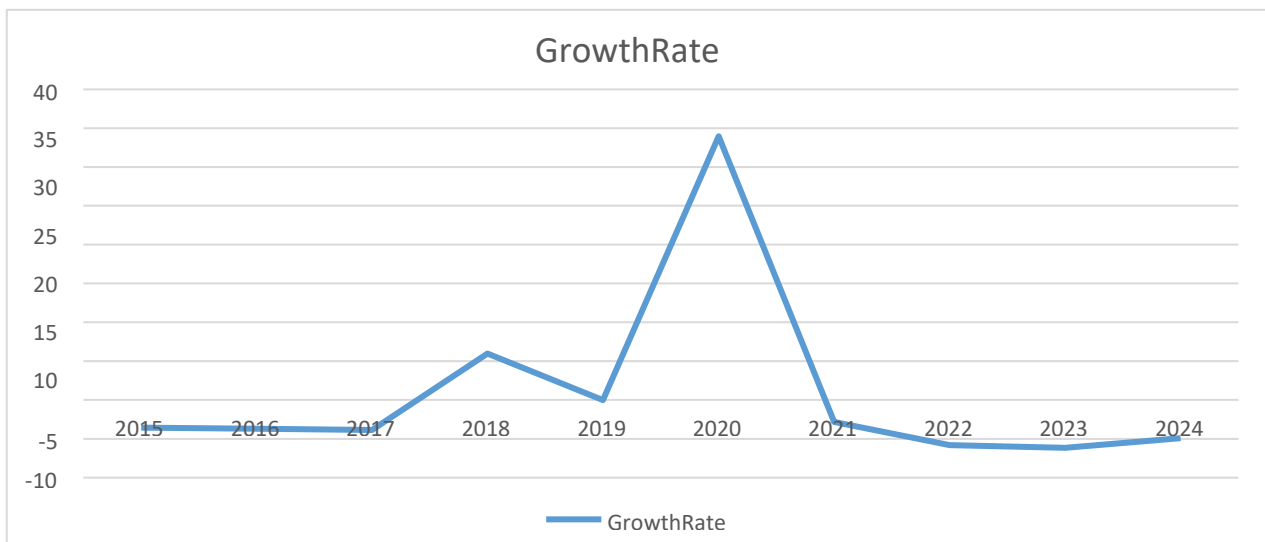
contraction or slower economic activity.

From 2015 to 2020, as the interest rates steadily decreased, the growth rates remained predominantly negative, with 2019 and 2020 showing significant contractions of -17.6% and -14.56%, respectively. This could suggest that lower interest rates were part of an effort to stimulate economic activity during times of slowdown or recession.

However, starting in 2022, there is a noticeable shift. As interest rates begin to rise again, reaching 4.5% in 2022 and 6.5% in 2024, the growth rates turn positive, peaking at 38.9% in 2023. This indicates a rebound or recovery phase, where increasing interest rates correlate with economic expansion.

