EXPLORING THE ECONOMIC LANDSCAPE OF LEADING GDP NATIONS AMIDST GLOBAL CRISES

1. Abstract

This report presents a comprehensive Tableau dashboard analyzing the economic performance of the top five GDP nations - United States, China, Japan, Germany, and India. The dashboard integrates interactive features such as calculated fields, dynamic filters, URL actions, and animations, offering users a seamless and intuitive experience. The analysis focuses on key economic indicators, including GDP growth, inflation, trade balances, and foreign direct investments (FDI), highlighting the impact of major global events like the 2008 financial crisis and the COVID-19 pandemic. By enabling user interaction, this project transforms raw data into actionable insight

2. Introduction

The goal of this project was to create a dynamic Tableau dashboard that simplifies the analysis of complex economic data for the top five GDP nations. These countries significantly influence the global economy, and their performance during global crises reveals patterns of resilience and recovery. By using calculated fields, filters, animations, and URL actions, this dashboard provides a detailed yet accessible way to explore key metrics.

The analysis focuses on four main visualizations- a map for FDI, a tree map for trade balances, a bubble chart for GDP rankings, and a line chart for GDP growth versus inflation. The dashboard's interactive elements allow users to filter data by year, explore country-specific trends, and access external resources for deeper insights. The use of calculated fields was required in refining raw data and creating dynamic dimensions and measures.

3. Objectives

- Develop an interactive dashboard to make complex economic data accessible to policymakers and researchers.
- Study how top GDP nations responded to global crises, focusing on resilience and recovery patterns.
- Provide actionable insights into global economic trends to support informed decision-making.
- Visualize key patterns like FDI, GDP growth, and inflation while improving usability with interactivity and animations.

4. Dataset and Calculated Fields

✧ **Dataset Description**

The dataset was sourced from the World Bank and Trading Economics, covering the years 2000–2022. Key metrics include:

- **GDP (current US$):** This indicator captures the total gross domestic product of each country
- **GDP Growth Rate:** This Indicator captures year on year growth rate of each country
- **Inflation (annual %):** Reflecting price stability trends.
- **Trade Balance (% of GDP):** This indicates the balance between exports and imports Indicating surplus or deficit status.
- **Foreign Direct Investments (FDI):** Tracking international capital flows or investments in each country.

✧ **Calculated Fields**

Calculated fields played a vital role in the project by providing additional insights and dynamic functionalities. The following calculated fields were used.

- **Selected Country Filter:**
  This field enables filtering by country across the dashboard.
  Formula: [Country Name] = [Country]
- **Trade Surplus or Deficit:**
  Categorizes countries based on their trade balance, labeling them as surplus or deficit economies.
  Formula:IF [External Balance] > 0 THEN "Surplus" ELSE "Deficit" END
- **External Balance:**
  Extracts external balance data, expressed as a percentage of GDP.
  Formula:IF [Indicator Name] = "External

balance on goods and services (% of GDP)" THEN [Values] END

- **Foreign Direct Investment (FDI):**
  Calculates FDI as a percentage of GDP.
  Formula:IF [Indicator Name] = "Foreign direct investment, net inflows (% of GDP)" THEN [Values] END
- **GDP in Trillion:**
  Converts GDP values from US dollars to trillions for easier interpretation.
  Formula:IF [Indicator Name] = "GDP (current US$)" THEN ([Values]/1000000000000) END
- **GDP Growth Rate:**
  Extracts annual GDP growth data.
  Formula:IF [Indicator Name] = "GDP growth (annual %)" THEN [Values] END
- **Inflation:**
  Extracts consumer price inflation data.
  Formula:IF [Indicator Name] = "Inflation, consumer prices (annual %)" THEN [Values] END

These calculated fields refined the data and ensured consistency across all visualizations.

5. Methodology

✧ **Data Collection**

- The dataset for this project was sourced from the **World Bank** website, covering the years **2000–2022**.
- Key variables included: GDP (current US$), GDP growth rate (annual %), inflation (consumer prices, annual %), trade balance (external balance on goods and services as % of GDP), and foreign direct investments
- These variables were selected to analyze the economic performance of the top five GDP nations (United States, China, Japan, Germany, and India) amidst global crises.

✧ **Data Preparation and Transformation:**

- Collected data from the World Bank website across five sheets and combined them into one Excel file.
- Filtered data to include relevant metrics for the years 2000 to 2022.
- Checked and handled null values to maintain data accuracy.
- Loaded the cleaned dataset into Tableau and created calculated fields for insights like trade surplus/deficit, GDP in trillions, and FDI as a percentage of GDP.

✧ **Dashboard Development:**
The dashboard was designed using Tableau to create four key visualizations:

- A **map** for visualizing FDI trends.
- A **tree map** for categorizing trade balances.
- A **bubble chart** for ranking GDP contributors.
- A **line chart** comparing GDP growth and inflation trends.

Dynamic filters, URL actions, highlights, and animations were integrated to enhance user interactivity.

6. Dashboard Features

✧ **Foreign Direct Investments (Map)**

The FDI map visualizes FDI as a percentage of GDP using the calculated field "Foreign Direct Investment (FDI)."Users can click on a country to update the GDP growth vs. inflation chart, highlighting year-on-year trends. This dynamic connection makes it easy to see how FDI affects economic performance.

