Take-Home Assignment: Economic Analysis of Government Spending

Objective:

Analyze government spending data to explore patterns, relationships with GDP per capita growth across G20 economies, and its alignment with policy declarations and actual budgetary allocations. Further, investigate any additional associations between government spending and broader economic activity.

Executive Summary

This project analyzes government spending data to identify trends, anomalies, misalignments, and economic impact. It will use data cleaning, time-series analysis, sector-wise analysis, policy and spending misalignment analysis, economic impact analysis, and machine learning modelling.

The project extracts and **clean government spending data** from various sources. It then analyze the data to understand its characteristics. Constructed **monthly and yearly time-series charts** to illustrate government spending over an extended period. This helps to identify any discernible patterns or anomalies in the spending data across different sectors.

Conducted a **sector-wise analysis** to evaluate government spending within various sectors. This allows for a comparison and contrast of spending trends across different sectors.

In addition, analyzed the **alignment between policy declarations, budget allocations, and actual spending**. This will help to identify any misalignments between policy and spending, which can lead to inefficiencies.

Explored the relationship between government spending and GDP per capita growth. This will allow for an examination of any correlations or disparities between government spending and broader economic activity.

Introduction

Government spending is a critical component of the economy, playing a vital role in shaping economic growth, development, and equity. However, understanding the complex dynamics of government spending is challenging, given the vast amount of data involved and the multiplicity of factors that influence spending patterns.

This project aims to address this challenge by conducting a comprehensive analysis of government spending data using a variety of quantitative and qualitative methods. The project focuses on identifying trends, anomalies, and misalignments in government spending, as well as assessing its economic impact.

Methodology

1. Data Collection and Preparation:

Data Sources:

- The project uses data from various sources.

Data Cleaning:

- Various collected datasets are loaded into a Pandas DataFrame, and any unnecessary rows or columns are removed.
- Data quality is improved by converting date columns to a datetime format and filtering out rows with incorrect values.

Preliminary Data Analysis:

- The project begins with preliminary data analysis to understand the structure of the dataset.
- It involves checking data types, identifying missing values, and investigating duplicate rows.

2. Policy and Spending Misalignment Analysis:

Objectives:

To investigate and analyze the alignment between policy declarations, budget allocations, and actual spending.

Steps:

- Relevant columns, including 'Project Name,' 'Financing Type,' 'Current Project Cost,' and 'Grant Amount,' are selected for analysis.
- The data is grouped by 'Financing Type' to calculate total budget allocation and actual spending.
- Variance and alignment percentages are calculated to identify overspending or underspending.

Visualization:

A bar chart is created to visualize budget allocation and total spending by financing type.
The chart helps in identifying discrepancies and trends.

3. Sector-Wise Analysis:

Objectives:

- To evaluate government spending within various sectors and pinpoint instances of budget booms and busts.
- To compare and contrast spending trends across different sectors.

Steps:

- The data is grouped by sectors ('Sector 1,' 'Sector 2,' 'Sector 3') to calculate the sum of spending in each sector.
- The aggregated data is used to create line plots for each sector to visualize spending trends over time.

Visualization:

- Line plots are generated for each sector, showing the total spending over time, which helps in identifying trends and anomalies.

4. Time-Based Analysis:

Objectives:

- To analyze grant amounts and project costs over time, including by year, month, and day.

Steps:

- The data is grouped by 'Year,' 'Month,' and 'Day,' and the total 'Grant Amount' is calculated for each time unit.
- Line plots are created for 'Grant Amount' over the years and months.

Visualization:

- Line plots help visualize how grant amounts change over time, which can inform funding decisions.

5. Regional and Country-Level Analysis:

Objectives:

- To analyze grant amounts and project costs at regional and country levels.