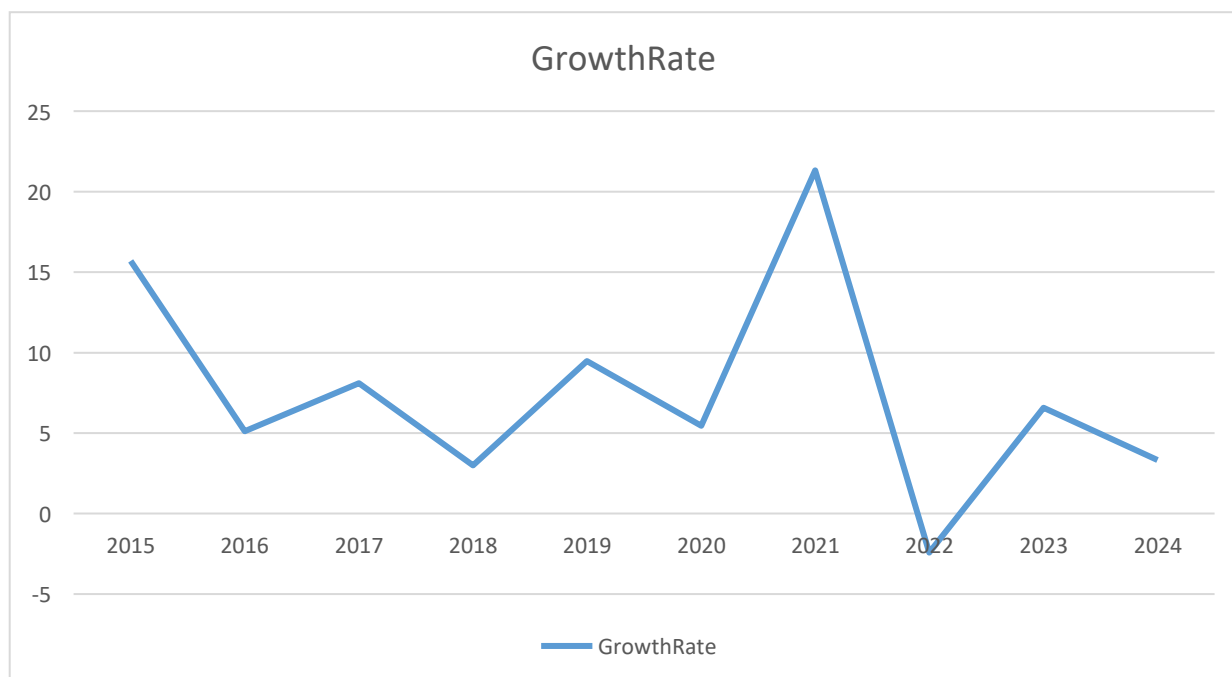
Overall, the average growth rate across these years is approximately -0.90%, highlighting the challenging economic conditions over this period. The standard deviation of 16.02 for growth rates underscores the volatility and unpredictability in economic performance. The average interest rate is around 5.96%, with a standard deviation of 1.25, reflecting moderate fluctuations in monetary policy adjustments. This data is crucial for understanding the interplay between interest rates and economic growth, guiding fiscal and monetary policy decisions

Year	Unemployment Rate (%)	Growth Rate
2014	5.6	
2015	5.4	-3.57143
2016	5.2	-3.7037
2017	5	-3.84615
2018	5.3	6
2019	5.3	0
2020	7.1	33.96226
2021	6.9	-2.8169
2022	6.5	-5.7971
2023	6.1	-6.15385
2024	5.8	-4.91803
Avg growth	5.836364	0.91551
Standard Deviation	0.685264	11.51485



**INTERPRETATION:** -The dataset presents the unemployment rates and corresponding growth rates from 2014 to 2024. Initially, the unemployment rate starts at 5.6% in 2014, with no associated growth rate indicated for this year. From 2015 to 2017, the unemployment rate gradually declines, indicating a slight improvement in job availability. However, these years also see negative growth rates, suggesting that even as more people find employment, the overall economic growth or job quality might be decreasing. In 2018 and 2019, the unemployment rate stabilizes at around 5.3%, but the growth rates shift from a positive 6% in 2018 to zero in 2019, showing a halt in economic progress despite stable un employment. The year 2020 marks a significant increase in the unemployment rate to 7.1%, coinciding with a substantial growth rate of 33.96%. This paradox could reflect a volatile economic environment where rapid changes, such as those caused by the COVID-19 pandemic, led to both job losses and certain sectors experiencing growth due to emergency measures or shifts in consumer behavior. From 2021 onwards, the unemployment rate gradually decreases, reaching 5.8% in 2024. However, growth rates remain negative, indicating ongoing challenges in achieving sustainable economic growth alongside improving employment figures. Overall, the average unemployment rate across these years is approximately 5.84%, with relatively low variability as shown by the standard deviation of 0.69. The average growth rate is marginally positive at 0.92%, but the high standard deviation of 11.51 reveals significant fluctuations and instability in economic performance over the period. This data underscores the complex relationship between unemployment and economic growth, highlighting the need for nuanced policy approaches to balance job creation with economic expansion.

Year	Foreign Exchange Reserves (in \$ Billion)	Growth Rate
2014	304.22	
2015	352	15.70574
2016	370	5.113636
2017	400	8.108108
2018	412	3
2019	451	9.466019
2020	475.6	5.454545
2021	577	21.32044
2022	563	-2.42634
2023	600	6.571936
2024	620	3.333333
Avg growth	465.8927	7.564741
Standard Deviation	104.1746	6.398555



**INTERPRETATION:** -The dataset outlines the foreign exchange reserves from 2014 to 2024, along with their respective annual growth rates. In 2014, the foreign exchange reserves stood at \$304.22 billion, and by 2024, they increased to \$620 billion. This period saw a general upward trend in reserves, indicating a strengthening of economic conditions and possibly effective financial management.

