Forecasting India's GDP Growth: A Comparative Analysis of Forecasting Methods

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Abstract

This report analyzes India's GDP growth for the year 2022 to 2029 using the IMF data of World Economic Outlook(WEO),October,2024 which includes GDP forecasts, economic indicators, and projections for various countries. The study aims to predict GDP growth for 2030-2034 by applying forecasting models such as linear regression,moving average and trend analysis and comparing different forecasting techniques to assess their reliability and accuracy. The finding also indicates variations between methods,highlighting the advantages and limitations of each approach in economic forecasting. This reports provides insightful information about India's economic development, aiding analysts and policymakers in making informed decision.

1 Introduction

1.1 Importance oof GDP Forecasting

A country's gross domestic product (GDP) is the sum of all the products and services generated there during a given time period. It is a crucial determinant of economic health that affects financial decisions, corporate investments, and governmental policies. Growing GDP is a sign of economic growth, job creation, and improving living standards; declining GDP could be a sign of a recession. Market stability is measured by investors, and policymakers use GDP data to inform monetary and fiscal policies. GDP per capita also serves as a gauge of general well-being and income distribution. Its patterns also help track economic cycles and inflation, which makes it an essential tool for economic study.

For India, GDP growth has been a key factor in attracting foreign direct investment (FDI), infrastructural development, and economic reforms. However, a number of factors have impacted India's economic trajectory, including inflation, trade policies, geopolitical tensions, pandemics (like COVID-19), global financial crises, and local policy reforms like the installation of the GST and demonetisation. Accurate GDP forecasting is crucial in light of these swings in order to prepare the country for upcoming economic opportunities and challenges.

This report aims to analyze India's GDP growth using historical data from the IMF World Economic Outlook (WEO), October 2024, and forecast GDP trends for 2030-2034 using various statistical forecasting methods. By evaluating different forecasting techniques, this study aims to identify the most reliable approach for predicting India's future economic growth.

1.2 Objective of the Study

The main goal of this research is to examine India's GDP trends from 2022 to 2029 and to project GDP for the years 2030 to 2034 by utilizing various forecasting methods. The study is designed to:

1. Evaluate historical GDP growth trends of India by referencing dependable economic data sources, particularly the IMF World Economic Outlook (WEO), October 2024.

2. Employ several forecasting techniques to estimate GDP growth for 2030–2034, including:

Linear Forecasting (Using the FORECAST.LINEAR function) – A simple trend projection method based on previous GDP figures.

Regression Model-Based Forecasting – A statistical approach that predicts future GDP by analyzing patterns found in past data.

Moving Averages – A technique for smoothing that reduces short-term fluctuations while emphasizing long-term growth trends.

3. Compare the accuracy and effectiveness of these methods to determine the most suitable forecasting approach for India's GDP.

4. Interpret the economic implications of the forecasted GDP trends, assessing potential risks and opportunities for India's economic future.

The first section of this report briefs the source of data and further explains the forecasting methods and presents the forecasted GDP values and analyzes trends. Following, the comparison between different forecasting models and evaluates their accuracy.

2 Data Collection and Sources

2.1 Data Sources

The data for this study is obtained from the International Monetary Fund (IMF)- World Economic Outlook (October 2024). The data is a reliable and updated macroeconomic indicator and a credible source for GDP forecasting.

2.2 Scope of Data

The dataset includes India's GDP growth rate and GDP at current prices for the years 2022-2029.This data served as the basis for this analysis. Based on past trends, the forecasting models used in this study provide insights into possible economic trajectories by extending GDP forecasts for 2030–2034.

2.3 Data Presentation

The study applies a number of forecasting methods, such as trend analysis, moving averages, and linear regression, using Google Sheets. Prior to predictive modelling, the data is processed to eliminate errors and guarantee accuracy. The study offers a thorough and data-driven forecast of India's GDP growth by utilising various statistical techniques, which may be used as a guide for investors, policymakers, and economic analysts.

