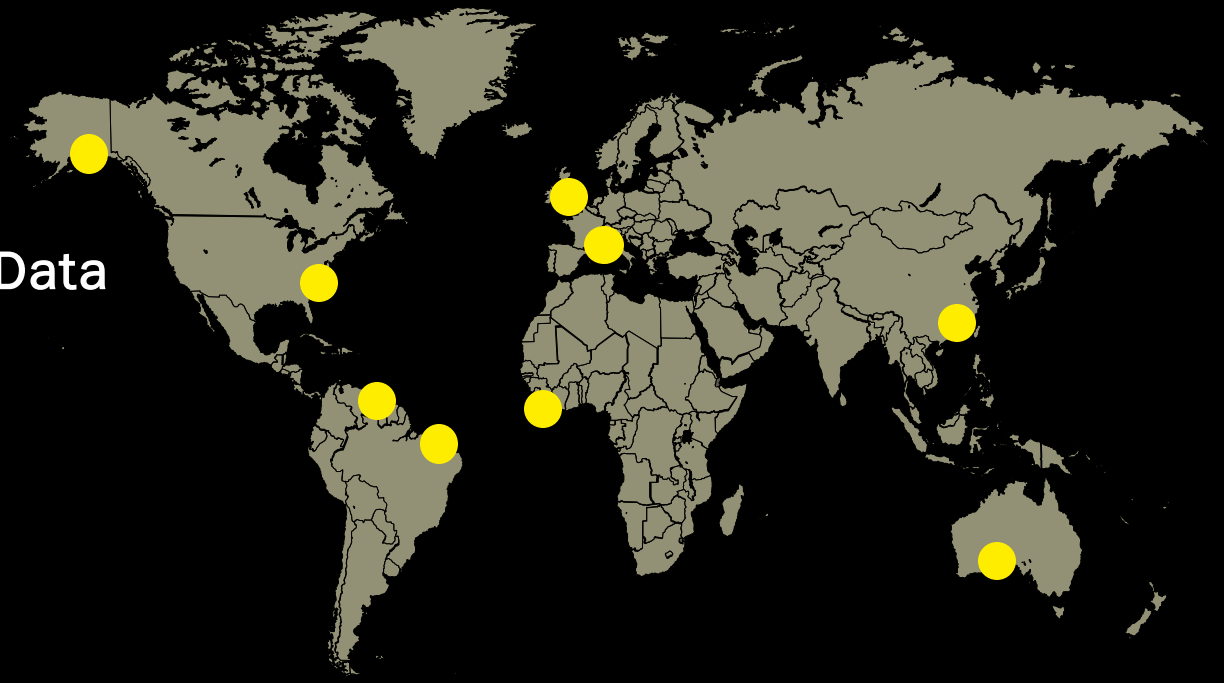
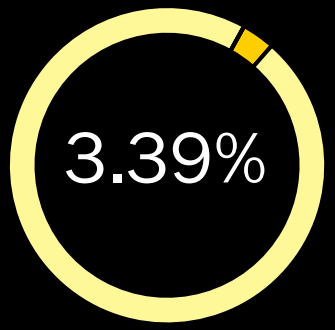
Project Title

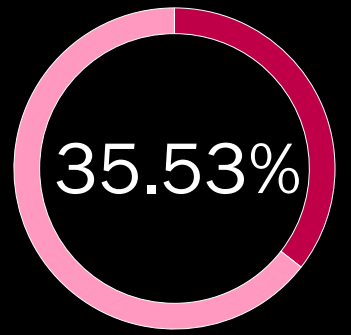
Analyzing Economic Indicators and Inflation Data (2010-2025)

Country	Country
USA	France
China	South Korea
Japan	Saudi Arabia
Germany	Brazil
India	Italy
UK	Bangladesh
Canada	Indonesia
Russia	Turkey
Australia	Malaysia
Pakistan	

