Effectiveness of Fiscal Policy on GDP

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Introduction

Fiscal policy refers to the government's use of spending and taxation to influence a country's economic activity. By adjusting levels of government expenditure, setting tax rates, and sometimes providing subsidies or incentives, fiscal policy aims to manage economic growth, stabilize prices, and reduce unemployment. When executed effectively, fiscal policy can help regulate the business cycle, spur economic growth during recessions, and cool down an overheating economy by curbing excessive spending. It is thus a critical instrument in economic planning and development.

Gross Domestic Product (GDP) is the total market value of all goods and services produced within a country in a specific period. As a core measure of economic health, GDP reflects a nation's economic output and productive capacity. Governments aim to achieve steady GDP growth, indicating a thriving economy that can support high living standards, create jobs, and improve public welfare. Fiscal policy directly impacts GDP growth by influencing aggregate demand: higher government spending or reduced taxation can boost demand and spur economic activity, while spending cuts or higher taxes can reduce demand, potentially slowing growth.

In this study, we explore the effectiveness of fiscal policy in driving GDP growth by analyzing three essential indicators: Government Spending, Inflation, and Unemployment.

1. Government Spending: Measured as General Government Final Consumption Expenditure (% of GDP), this variable represents government expenditure on goods and services. Governments spending more often stimulates demand, encourages investment, and creates jobs, positively impacting GDP growth. However, excessive spending can also lead to high public debt or “crowding out” private investment, hindering growth. By including government spending as a variable, we can examine its role in enhancing or limiting GDP growth.

2. Inflation (GDP Deflator): Inflation, represented by the GDP deflator (annual %), is the rate at which general prices for goods and services rise, eroding purchasing power. Moderate inflation is typically seen as a sign of a growing economy, encouraging spending and investment. However, high inflation can harm the economy, reducing consumption as purchasing power declines and increasing uncertainty among investors. By analyzing inflation’s relationship with GDP, we can assess how price stability affects economic growth and understand the balance between stimulating the economy and managing inflation risks.

3. Unemployment: Unemployment, measured as the total % of the labor force (modeled ILO estimate), provides insight into the economy’s health and efficiency in utilizing human resources. High unemployment suggests underutilized labor resources, leading to lower output and slower GDP growth. Conversely, low unemployment indicates economic strength, as more individuals

are employed and contributing to production. By examining unemployment's impact on GDP, we can assess the effectiveness of fiscal policies aimed at job creation and economic stimulation.

Objective and Research Gap

This study investigates the relationship between changes in government spending, inflation, and unemployment rates with overall GDP growth. While much research has explored fiscal policy impacts on growth, findings often vary by country and economic context, and specific analysis of these variables is limited. Additionally, understanding how these factors have influenced GDP growth in recent years can offer relevant insights for policymakers aiming to optimize fiscal strategies.

Research Question

To what extent do factors related to fiscal policy, such as government expenditure, inflation, and unemployment, affect GDP growth?

Project Objective

Using a 10-year dataset from World Development Indicators (WDI) covering 2014 to 2023, this project aims to provide a clearer understanding of the effectiveness of fiscal policy on GDP growth. By examining the dynamics between these fiscal variables and economic growth, this study seeks to fill a critical research gap and support evidence-based policymaking that promotes economic stability and development.