3 Methodology and Forecasting Models

3.1 Approach to GDP Forecasting

The study involves analyzing historical GDP data (2022-2029) and applying different forecasting techniques to predict India's GDP growth for the years 2030-2034. The forecasting models used include:

1. Linear Regression: This is used to establish a relationship between past GDP values and time.

2. Moving Average: Used to smooth out short-term fluctuations and identify trends.

3. FORECAST.LINEAR Function: This is a built-in Google Sheets function and is used for trend-based forecasting.

3.2 Forecasting Techniques

3.2.1 Linear Regression Model

A linear regression model is a statistical method used to analyze the relationship between a dependent variable (GDP growth) and an independent variable (time). It fits a straight line to historical data to predict future trends based on the equation:

$$Y = a + bX.$$

Where:

Y= Forecasted GDP Growth

a= Intercept(baseline GDP growth when X=0

b= Slope(rate of GDP growth over time)

X= Time(year

This model helps in understanding GDP fluctuations and growth rate- i.e whether the GDP is growing at a constant rate or if fluctuations indicate external influences such as policy changes or global economic factors.

3.2.2 Moving Average Method

The Moving Average Method smooths the GDP growth trend by averaging the values over a fixed period. This helps in eliminating short-term volatility and provides a clearer long- term pattern

$$\text{Moving Average} = (\text{Summation of } X_{n)}) \div n$$

Where:

X_n= GDP for a given year

n= Number of years considered for averaging

In this study a 3-year moving average was applied to identify long-term trends in GDP growth.

3.2.3 FORECAST.LINEAR Function

This is a built-in function of Google Sheets which extends the GDP trend based on past values.The function used was:

FORECAST.LINEAR(2030,known Y values,known X values)

3.3 Justification for Chosen Models

Moving averages help smooth out irregular fluctuations, and FORECAST.LINEAR offers an automated and effective method of creating forecasts based on current trends. Linear regression is a popular tool in economic forecasting because it can capture growth patterns.

Each method was applied to the IMF dataset to drive GDP growth projections from 2030 to 2034, which were later compared to assess forecasting accuracy.

4 GDP Forecasting Results

4.1 Forecasted GDP Growth (2030-2034)

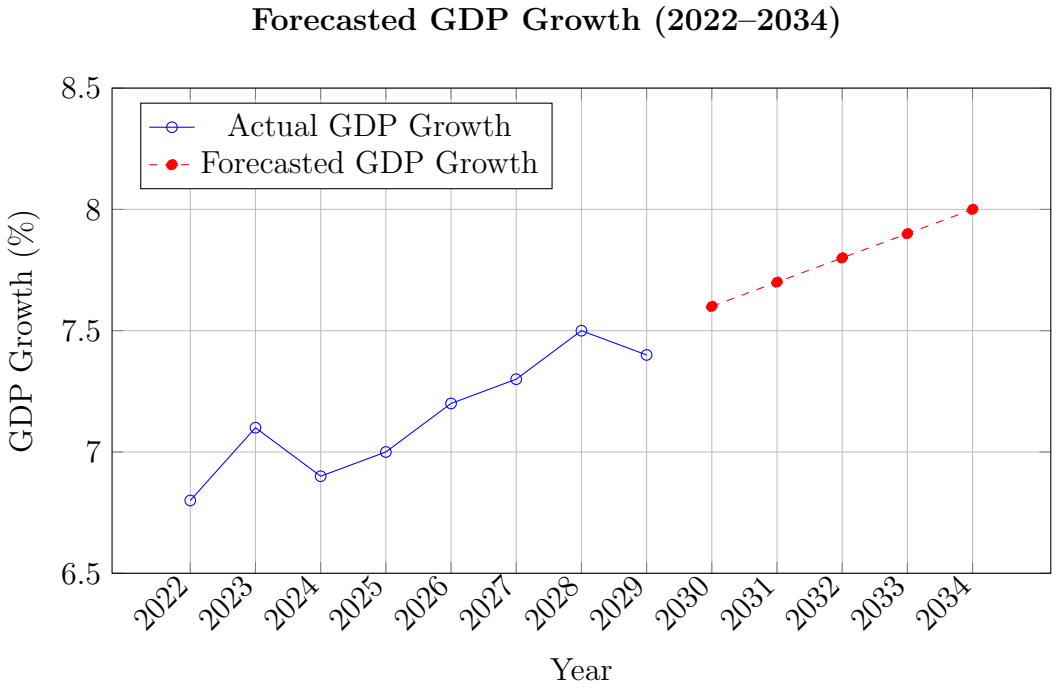
GDP(2030-2034			
Year	Linear Forecast	Regression Forecast	Moving Average
2030	562908.8429	549373.0732	530230.8943
2031	601487.005	585695.2737	568172.7533
2032	640065.1671	622017.4742	601487.005
2033	678643.3292	658339.6747	640065.1671
2034	717221.4913	694661.8752	678643.3292