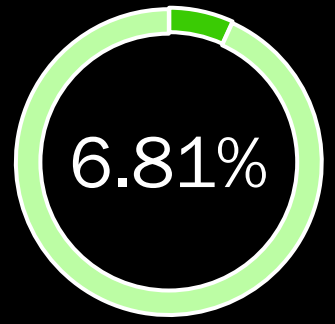




Economic Growth (%)



Inflation Rate (%)

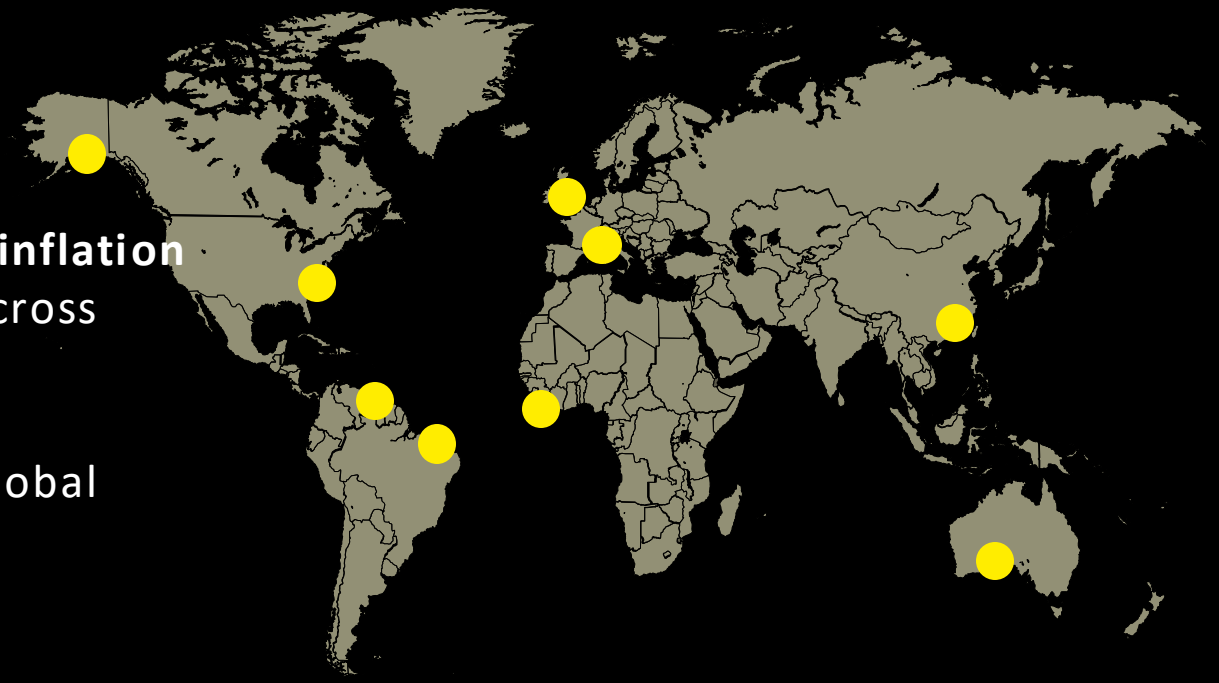


Unemployment Rate (%)

objective

This report provides a comprehensive analysis of key economic indicators, including **GDP (in billion USD), inflation rates, unemployment rates, and economic growth** across multiple countries worldwide.

Covering the period from **2010 to 2025**, it highlights economic trends, patterns, and insights that shape global markets.