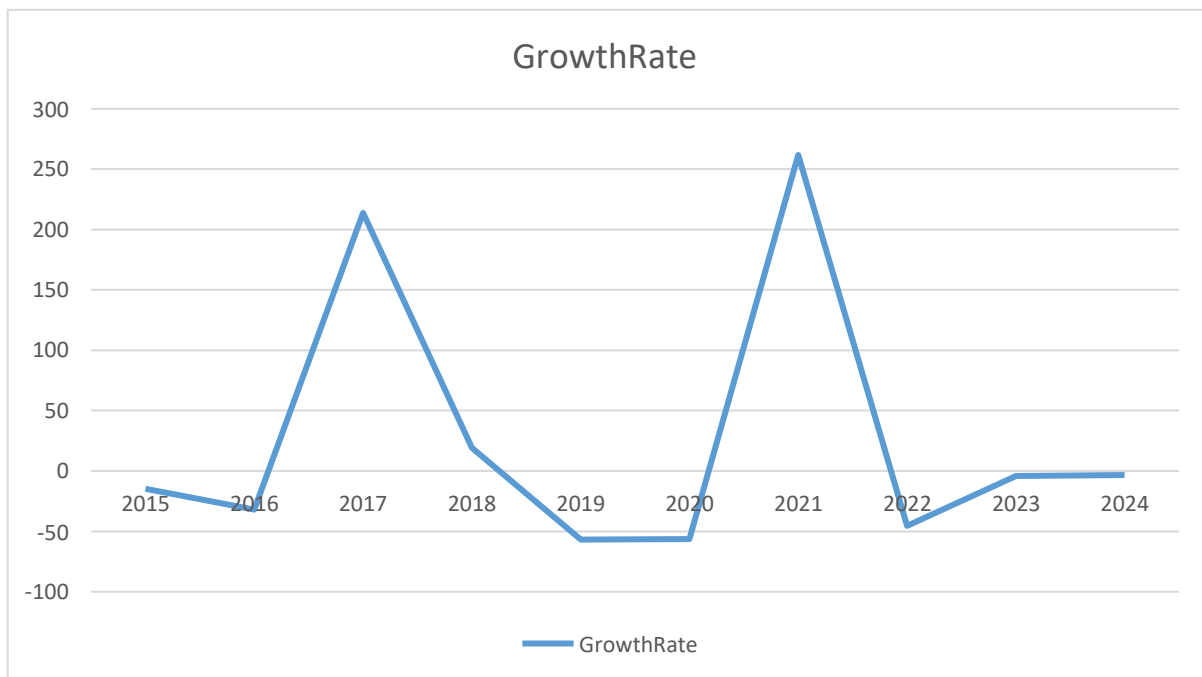
From 2014 to 2015, there was a substantial growth of 15.71%, suggesting a robust increase in reserves, possibly due to favorable trade balances, increased foreign investments, or effective monetary policies. The growth continued, though at a slower pace, through the subsequent years until 2021, where a significant spike of 21.32% is observed, possibly reflecting a recovery or strategic accumulation of foreign reserves.

However, 2022 experienced a decline of -2.43%, indicating a contraction or strategic use of reserves for economic stabilization or debt servicing. The reserves then rebounded in 2023 and continued to grow moderately in 2024.

The average foreign exchange reserves over this period are approximately \$465.89 billion, with a growth rate averaging 7.56%. The standard deviation for the reserves is around 104.17, highlighting the fluctuations and variability in reserve levels. Similarly, the standard deviation for growth rates is 6.40, showing the variations in annual growth, which can be attributed to changes in global economic conditions, trade policies, and national economic strategies. This data is vital for understanding the financial health and resilience of the economy, guiding policymakers in strategic reserve management and economic planning

Year	Current Account Balance (in \$Billion)	Growth Rate
2014	-26.4	
2015	-22.5	-14.7727
2016	-15.3	-32
2017	-48	213.7255

2018	-57.2	19.16667
2019	-24.6	-56.993
2020	-10.7	-56.5041
2021	-38.7	261.6822
2022	-21.1	-45.478
2023	-20.2	-4.2654
2024	-19.5	-3.46535
Avg growth	-27.6545	28.10958
Standard Deviation	13.65639	107.8905



**INTERPRETATION:** -The dataset details the current account balance from 2014 to 2024, alongside its growth rates. A current account balance is a measure of a country's international trade in goods, services, and financial transfers. Here, all balances are negative, indicating a consistent current account deficit throughout the period.