Methodology

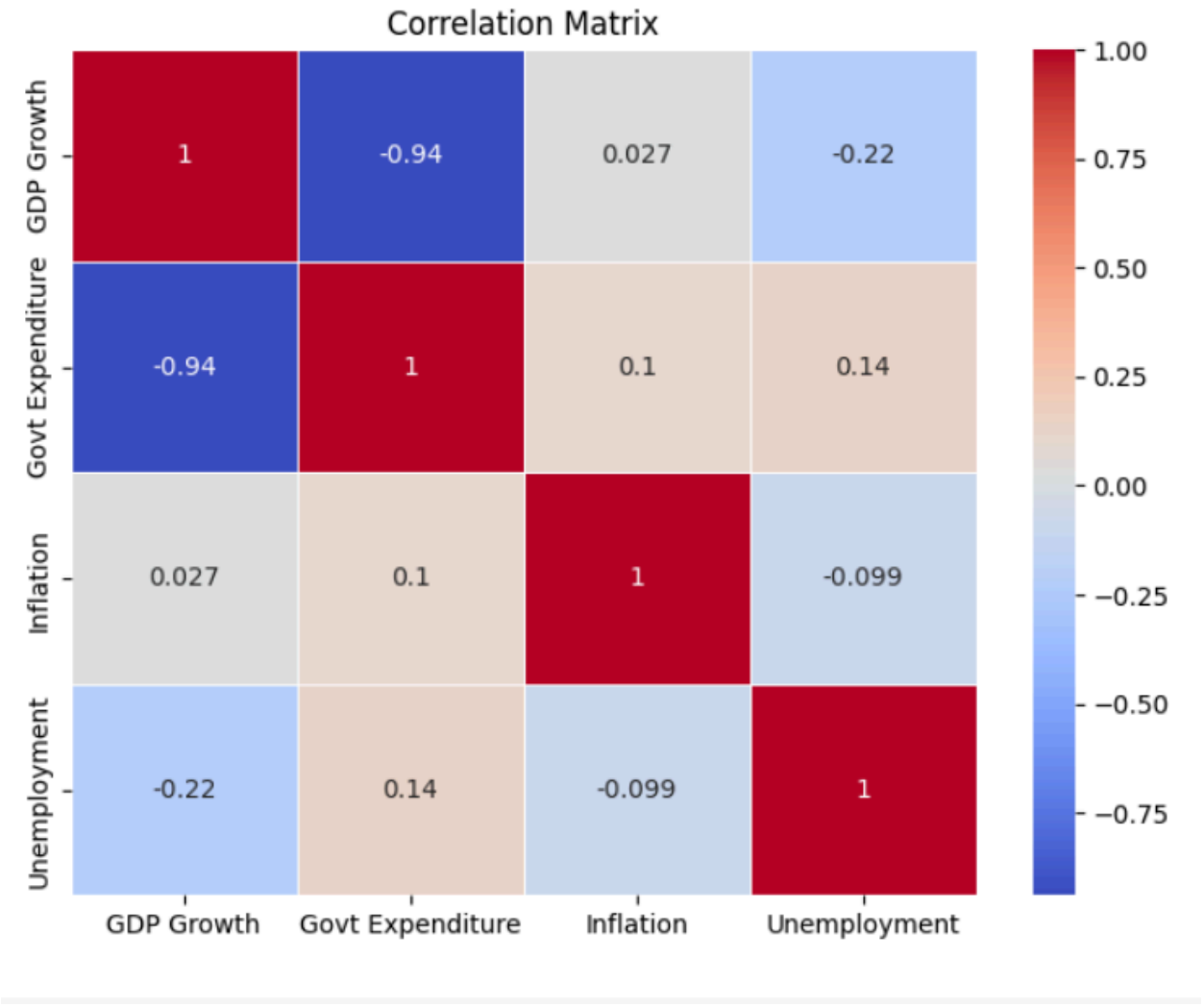
In this study, we analyze the effectiveness of fiscal policy on GDP growth using data from the World Development Indicators (WDI) database. The dataset includes annual data from 2014 to 2023 and consists of four key variables across different countries:

1. GDP Growth (annual %): The dependent variable representing the percentage change in a country's GDP growth each year.
2. General Government Final Consumption Expenditure (% of GDP): This independent variable represents the proportion of GDP that accounts for government spending on goods and services.
3. Inflation, GDP Deflator (annual %): An independent variable that measures the annual percentage change in the cost of all goods and services included in GDP, serving as a measure of inflation.
4. Unemployment, total (% of total labor force, modeled ILO estimate): This independent variable represents the unemployment rate, providing insight into labor market conditions and economic productivity.

Each variable is essential for understanding the interaction between fiscal policy factors and economic growth. Government spending shows direct fiscal efforts, inflation reflects price stability, and unemployment indicates resource utilization in the economy.

To analyze these relationships, we conducted various visualizations to explore and interpret the data:

1. Correlation Matrix: A correlation matrix displays the correlation coefficients between variables, helping us identify potential linear relationships. By analyzing the correlation coefficients, we can gauge how strongly each fiscal policy variable is associated with GDP growth, which guides our selection of key variables for the regression model.