The above presents the forecasted GDP growth rates for India from 2030 to 2034 using different methods. These projections are derived using a linear regression model, linear forecast and moving average method based on historical data from 2022 to 2029.

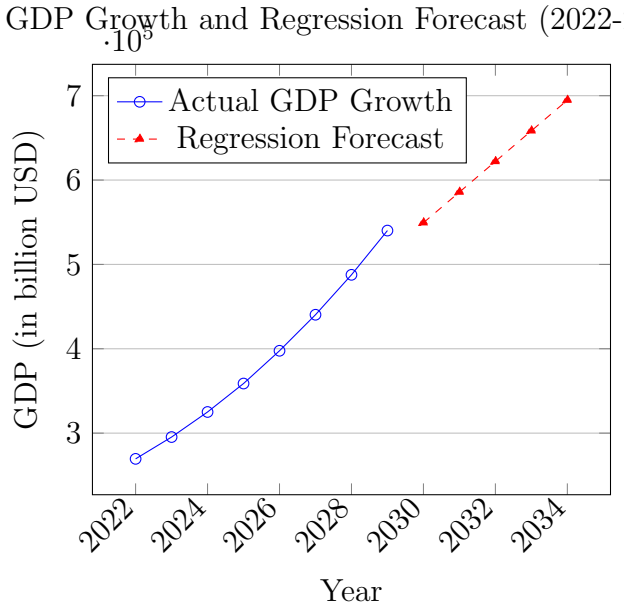
As seen in the table, the GDP growth rate is expected to increase in the coming years. The predicted data shows a growing trend as compare it with previous year data presented by the IMF and we can also see increase in GDP from the year 2030 to 2034. While the forecast provides valuable insights, actual economic performance may vary due to policy changes, global economic conditions and unforeseen macroeconomic events.