Dataset: Economic Indicators and Inflation Data

Source: Economic Indicators and Inflation Data : **Kaggle** / Adil Shamim (Owner)

Visualization

Average GDP Comparison Across Countries- 2010-2025 (Vbar)

Average Economic Growth Across Countries- 2010-2025 (Vbar)

Inflation Rate of Countries in 2024 (Vbar)

Average Global Inflation vs. Economic Growth Trends Across Countries- 2010 to 2025(Linebar)

Canada Inflation Rate/Unemployment Rate(%)/Economic Growth(%)- 2020-2025 (Linebar)

Data Preparation

Cleaning and processing raw economic data using Pandas.

```
print(df.isnull().values.any())
```

```
False
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 304 entries, 0 to 303
Data columns (total 6 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Country                   304 non-null    object
 1    Year                     304 non-null    int64
 2    GDP (in billion USD)     304 non-null    float64
 3    Inflation Rate (%)       304 non-null    float64
 4    Unemployment Rate (%)    304 non-null    float64
 5    Economic Growth (%)      304 non-null    float64
dtypes: float64(4), int64(1), object(1)
memory usage: 14.4+ KB
```

Time Series

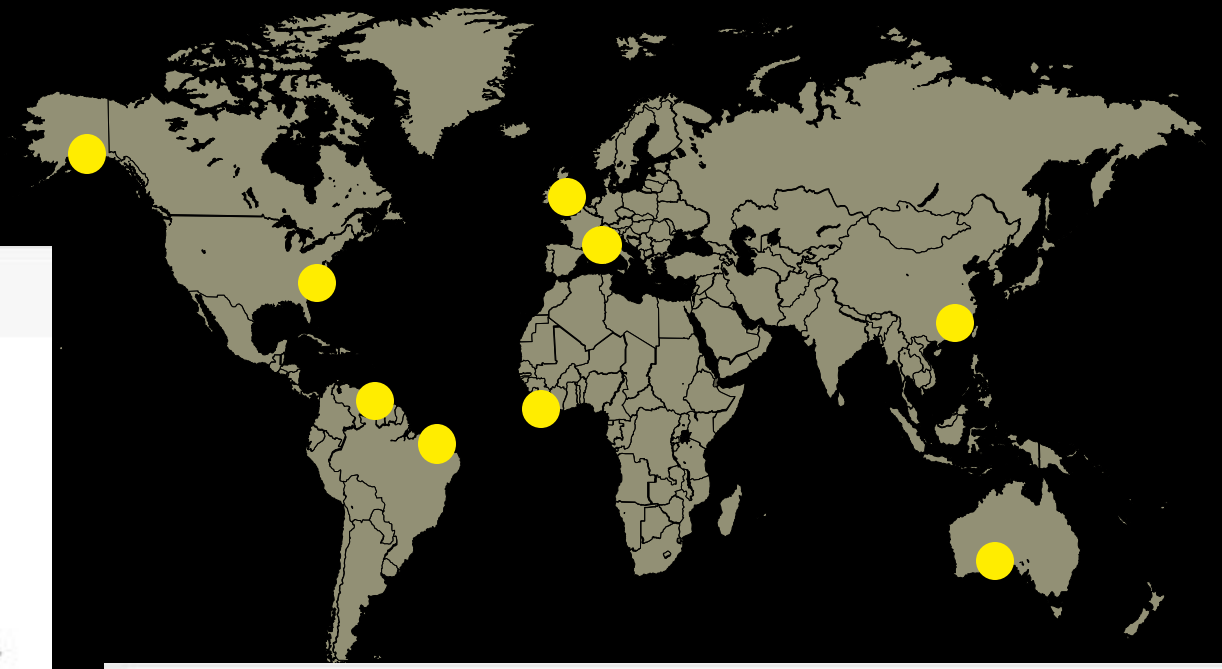
```
year= df["Year"].unique()
print(year)
```

```
[2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
 2024 2025]
```

Information about Data

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 304 entries, 0 to 303
Data columns (total 6 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Country                   304 non-null    object
 1    Year                     304 non-null    int64
 2    GDP (in billion USD)     304 non-null    float64
 3    Inflation Rate (%)       304 non-null    float64
 4    Unemployment Rate (%)    304 non-null    float64
 5    Economic Growth (%)      304 non-null    float64
dtypes: float64(4), int64(1), object(1)
memory usage: 14.4+ KB
```



```
import pandas as pd
df = pd.read_csv("Economic Indicators And Inflation.csv")
print(df.head())
```