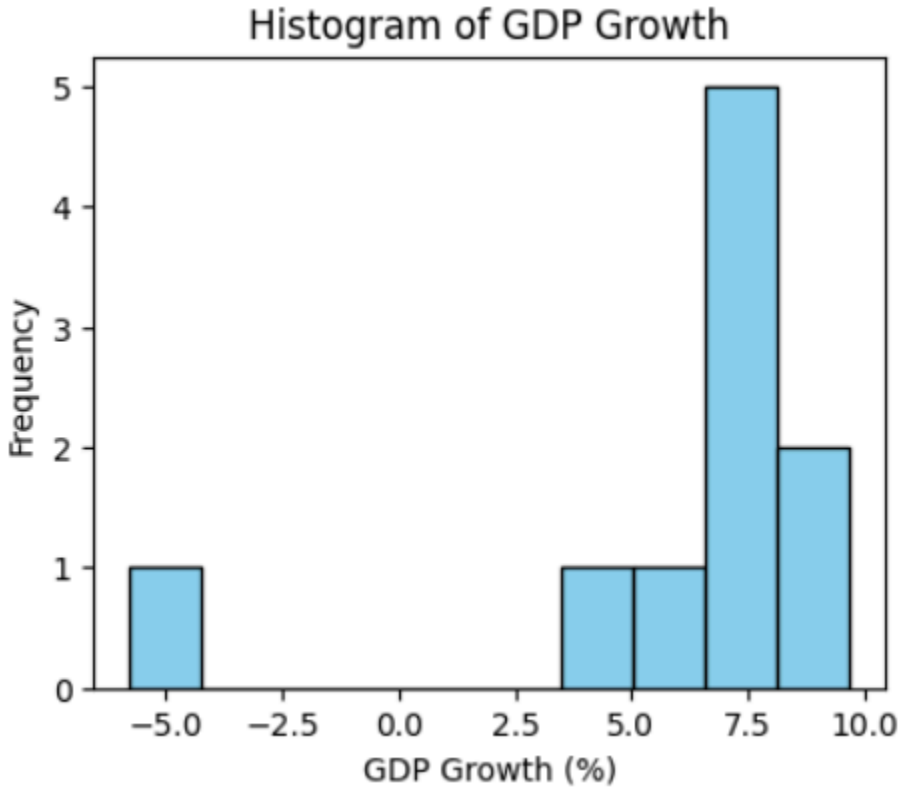


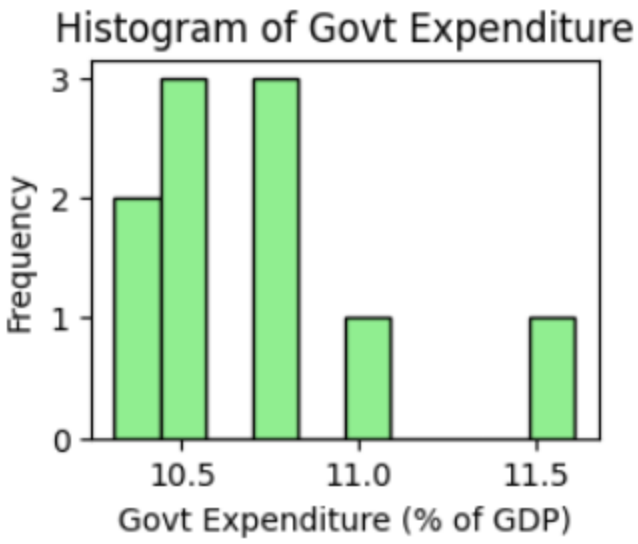
Blue indicates a negative correlation, red indicates a positive correlation, and white indicates no correlation. The intensity of the colour represents the strength of the correlation.

The numbers within each cell represent the correlation coefficient, which ranges from -1 to 1. A value of 1 indicates a perfect positive correlation, -1 indicates a perfect negative correlation