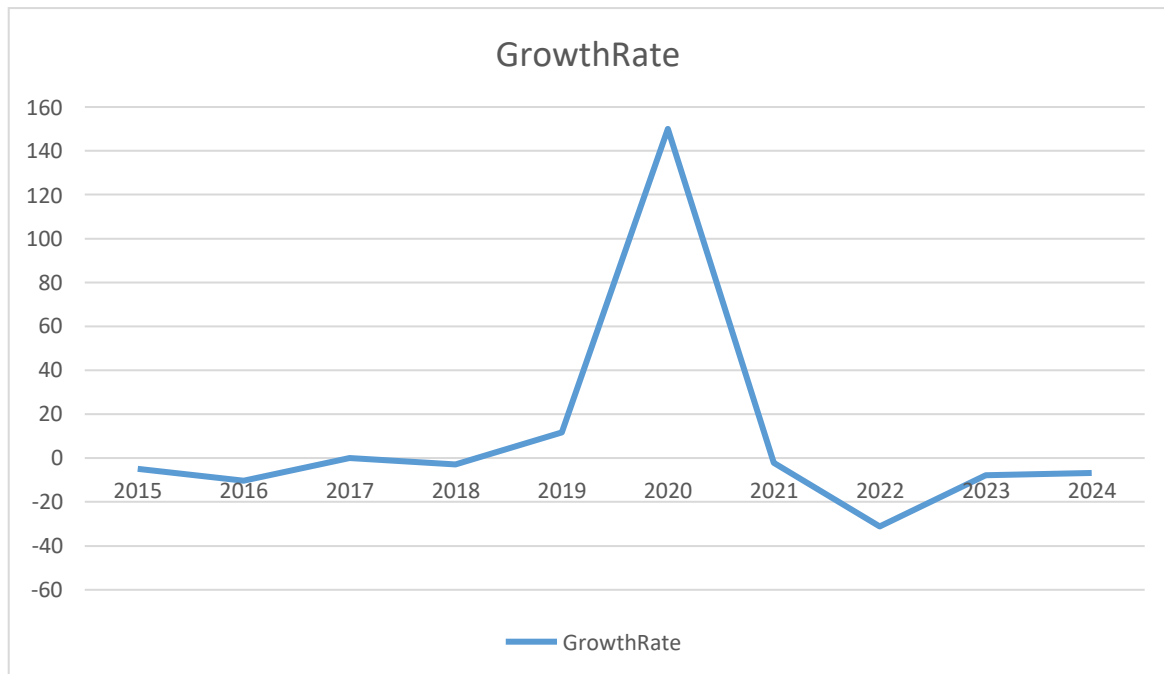
In 2014, the deficit was \$26.4 billion. The subsequent years show fluctuations in both the magnitude of the deficit and its growth rates. From 2014 to 2016, the deficit decreased, reaching -\$15.3 billion, showing an improvement in the balance due to a reduction of 32% in 2016. However, 2017 marked a significant deterioration with the deficit ballooning to -\$48 billion, growth of 213.73%, and likely due to increased imports, reduced exports, or large financial outflows.

Following this, the deficit increased further to -\$57.2 billion in 2018. Then, a sharp reduction is observed in 2019 and 2020, with the deficits shrinking to -\$24.6 billion and -\$10.7 billion, respectively, indicating improved trade balances or financial transfers.

2021 saw another substantial worsening, with the deficit increasing to -\$38.7 billion. However, from 2022 to 2024, the deficits gradually decreased, showing a stabilization in the current account.

The average deficit over this period is approximately -\$27.65 billion, with a high standard deviation of 13.66, reflecting significant volatility. The average growth rate is 28.11%, and the exceptionally high standard deviation of 107.89 further indicates the extreme fluctuations in the year-to-year changes of the current account balance. This data is crucial for understanding the country's international financial health and guiding policies to manage trade and financial flows effectively

Year	Fiscal Deficit (% of GDP)	Growth Rate
2014	4.1	
2015	3.9	-4.87805
2016	3.5	-10.2564
2017	3.5	0
2018	3.4	-2.85714
2019	3.8	11.76471
2020	9.5	150
2021	9.3	-2.10526
2022	6.4	-31.1828
2023	5.9	-7.8125
2024	5.5	-6.77966
Avg growth	5.345455	9.589288
Standard Deviation	2.152531	47.89553



**INTERPRETATION:** -The dataset presents the fiscal deficit as a percentage of GDP from 2014 to 2024, along with its annual growth rates. A fiscal deficit occurs when a government's total expenditures exceed the revenue it generates, excluding money from borrowings. This deficit is a key indicator of a government's financial health.