```
  Country   Year   GDP (in billion USD)   Inflation Rate (%)  \
0     USA   2010                15000.0                1.64
1     USA   2011                15500.0                3.16
2     USA   2012                16000.0                2.07
3     USA   2013                16500.0                1.50
4     USA   2014                17000.0                1.62

    Unemployment Rate (%)   Economic Growth (%)
0                    9.63                  2.55
1                    8.94                  1.53
2                    8.10                  2.28
3                    7.70                  1.84
4                    7.25                  2.53
```

Information about Data

```
df.head()
```

	Country	Year	GDP (in billion USD)	Inflation Rate (%)	Unemployment Rate (%)	Economic Growth (%)
0	USA	2010	15000.0	1.64	9.63	2.55
1	USA	2011	15500.0	3.16	8.94	1.53
2	USA	2012	16000.0	2.07	8.10	2.28
3	USA	2013	16500.0	1.50	7.70	1.84
4	USA	2014	17000.0	1.62	7.25	2.53

```
df.tail()
```

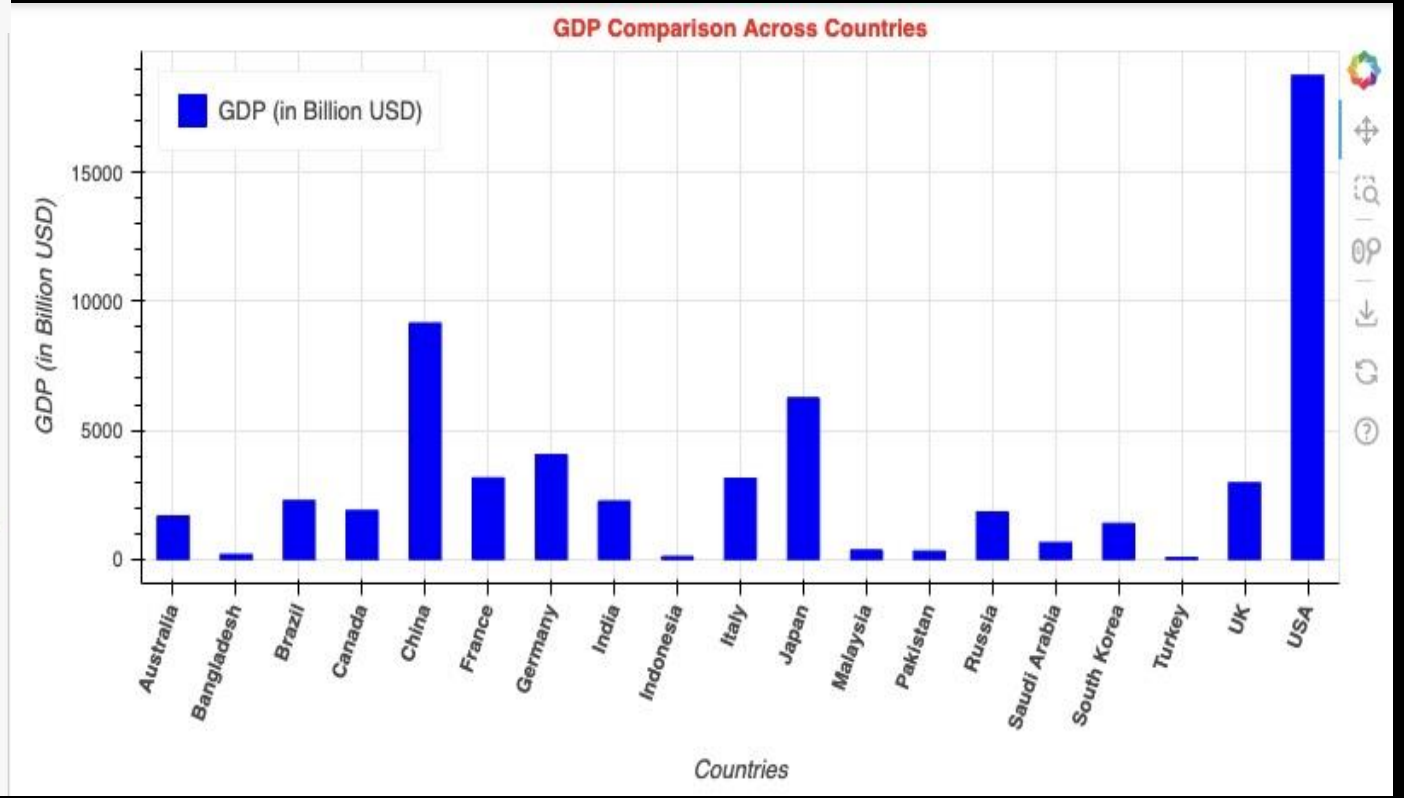
	Country	Year	GDP (in billion USD)	Inflation Rate (%)	Unemployment Rate (%)	Economic Growth (%)
299	Pakistan	2021	296.0	8.9	5.0	5.7
300	Pakistan	2022	350.0	12.3	5.0	6.0
301	Pakistan	2023	400.0	20.0	5.0	4.0
302	Pakistan	2024	450.0	25.0	5.0	3.0
303	Pakistan	2025	500.0	20.0	5.0	3.2