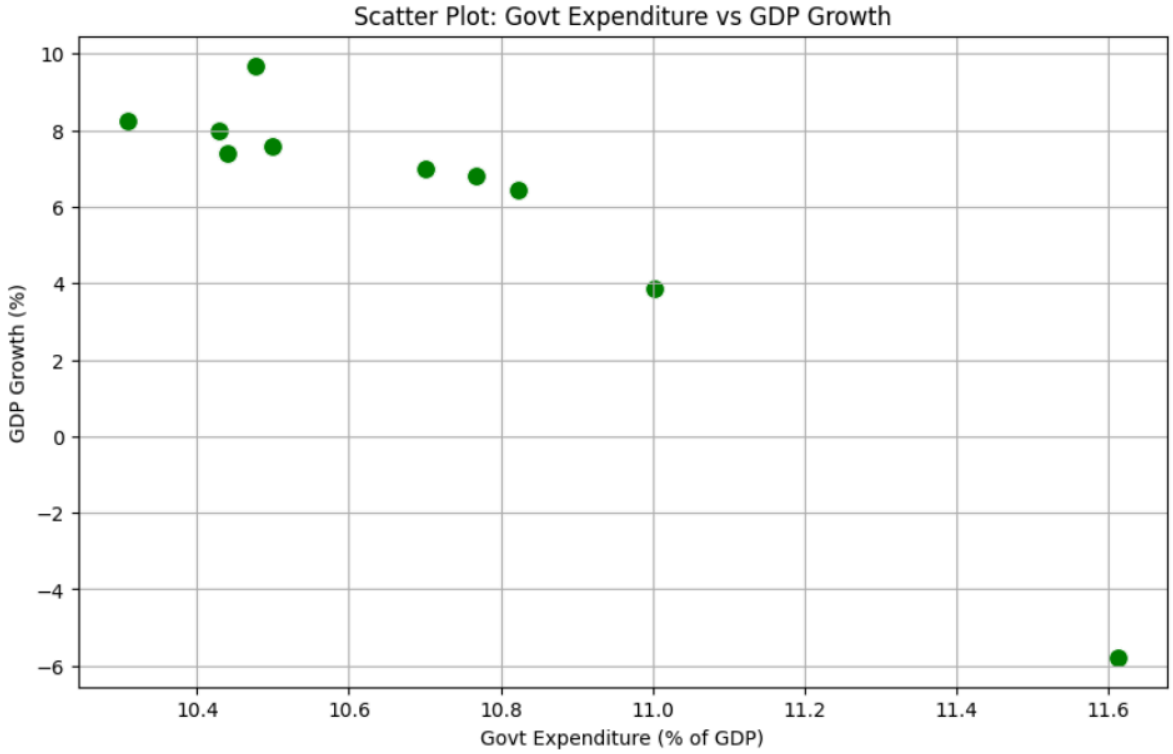
and 0 indicates no correlation.

2. Histograms: These charts display the distribution of each variable, allowing us to understand the frequency and range of values. By observing the shapes of the distributions, we can check for skewness or outliers in the data.





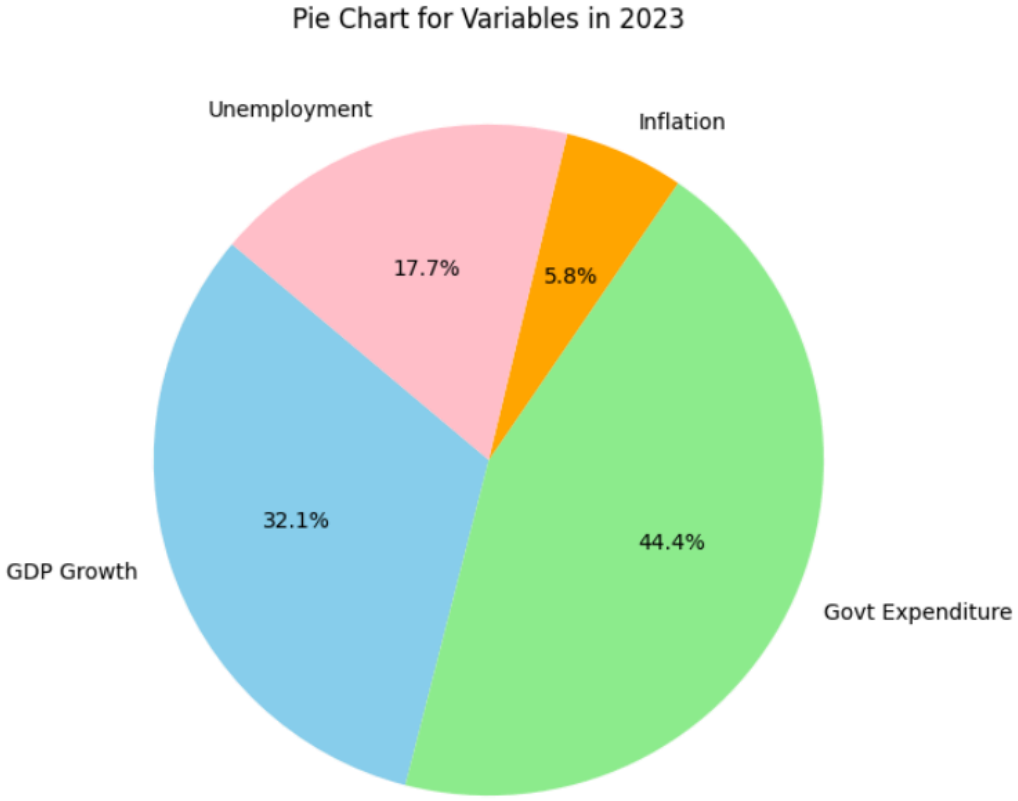
3. Scatter Plots: Scatter plots visually represent the relationships between GDP growth and each independent variable. They help us identify any potential patterns, such as positive or negative correlations, that can guide our analysis.