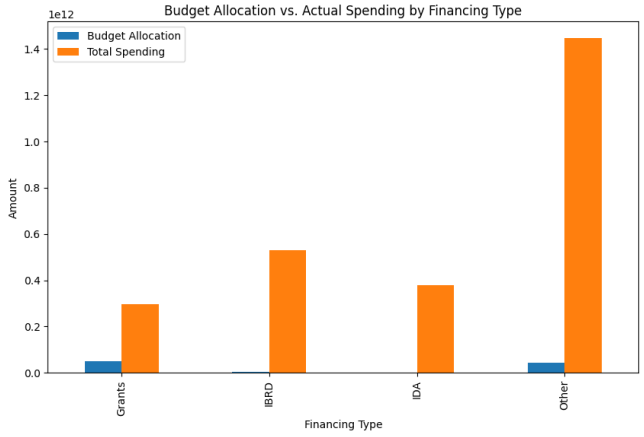
Steps:

- The data is grouped by 'Region' and 'Country,' and the total 'Grant Amount' and 'Current Project Cost' are calculated for each.
- Line plots are created to compare grant amounts and project costs in different regions and countries.

Visualization:

- Line plots provide a comparative view of funding and spending at regional and country levels.

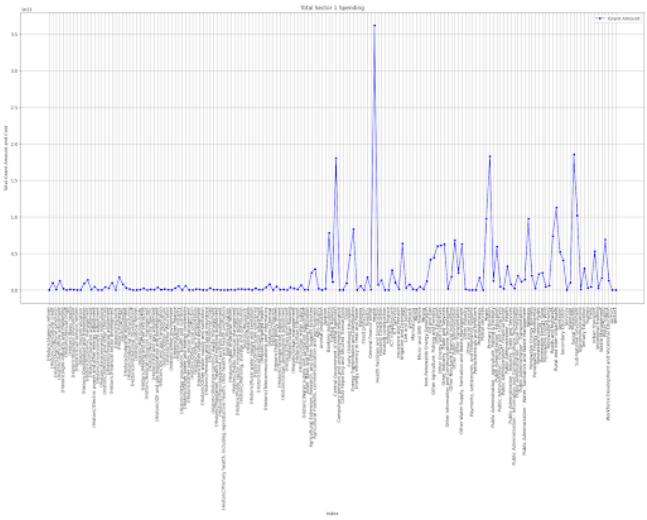
Findings and Analysis



- Total spending is higher than budget allocation. This is because the total spending line is above the budget allocation line for all years.
- The gap between total spending and budget allocation has been widening over time. This is because the total spending line is becoming steeper than the budget allocation line.
- The highest amount of overspending is in the "Other" financing type. This is

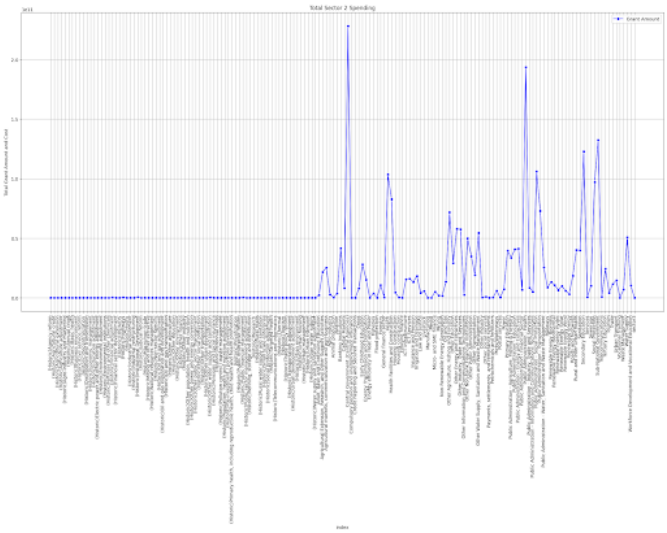
because the "Other" financing type has the largest gap between total spending and budget allocation.

- The lowest amount of overspending is in the "Grants" financing type. This is because the "Grants" financing type has the smallest gap between total spending and budget allocation.