```
#df.sort_values(by=['Country','Year'], ascending=True)
countries = df["Country"].unique()
print(countries)
```

```
['USA' 'China' 'Japan' 'Germany' 'India' 'UK' 'Canada' 'Russia'
 'Australia' 'France' 'South Korea' 'Saudi Arabia' 'Brazil' 'Italy'
 'Bangladesh' 'Indonesia' 'Turkey' 'Malaysia' 'Pakistan']
```

```python
# Import necessary modules from Bokeh
from bokeh.plotting import figure, show
from bokeh.io import output_notebook

# Enable Bokeh output for Jupyter Notebook
output_notebook()

from bokeh.models import ColumnDataSource  # Import data source model

# Group the dataset by 'Country' and calculate the average GDP
df_grouped = df.groupby("Country")["GDP (in billion USD)"].mean().reset_index()

# Convert 'Country' column to a list of strings for categorical x-axis
countries = df_grouped["Country"].astype(str).tolist()

# Convert 'GDP (in billion USD)' to a list of floats for numerical y-axis
gdps = df_grouped["GDP (in billion USD)"].astype(float).tolist()

# Create a ColumnDataSource for Bokeh visualization
source = ColumnDataSource(data=dict(countries=countries, gdps=gdps))

# Create a figure for the bar chart
visual_GDP = figure(
    title="GDP Comparison Across Countries",  # Chart title
    x_range=countries,  # Set categorical x-axis with country names
    x_axis_label="Countries",  # X-axis label
    y_axis_label="GDP (in Billion USD)",  # Y-axis label
    height=400, width=800  # Set figure dimensions
)

# Add vertical bars (GDP values per country)
visual_GDP.vbar(
    x="countries", top="gdps", source=source,
    width=0.5, color="blue"
)

# Customize x-axis labels
visual_GDP.xaxis.major_label_orientation = 1.2  # Rotate labels for readability
visual_GDP.xaxis.major_label_text_font_style = 'bold'  # Make labels bold

# Customize title appearance
visual_GDP.title.align = 'center'  # Center align the title
visual_GDP.title.text_color = 'red'  # Change title color to red