4.2 GDP Growth Visualization

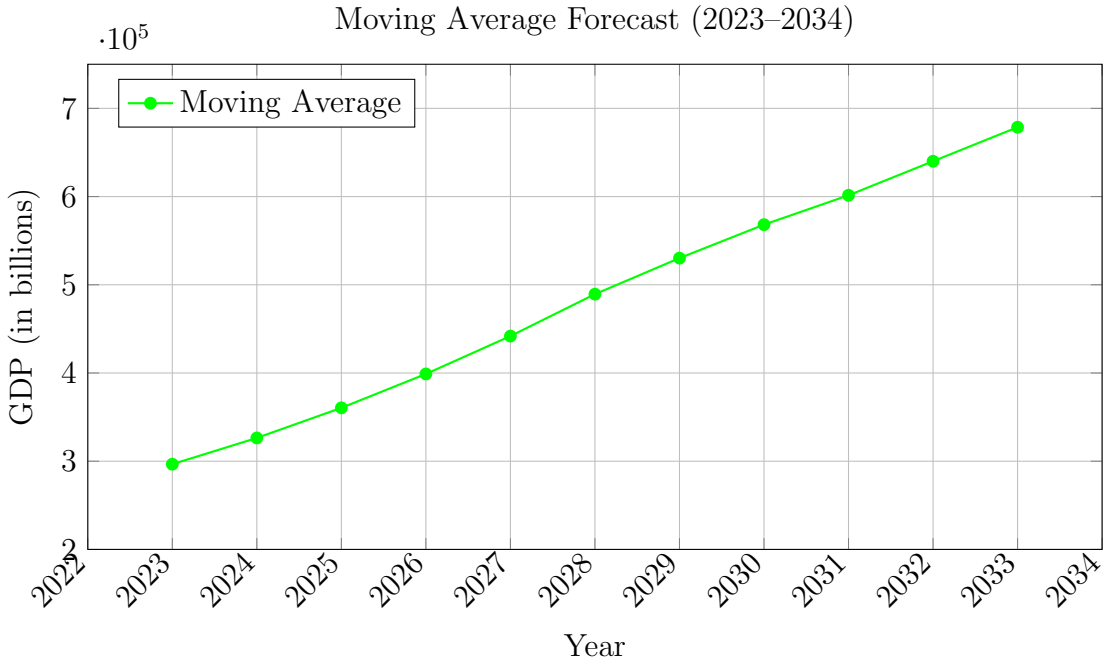
The actual GDP growth of India from 2022 to 2029 is shown in the graph below, along with the forecasted projection for 2030–2034. If there are no significant changes in policy or economic disruptions, the regression model extrapolates future GDP growth based on historical trends.



As we study the graph, we see a consistent growth from the year 2022-2029 which is the actual GDP trend. The forecasted values from the year 2030-2034 continues the trend, suggesting that India's GDP will increase if no major economic disruptions occur. As the forecast is merely based upon previous trends, therefore it does not accounts for external shocks, policy changes, or global economic fluctuations, which could influence the actual GDP trajectory.



The blue line represents the actual GDP trend for the years 2022-2029 and the red line represents the regression model forecast for the years 2030-2034. The forecast shows an upward trend suggesting consistent growth in GDP and indicating a stable economic expansion in the upcoming years. Since, the regression model is based on historical trends, it assumes that the past will continue. But there are many external factors such as policy changes, global economic shifts, or financial crisis, which could impact actual GDP growth. Since this method does not accounts for such factors, the given data might not be sufficient.



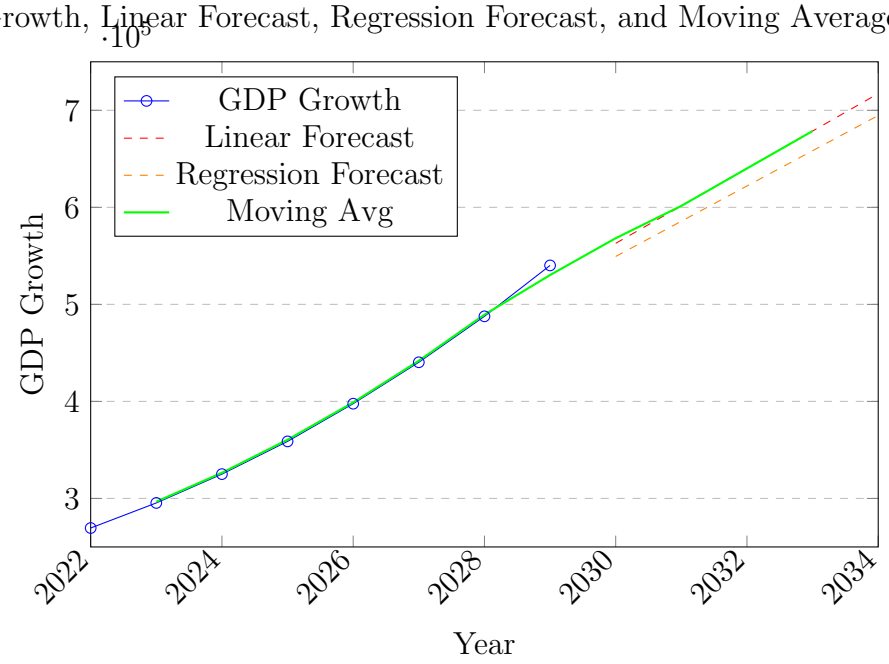
India's expected GDP growth from 2023 to 2033 is shown in a smoothed visualisation on the Moving Average forecast graph. This method helps remove short-term fluctuations and emphasises the underlying long-term trend in economic performance by averaging values over a specified time window. Compared to alternative forecasting