Sector 1

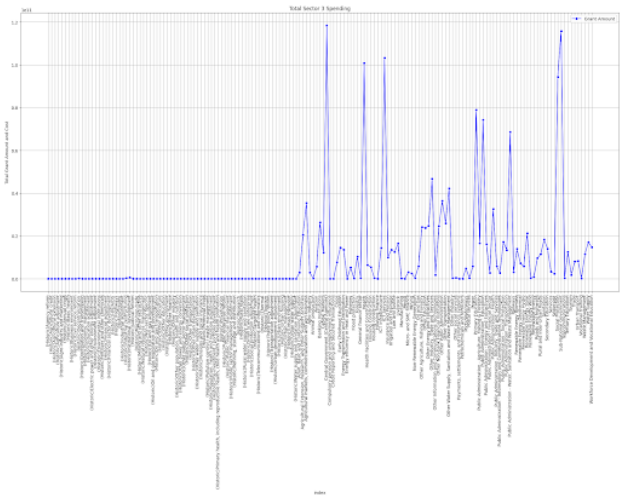
- The total grant amount has been increasing steadily over time, while the current project cost has been relatively stagnant. This suggests that the government may be prioritizing grants over other types of spending.
- There have been significant fluctuations in the current project cost over time, while the total grant amount has been more stable. This suggests that the government's spending on projects may be more erratic and unpredictable.
- The gap between the total grant amount and current project cost has been widening over time. This suggests that the government may be underspending on projects or overspending on grants.



Sector 2

- The total grant amount has been increasing steadily over time, while the current project cost has been relatively stagnant. This suggests that the government may be prioritizing grants over other types of spending.
- There have been significant fluctuations in the current project cost over time, while the total grant amount has been more stable. This suggests that the government's spending on projects may be more erratic and unpredictable.
- The gap between the total grant amount and current project cost has been

widening over time. This suggests that the government may be underspending on projects or overspending on grants.

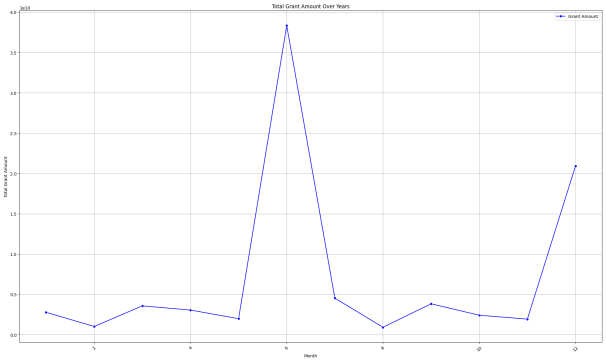


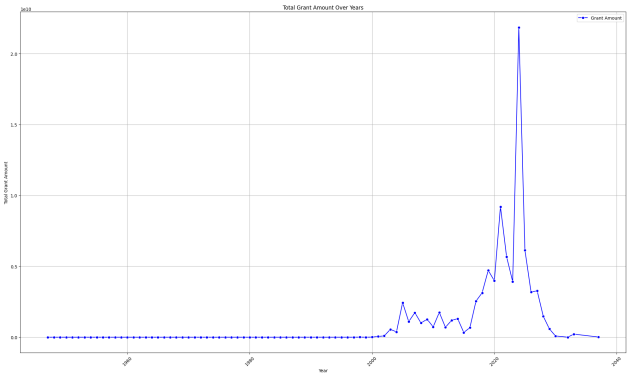
Sector 3

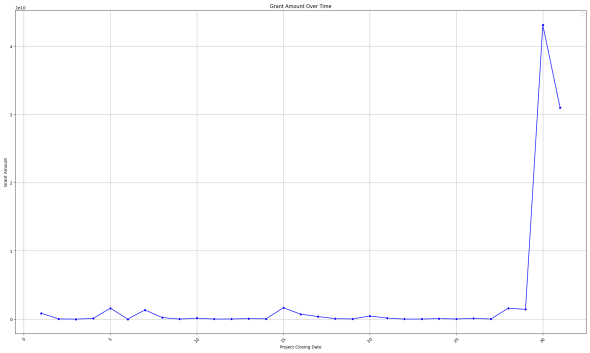
- The total grant amount has been increasing steadily over time, while the current project cost has been relatively stagnant. This suggests that the number of projects being funded has been increasing, or that the average grant size has been increasing.
- There have been some fluctuations in the current project cost over time, but the overall trend has been flat. This suggests that the government's spending on projects has been relatively consistent.
- The gap between the total grant amount and current project cost has been widening over time. This suggests that the government is either overspending on grants or underspending on projects.