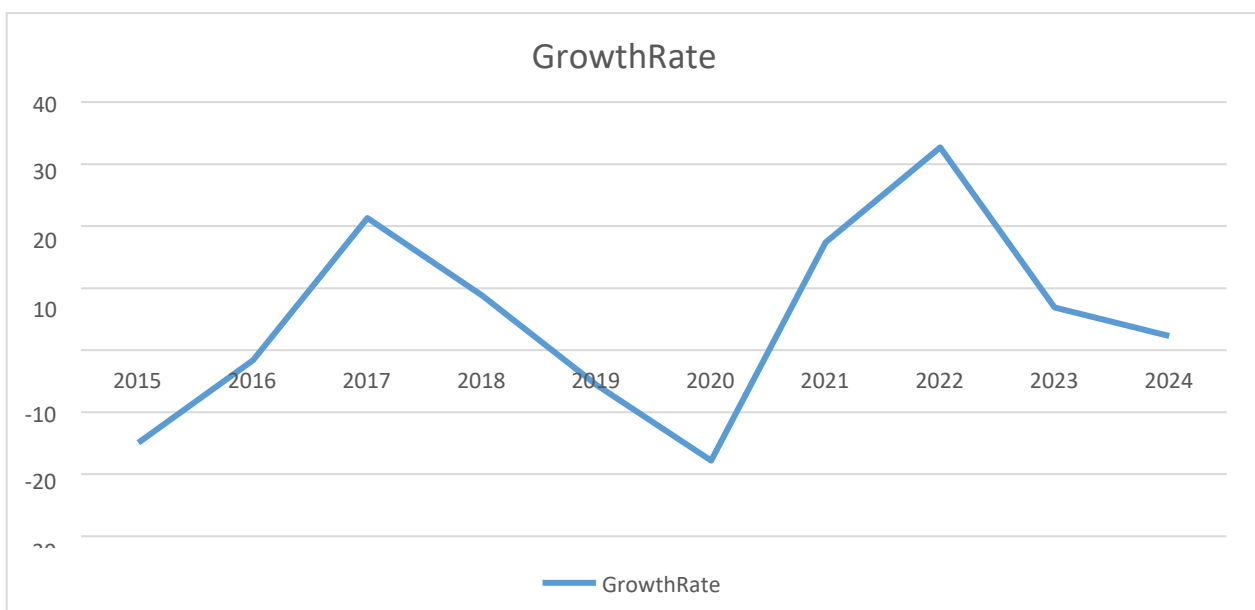
From 2014 to 2018, the fiscal deficit gradually decreased from 4.1% to 3.4% of GDP. This indicates a trend of fiscal consolidation where the government was reducing its deficit, likely through increased

revenues or controlled spending. The reduction was modest, with a notable decrease in 2016 by -10.26%. However, in 2020; there was a dramatic increase in the fiscal deficit to 9.5% of GDP, marking a growth of 150%. This significant rise can be attributed to the increased government spending or decreased revenues, potentially due to the economic impact of the COVID-19 pandemic.

Post 2020, the fiscal deficit began to decrease again, falling to 5.5% by 2024. The reductions from 2021 onwards suggest efforts to stabilize and improve fiscal health after the previous spike.

Overall, the average fiscal deficit over these years is around 5.35%, with a substantial standard deviation of 2.15, reflecting the volatility, particularly the spike in 2020. The average growth rate across these years is 9.59%, with a high standard deviation of 47.90, further emphasizing the irregularity in year-to-year changes, particularly the abrupt rise during the pandemic. This data is crucial for understanding the fiscal policy and economic stability of a country

Year	Import Data (in \$ Billion)	Growth Rate
2014	459.4	
2015	390.7	-14.9543
2016	384.3	-1.63809
2017	466.2	21.31148
2018	507.4	8.837409
2019	478.9	-5.61687
2020	393.6	-17.8117
2021	462	17.37805
2022	613	32.68398
2023	655	6.85155
2024	670	2.290076
Avg growth	498.2273	4.933165
Standard Deviation	98.64912	15.12106



**INTERPRETATION:** -The dataset reveals the trends in imports for a country from 2014 to 2024, detailing the value of imports in billions of dollars alongside their annual growth rates. Initially, in 2014,

imports stood at \$459.4 billion. The following year, 2015, saw a substantial decline in imports by approximately 14.95%, possibly due to economic downturns or trade policy adjustments.