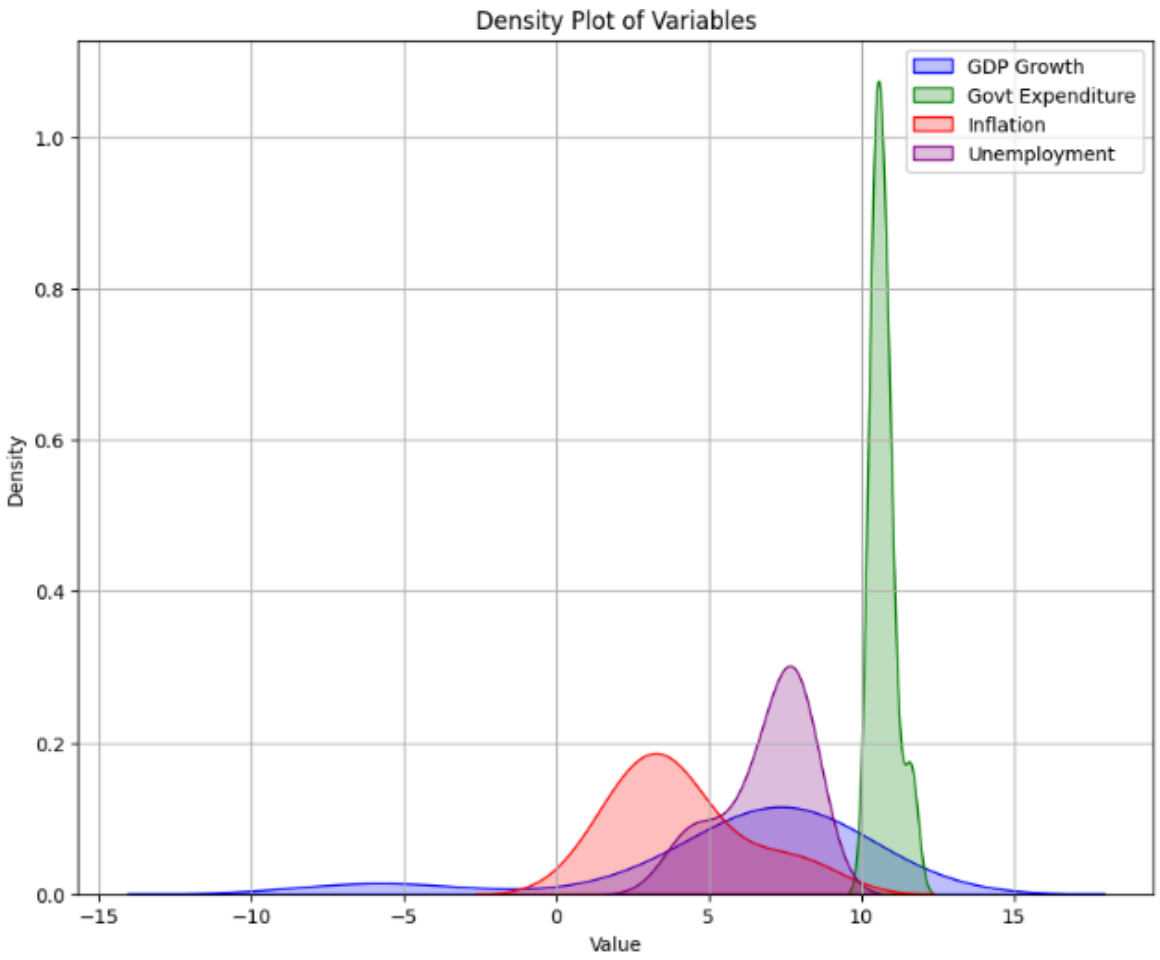
There seems to be a weak negative correlation between government expenditure and GDP growth. This suggests that as government expenditure increases, GDP growth tends to decrease, but the relationship is not very strong.

While there is a slight tendency for countries with higher government expenditure to have lower GDP growth, the relationship is not very clear-cut. Other factors, such as the efficiency of government spending, economic conditions, and other policy measures, likely also contribute to GDP growth.