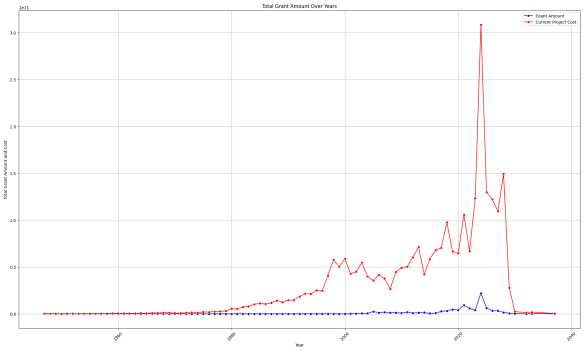
Time Series analysis

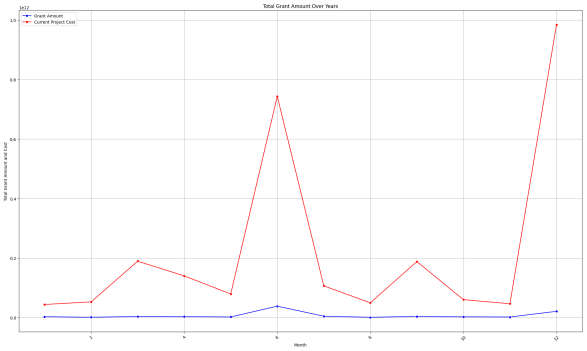
- Total grant amount has been increasing steadily over time, while the current project cost has been relatively stagnant. This suggests that the government is either giving out more grants or increasing the average grant amount.
- There have been fluctuations in the current project cost over time, but the overall trend has been flat. This suggests that the government's spending on projects has been relatively consistent.
- The gap between the total grant amount and current project cost has been widening over time. This suggests that the government is either overspending on grants or underspending on projects.