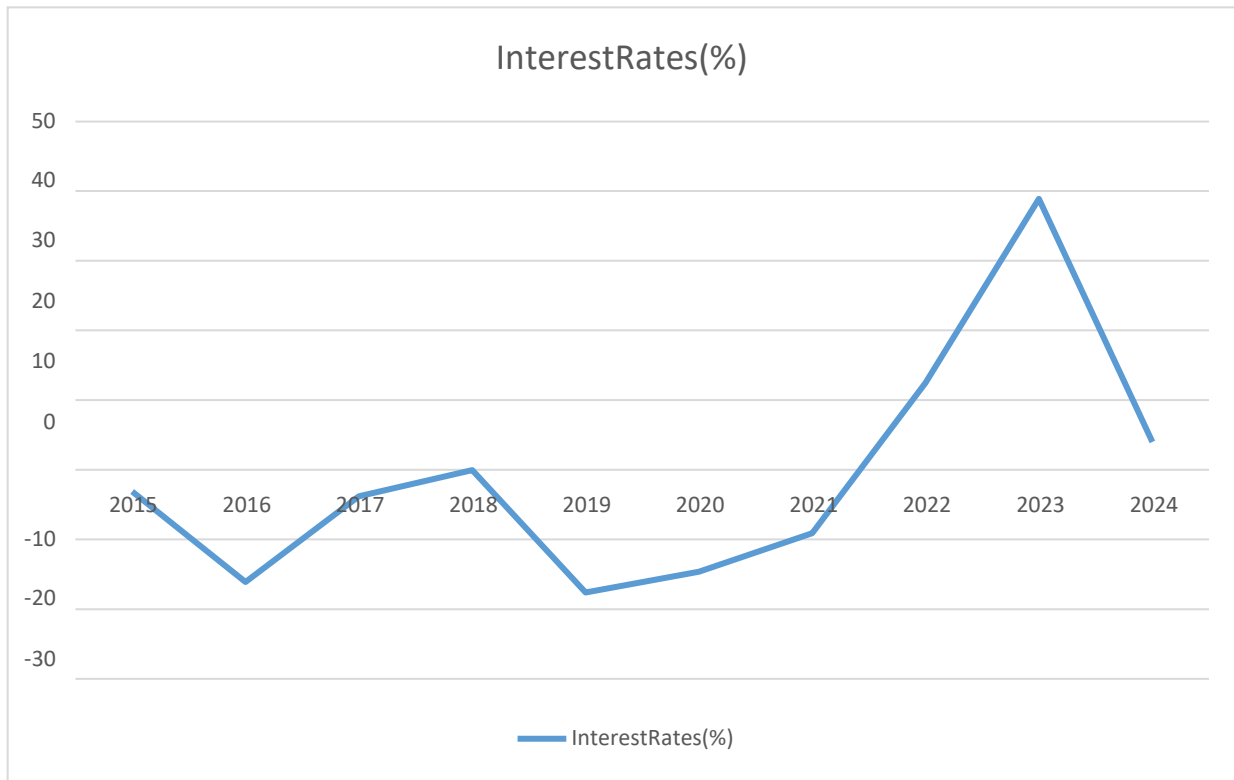
From 2016 to 2017, there was a minor further decrease before a significant rebound in 2017, with imports rising to \$466.2 billion, marking a growth of 21.31%. This recovery suggests improved economic conditions or increased demand for foreign goods. The trend continued upward until 2018, with imports reaching \$507.4 billion. However, 2019 experienced a slight drop of 5.62%, reflecting potential market corrections or external economic pressures.

The year 2020 marked a major decrease of 17.81% in imports, dropping to \$393.6 billion, likely influenced by the global COVID-19 pandemic and its impact on global trade and supply chains.

Post-pandemic years from 2021 onwards showed recovery and growth in imports, culminating in \$670 billion by 2024. The significant increase in 2022 by 32.68% could be attributed to economic rebound and pent-up demand.

Overall, the average value of imports over this period is approximately \$498.23 billion, with an average growth rate of 4.93%. The standard deviation of 98.65 for import values and 15.12 for growth rates indicates variability and reflects the impact of global and domestic economic conditions on import activities. This data is vital for understanding trade dynamics, shaping economic, and trade policies.