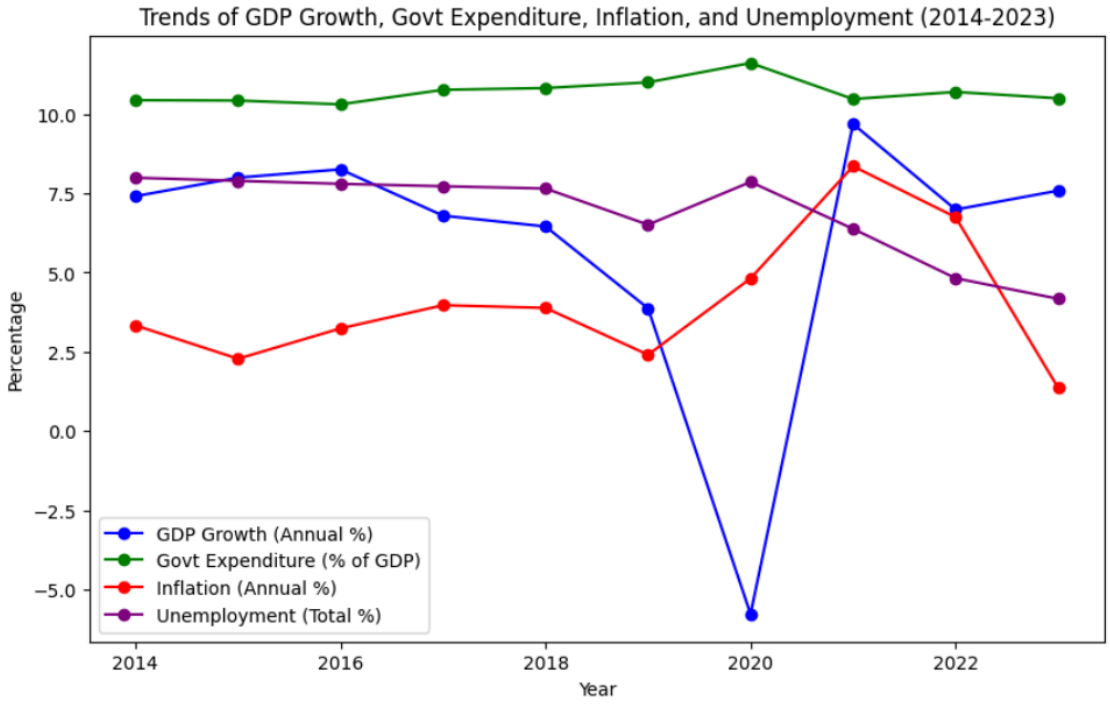
4. Pie Charts: Pie charts can be used to show the proportion of countries experiencing different rates of GDP growth, government expenditure, inflation, or unemployment within certain ranges. This helps in understanding how countries are distributed across these fiscal and economic metrics.



5. Density Plots: Density plots allow us to visualize the distribution of variables in a smoothed manner, providing insights into the spread and central tendency of each variable.



6. Line Graphs: Line graphs are used to observe trends over time for each variable, such as how GDP growth, government spending, inflation, and unemployment rates have evolved from 2014 to 2023. These graphs highlight trends within countries or globally, providing a time-based perspective on fiscal policy and economic growth.



By combining these visualizations with a multiple linear regression model, we aim to uncover how government spending, inflation, and unemployment collectively impact GDP growth. This comprehensive approach will help us answer our research question about the effectiveness of fiscal policy on economic growth.

We analyze the null values or missing values available in our dataset. There is no missing value in our dataset.

Conclusion

Based on the analysis, we observe a moderate correlation between fiscal policy indicators—government expenditure, inflation, and unemployment—and GDP growth, as evidenced by an R-squared value of 0.72. This R-squared value suggests that approximately 72% of the variability in GDP growth can be explained by the selected fiscal policy factors, indicating a relatively strong model fit. Additionally, the Mean Squared Error (MSE) of 0.071 implies a reasonably low average error, suggesting the model's predictions are relatively accurate.

The intercept of 122.03 represents the baseline GDP growth when all other variables are zero, while the negative coefficient for government expenditure suggests an inverse relationship with GDP growth, possibly indicating diminishing returns or inefficiencies in government spending. In contrast, the positive coefficient for inflation suggests a direct, though minimal, relationship with GDP growth, and the negative coefficient for unemployment indicates that higher unemployment rates are associated with reduced GDP growth.

This analysis was conducted using the Python libraries *pandas* and *matplotlib* for data manipulation and visualization, respectively.