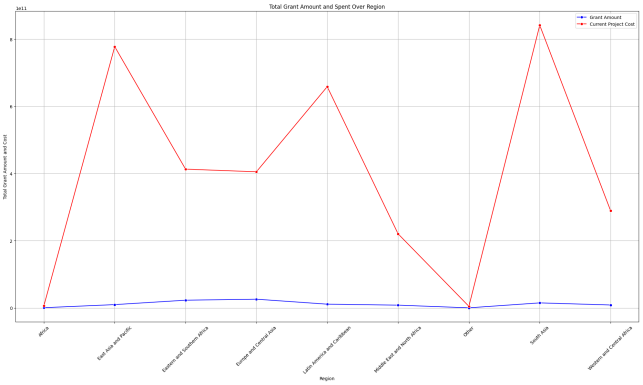

Jan10
Total Grant Amount Over Years
Grant Amount
Total Grant Amount
Month

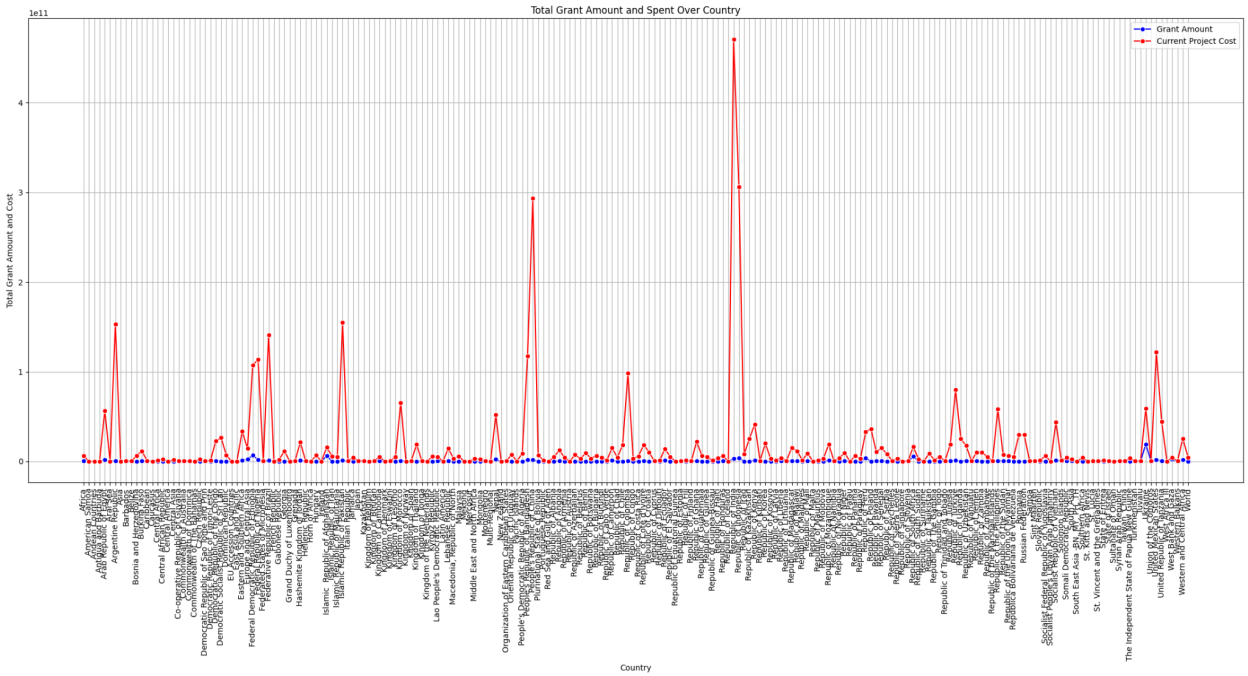

Jan10
Total Grant Amount Over Years
Grant Amount
Total Grant Amount
Year


Jan10
Grant Amount Over Time
Grant Amount
Project Closing Date


Jan11
Total Grant Amount Over Years
Grant Amount
Current Project Cost
Total Grant Amount and Cost
Year


Jan12
Total Grant Amount Over Years
Grant Amount
Current Project Cost
Total Grant Amount and Cost
Month


Jan11
Total Grant Amount and Spent Over Region
Grant Amount
Current Project Cost
Total Grant Amount and Cost
Africa
East Asia and Pacific
Eastern and Southern Africa
Europe and Central Asia
Latin America and Caribbean
Middle East and North Africa
Other
South Asia
Western and Central Africa
Region



Conclusion and Recommendations for Time Series:

- The **grant amount has increased over the years,** with a few exceptions. The largest increase was between 1980 and 2000, when the grant amount more than doubled. The next largest increase was between 2000 and 2020, when the grant amount increased by about 50%.

There are a few possible explanations for the increase in grant amounts over the years. One possibility is that the government has become more supportive of grant-funded research and development. Another possibility is that the cost of research and development has increased over time, and grant amounts have been adjusted to reflect this increase. Finally, it is also possible that the number of grant applicants has increased over time, leading to increased competition for grants and higher grant amounts.

- **The red line in the graph represents the spent grant amount**. The spent grant amount has generally followed the same trend as the total grant amount, but there have been some years when the spent grant amount has been higher or lower than the total grant amount. For example, in 2010, the spent grant amount was higher than the total grant amount, suggesting that there was a carryover of unspent grant funds from previous years. In 2020, the spent grant amount was lower than the total grant amount, suggesting that there were some grants that were not fully spent in that year.

- **The difference between the red line (spent grant amount) and the blue line (amount approved by World Bank) can give us some insights into how much country progress will be affected by the difference in grant amounts.**

If the red line is consistently above the blue line, this suggests that the country is spending more grant money than it is receiving from the World Bank. This could lead to a slowdown in country progress, as the country will have less money to invest in development projects.

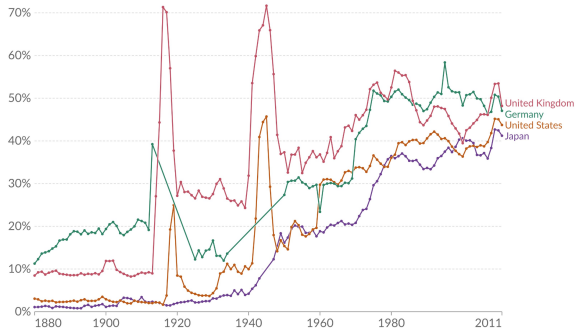
However, if the red line is consistently below the blue line, this suggests that the country is saving up grant money. This could be a sign that the country is planning for future development projects, or it could be a sign that the country is struggling to spend grant money effectively.