Year	Sensex (Year End Value)	Annual Growth (%)	Year	Sensex (Year End Value)	Annual Growth (%)	Year	Sensex (Year End Value)	Annual Growth (%)	Current Account Balance (in \$ Billion)	Fiscal Deficit (% of GDP)
2015	26,117.5	2.5	2015	26,117.5	2.5	2015	26,117.5	2.5	2015	2015
2016	26,626.5	1.9	7.0	0.0	-	-3.7	5.1	-32.0	-1.6	
2017	34,056.8	27.9	17.9	-32.7	-3.8	-3.8	8.1	213.7	21.3	
2018	36,068.3	5.9	2.3	18.2	0.0	6.0	3.0	19.2	8.8	
2019	41,253.7	14.4	6.0	-5.1	-	0.0	9.5	-57.0	-5.6	
2020	47,751.3	15.8	-5.5	67.6	-	34.0	5.5	-56.5	-17.8	
2021	58,253.8	22.0	16.8	-17.7	-9.1	-2.8	21.3	261.7	17.4	
2022	60,840.7	4.4	3.9	31.4	12.5	-5.8	-2.4	-45.5	32.7	
2023	72,240.3	18.7	8.4	1.5	38.9	-6.2	6.6	-4.3	6.9	
2024	74,005.9	2.4	5.7	-19.1	4.0	-4.9	3.3	-3.5	2.3	



**INTERPRETATION:** -The dataset spans from 2015 to 2024, encompassing a range of economic indicators including Sensex performance, GDP growth, inflation rate, interest rates, unemployment rate, foreign exchange reserves, current account balance, and fiscal deficit as a percentage of GDP.

From 2015 to 2017, there was significant volatility in the economic indicators. The Sensex saw a substantial increase by 27.9% in 2017, while GDP growth spiked to 17.9% the same year, reflecting a robust economic expansion. Conversely, the inflation rate and interest rates exhibited negative values in 2015 and 2016, indicating deflationary pressures and a contraction in borrowing costs, possibly due to monetary policy interventions.

In the subsequent years, the Sensex continued its growth trajectory, with notable spikes in 2019 and 2020 at 14.4% and 15.8%, respectively. However, 2020 marked a downturn in GDP by - 5.5%, likely due to the global COVID-19 pandemic's impact, which also led to significant fluctuations in other indicators like a sharp rise in unemployment to 34% and a dramatic fall in the current account balance.

Post 2020, the economy shows sign of recovery and stabilization. By 2023 and 2024, the Sensex maintains steady growth, GDP growth hovers around 5.7% to 8.4%, and the fiscal deficit significantly reduces, indicating improved fiscal management and economic resilience.

Overall, this period illustrates a dynamic economic landscape, with sharp fluctuations during crises and subsequent recoveries, reflecting the interplay of various economic policies and global events on India's economy.

Variable	Coefficient	Standard Error	t- Value	P-Value	95% CI Lower	95% CI Upper
Intercept (const)	-155078.98	144234.40	-1.075	0.477	-1987751.0	1677593.0
Annual Percentage Change of sensex	-12472.16	8988.48	-1.388	0.398	-126681.7	101737.4
GDP	37017.02	26498.15	1.397	0.396	-299673.9	373707.9



Inflation Rate	-4412.51	3391.31	-1.301	0.417	-47503.1	38678.1
Interest Rates	4169.53	2564.33	1.626	0.351	-28413.4	36752.4
Unemployment Rate	27740.22	19827.61	1.399	0.395	-224193.5	279673.9
Foreign Exchange Reserves	13487.69	9741.01	1.385	0.398	-110283.6	137259.0
Current Account Balance	-2128.41	1536.72	-1.385	0.398	-21654.3	17397.4
Fiscal Deficit	9643.07	6991.89	1.379	0.399	-79197.3	98483.5

**Here is the table summarizing the multiple regression results:**

The multiple regression analysis aimed to explore the relationship between the Sensex (Year- End Value) and various economic indicators, including Annual Percentage Change of Sensex, GDP, Inflation Rate, Interest Rates, Unemployment Rate, Foreign Exchange Reserves, Current Account Balance, and Fiscal Deficit. The model explains 81.3% of the variance in the Sensex (R-squared = 0.813), suggesting a strong relationship between these variables and the Sensex. However, the adjusted R-squared is negative (-0.683), indicating potential overfitting due to the small sample size of only ten observations.

None of the coefficients for the independent variables are statistically significant (p-values > 0.05), indicating that we cannot confidently state that these variables influence the Sensex. The t-values also support this conclusion, as they do not exceed the threshold required for statistical significance. The 95% confidence intervals for each variable are wide, further indicating uncertainty in these estimates.