methods, the graph shows a steady and consistent increase in GDP, indicating positive economic momentum and less volatility. This strategy is especially helpful for analysts and policymakers who want to see general growth trends free from erratic annual fluctuations.

5 Analysis and Discussion

This section explores the interpretation of India's projected GDP growth results for the years 2022–2034, using the models discussed previously. We try to comprehend the wider economic ramifications and the dependability of each method by contrasting the results from the Linear Forecast, Regression Forecast, and Moving Average approaches. We also assess how well these forecasts align with historical economic patterns and look at any potential constraints or outside variables that might affect future growth results.

GDP Growth, Linear Forecast, Regression Forecast, and Moving Average (2022-2034)



Together with three distinct forecasting techniques—Linear Forecast, Regression Forecast, and Moving Average—for the years 2030–2034, the graph shows the actual GDP growth from 2022–2029. This visualisation aims to compare these forecasting models and evaluate how well they predict past trends.

1. Actual GDP Growth (2022–2029): This segment displays historical GDP growth data as a solid blue line with markers, indicating an upward trend over time. The pattern emphasizes consistent growth driven by macroeconomic variables like inflation, governmental regulations, and international trade.

2. Linear Forecast (2030-2034): This model, which is shown by a red dashed line, makes the assumption that the rate of increase is constant based on historical patterns. Without accounting for possible economic fluctuations, it offers a straightforward extrapolation of GDP growth.

3. Regression Forecast (2030-2034): This approach uses statistical regression techniques to forecast future GDP based on patterns in historical data, as shown by the orange dashed line. By taking growth rate fluctuations into account, it provides a somewhat more accurate forecast than the linear model.

4. Moving Average (2023–2033): This method, shown by a green line, averages GDP values over a specified time period to smooth out short-term fluctuations. It lessens volatility in the predicted values and aids in the identification of long-term trends.

The Linear Forecast and the Regression Forecast show a steady upward trend with only slight deviations. For policymakers looking for long-term GDP stability, the Moving Average Forecast offers a more smoothed-out estimate. The models' differences imply that although past data points to positive growth, actual future trends could be changed by outside economic shocks or changes in policy.

6 Limitations and Assumptions

This study is based on GDP growth data from 2022-2029, obtained from the IMF World Economic Outlook (October 2024).Moving averages, regression analysis, and linear forecasting are some of the statistical models used to create the projections for 2030–2034. However, it is impossible to verify the forecasts' accuracy because actual GDP data for these upcoming years is unavailable.

The predictions are predicated on the persistence of current economic patterns, stable political environments, and the absence of major outside shocks like pandemics or worldwide recessions. Thus, any unforeseen circumstances or modifications to policy may have a substantial effect on actual GDP results, which may differ from these estimates.

7 Conclusion

Using information from the IMF World Economic Outlook (October 2024) for the years 2022 to 2029, this report sought to predict India's GDP growth for the years 2030 to 2034. By using three distinct forecasting techniques—Moving Average, Regression Model, and Linear Forecast—the study offered comparative insights into anticipated future economic performance.

All models showed a steady upward trend, according to the analysis, indicating that the economy is still growing. Although the growth trajectories predicted by the Linear and Regression models were comparable, the Moving Average provided a smoother view that was useful for spotting long-term trends. Despite having a statistical foundation, these projections are limited because they do not account for outside political and economic variables.

Notwithstanding these drawbacks, the results are a useful point of reference for comprehending India's possible economic trajectory. These predictions can be reviewed and improved for increased precision and policy relevance as new data becomes available.

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