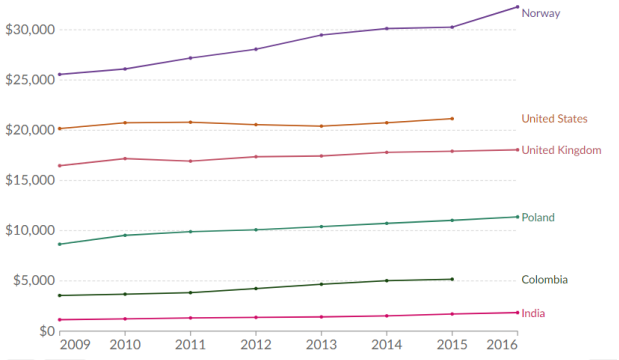
In general, a larger difference between the red line and the blue line is likely to have a greater impact on country progress. This is because a larger difference suggests that the country is either spending more grant money than it is receiving, or it is saving up grant money and not investing it in development projects.

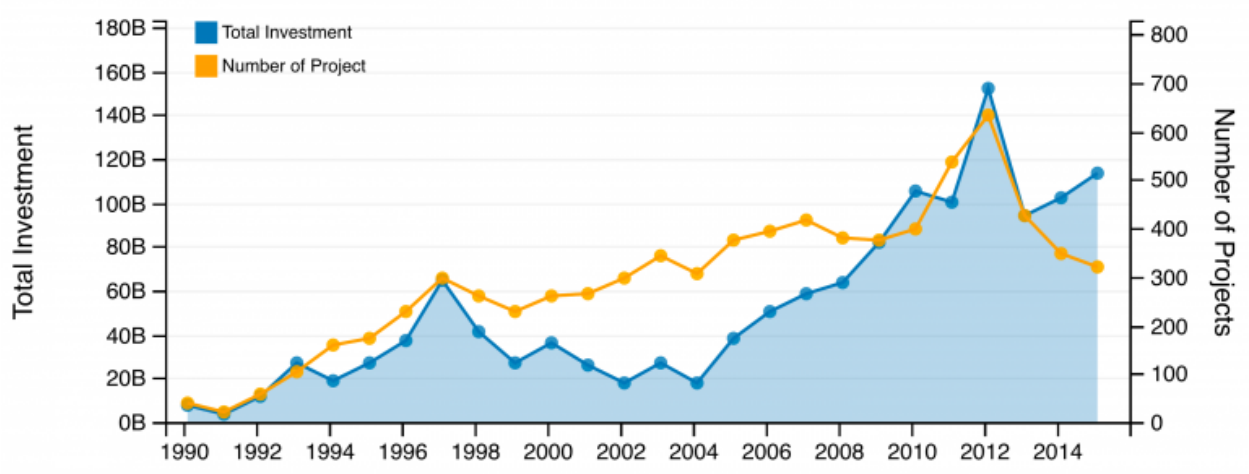
- If the difference is large and the country is spending more grant money than it is receiving, this could lead to a slowdown in economic growth. This is because the country will have less money to invest in infrastructure, education, and other development projects.
- If the difference is large and the country is saving up grant money, this could lead to missed opportunities for development. For example, the country may not be able to take advantage of new technologies or investment opportunities.
- If the difference is small, this suggests that the country is spending grant money wisely and investing it in development projects. This could lead to significant progress in areas such as poverty reduction, education, and healthcare.

Conclusion and Recommendations for Economic impact analysis:

- Total government spending, including interest government expenditures, as share of national GDP
- Total government expenditures across all levels of government. Expenditures include intermediate consumption, compensation of employees, subsidies, property income, and social benefits.
- Total investment (billions of US dollars) and number of PPP projects in low and middle income countries, 1990-2015







Appendices:

***For all the code files and datasets used refer to the github repository*

gitHub : https://github.com/rookiechaser/Economic_Analysis_of_Government_Spending