For instance, selecting **China** shows consistently high FDI inflows correlating with strong GDP growth, while **India** displays variability in FDI due to periodic policy changes. The map emphasizes the importance of foreign investments in driving growth and highlights regional disparities.

✧ **Trade Balance (Tree Map)**

This tree map categorizes countries into surplus and deficit economies using the calculated field "Trade Surplus or Deficit."The color scheme - Dark brown for surplus and Light brown for deficit - makes it easy to identify patterns. The year filter updates both the tree map and other connected visualizations.

For example, **Germany** consistently shows a surplus driven by its export-oriented economy, while **India** and the **United States** often appear in deficit due to their import dependencies. Selecting on any country opens its profile on Trading Economics, providing access to external trade data(https://tradingeconomics.com/).

✧ **Top 5 GDP Contributors (Bubble Chart)**

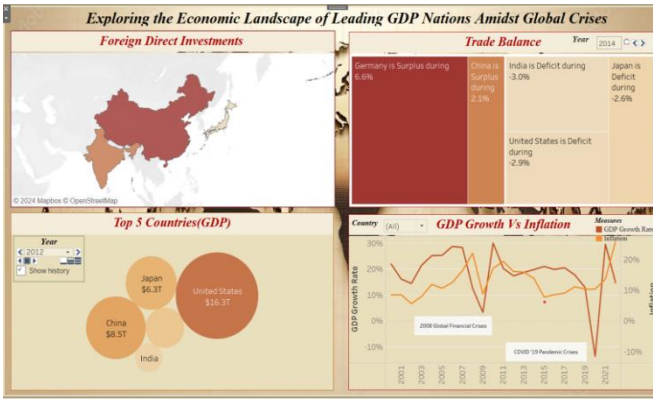
This chart ranks the top five GDP nations using the calculated field "GDP in Trillion." Bubble sizes represent GDP values, and animations allow users to observe year-on-year changes dynamically.

The animation highlights how **China** has risen from the fourth-largest economy in 2000 to the second-largest by 2022. The **United States** remains the largest GDP contributor throughout. Clicking on a bubble redirects users to the World Bank's page for that country, providing more details(https://data.worldbank.org/country/).

✧ **GDP Growth vs. Inflation (Line Chart)**

This line chart uses the calculated fields "GDP Growth Rate" and "Inflation" to display year-on-year trends. Users can filter by country to focus on specific data.

For example, selecting **India** reveals higher inflation rates compared to developed nations, reflecting challenges in managing price stability. In contrast, **Japan** shows steady GDP growth with minimal inflation. The chart is particularly insightful for analyzing economic volatility during global crises and COVID'19 Pandemic Crises.



7. Filters, URL Actions, Highlights and Animations

✧ **Filters**

Filters were implemented to enhance user interactivity, Key filters include-

- **Year Filter:** Updates all visualizations to display data for the selected year.
- **Country Filter:** Allows users to focus on specific countries by dynamically updating all linked charts.

✧ **URL Actions**

URL actions provide quick access to external resources for additional details. Examples include:

- **Trade Balance Tree Map:** Clicking on a country opens its profile on Trading Economics(https://tradingeconomics.com/).
- **Top 5 GDP Bubble Chart:** Selecting a bubble redirects to the World Bank's page for that country((https://data.worldbank.org/country/).

These actions extend the dashboard's utility, making it a gateway to deeper analysis

✧ **Highlights Feature**

- In the FDI map, clicking on a Specific country triggers a highlight action that updates the GDP growth vs. inflation chart to show data for the selected country.

✧ **Animations**

- The bubble chart uses animations to visualize GDP rankings over time. This feature highlights long-term trends, such as the rise of **China** as a global economic power and the resilience of the **United States** during crises. Animations make the dashboard more engaging and help users identify patterns easily.

8. Insights and Observations

The dashboard reveals several key insights:

- **FDI and Growth:** Countries with higher FDI inflows, such as China and India, often experience faster GDP growth, emphasizing the importance of attracting foreign investments.
- **Trade Balances:** Surplus economies like Germany benefit from strong export policies, while deficit nations like the United States face challenges balancing imports and exports.
- **Resilience to Crises:** Developed nations recover more quickly during economic downturns, as seen during the 2008 financial crisis and the COVID-19 pandemic.
- **Global Power Shifts:** Animations show how China has overtaken Japan to become the second-largest GDP contributor, signaling a shift in global economic power.

9. Conclusion

This Tableau dashboard transforms complex economic data into a user-friendly and interactive platform. By integrating calculated fields, filters, URL actions, and animations, it provides a comprehensive view of the economic performance of the top five GDP nations. The project highlights the importance of interactivity in data visualization, making it easier for users to uncover actionable insights.Whether you are a policymaker, researcher, or business professional, this dashboard offers valuable insights into global economic trends and their implications.

10. References

1. World Bank, "World Development Indicators," 2000 - 2022.(https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS?locations=NO)
2. Tableau, "Interactive Data Visualization Tool."
3. Trading Economics, "Global Economic Data and Trends.