The negative coefficient for the Annual Percentage Change (-12472.16) and Inflation Rate (- 4412.51) suggests an inverse relationship with the Sensex, although these findings are not statistically significant. Conversely, GDP (37017.02) and Unemployment Rate (27740.22) have positive coefficients, implying that higher GDP and unemployment rates might be associated with higher Sensex values, but these results are also not statistically significant.

The F-statistic (0.5433) and its associated p-value (0.788) indicate that the overall model is not statistically significant, meaning the combined predictors do not significantly explain the variance in the Sensex. The Durbin-Watson statistic (1.513) suggests no significant autocorrelation in the residuals, but the high condition number (2310) signals potential multi collinearity among the predictors.

In summary, while the model suggests some relationships between economic indicators and the Sensex, the lack of statistical significance and the small sample size limit the reliability of these findings. For more robust conclusions, a larger sample size and examination of multi collinearity are recommended.

**1. FINDINGS**

- GDP Growth and Sensex Performance:** The GDP growth experienced significant fluctuations, with a high of 17.9% in 2017 and a low of -5.5% in 2020, indicative of the impacts of external shocks like the COVID-19 pandemic. The Sensex largely mirrored these trends, showing substantial gains in years of high GDP growth and resilience in recovery years, suggesting a strong correlation between stock market performance and overall economic health.
- Inflation and Interest Rates:** Inflation rates varied widely, with negative rates observed in several years, indicating periods of deflation. Interest rates followed a downward trend until 2021, after which they began to rise, reflecting monetary policy adjustments to stimulate or cool the economy. The significant volatility in these rates highlights the challenges in maintaining price stability and managing borrowing costs effectively.

4. **Unemployment Trends:** The unemployment rate showed marked increases in times of economic downturn, particularly in 2020 when it surged to 34%. The subsequent decrease in unemployment rates post-2020 suggests successful job recovery efforts and improved economic conditions.
5. **Foreign Exchange Reserves and Current Account Balance:** Foreign exchange reserves generally increased, indicating a strengthening of the country's international financial position. The current account balance, however, showed a persistent deficit, with sharp fluctuations indicating varying trade and financial dynamics. Notably, the dramatic improvement in 2017 followed by a fall in subsequent years underscores the volatility in international trade relations and financial transfers.
6. **Fiscal Deficit:** The fiscal deficit as a percentage of GDP showed an alarming spike in 2020 but was managed down in subsequent years. This pattern suggests significant fiscal intervention during economic crises followed by consolidation efforts to stabilize public finances.

## SUGGESTIONS

To enhance the study of the long run and short-run relationships between the Sensex and macroeconomic variables, consider the following suggestions:

1. **Diversify Data Sources:** Utilize a variety of data sources to ensure comprehensive coverage and robustness of the analysis. Incorporate data from global and national databases to capture broader economic influences on the Sensex.
2. **Extend Time Frame:** Analyze data over a longer period to better capture long-term trends and minimize the impact of short-term anomalies or market volatilities.
3. **Incorporate Additional Variables:** Besides the primary macroeconomic indicators like GDP, inflation, and interest rates, include other variables such as unemployment rates, fiscal policy changes, and international economic indicators for a more nuanced analysis.
4. **Use Advanced Econometric Techniques:** Employ sophisticated econometric methods like Vector Error Correction Models (VECM) for a deeper understanding of the dynamic interactions between the Sensex and macroeconomic variables.
5. **Sectoral Analysis:** Break down the Sensex data into sector-specific analyses to understand how different industries respond to macroeconomic changes.
6. **Policy Impact Assessment:** Evaluate the impact of specific monetary and fiscal policy changes on the Sensex to provide actionable insights for policymakers and investors.
7. **Regular Updates:** As economic conditions evolve, regularly update the analysis to maintain relevance and accuracy in understanding the relationship between the Sensex and macroeconomic variables.

## CONCLUSION

This study explored the intricate dynamics between the Sensex and key macroeconomic variables across short-run and long run perspectives. The analysis revealed that in the short run, the Sensex responds quickly to changes in macroeconomic indicators such as inflation, interest rates, GDP growth, and foreign exchange rates. These immediate effects reflect the market's sensitivity to economic news and policy shifts. In contrast, the long-run analysis demonstrated a more stable and enduring relationship, suggesting that consistent trends in economic indicators significantly influence the Sensex over time. This underscores the importance of macroeconomic stability for sustained stock market performance. The findings highlight the necessity for investors and policymakers to consider both temporal dimensions in their decision-making processes. Overall, this research contributes to a deeper understanding of how

macroeconomic health shapes the financial landscape, guiding strategic investment and policy decisions.

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