# Display the plot
show(visual_GDP)
```

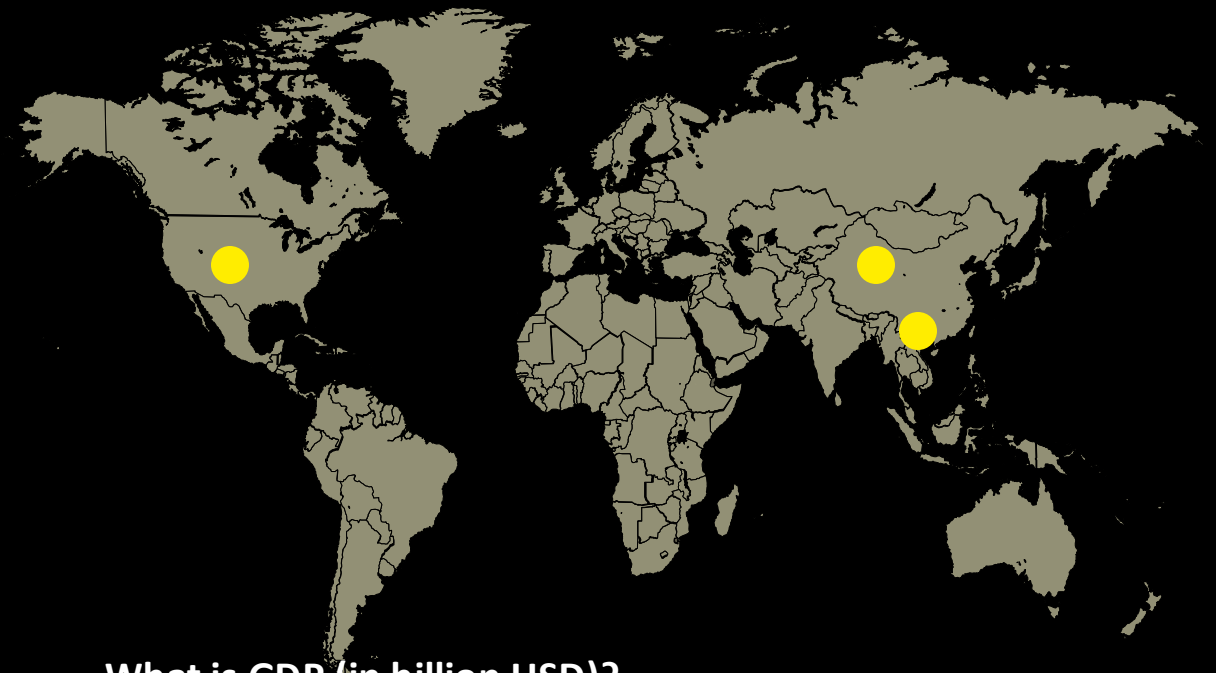
Average GDP Comparison Across Countries 2010-2025



Result

Average GDP Comparison Across Countries 2010-2025

Country	GDP (billion USD)
USA	18,750.00
China	9,150.00
Japan	6,250.00



Key Insights

1.The USA has the highest GDP, keeping a strong influence on the global economy.

2-China is growing quickly but still has a long way to catch up with the US.

3-Japan remains strong but struggles with an aging population and slower growth.

What is GDP (in billion USD)?

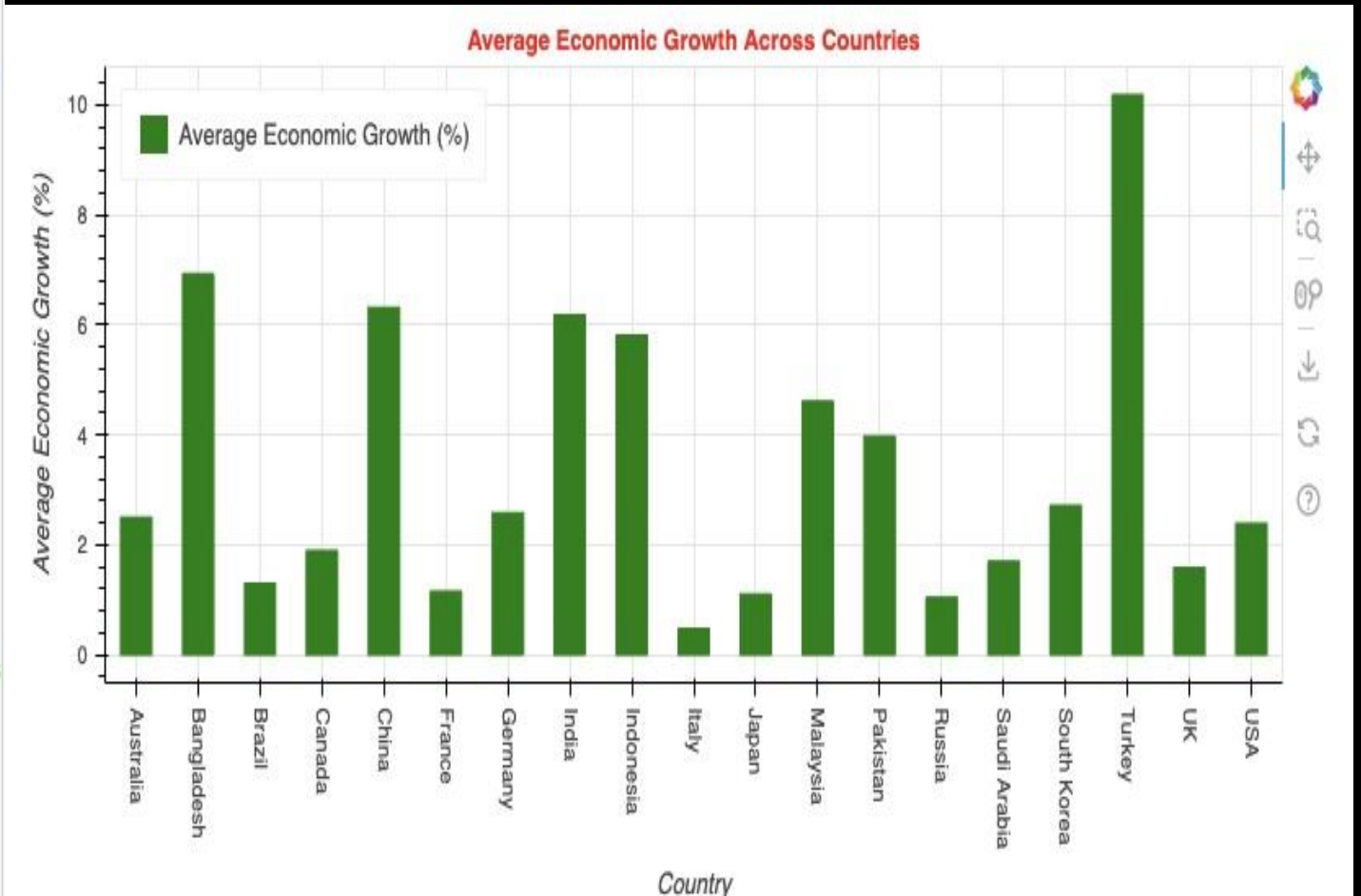
GDP (Gross Domestic Product) is the total monetary value of all goods and services produced within a country's borders in a specific time period (usually annually).

Why Is GDP Important?

- Measures economic performance → Higher GDP indicates a strong economy, while a declining GDP may signal a recession.
- Used for international comparison → Helps compare economic sizes of countries (e.g., USA vs. Canada).
- Influences economic policies → Governments adjust policies (interest rates, taxes) based on GDP trends.

```python
# Import necessary Bokeh modules and enable output for Jupyter Notebook
from bokeh.plotting import figure, show
from bokeh.io import output_notebook
output_notebook()
from bokeh.models import ColumnDataSource

# Group data by 'Country' and calculate the average economic growth
df_grouped = df.groupby("Country")["Economic Growth (%)"].mean().reset_index()

# Convert 'Country' to string format and extract lists for visualization
df_grouped["Country"] = df_grouped["Country"].astype(str)
countries = df_grouped["Country"].to_list()
avg_growth = df_grouped["Economic Growth (%)"].to_list()

# Create a ColumnDataSource for Bokeh visualization
source = ColumnDataSource(data=dict(countries=countries, avg_growth=avg_growth))

# Create a figure for the bar chart
visual_growth = figure(
    title="Average Economic Growth Across Countries",
    x_range=countries,
    x_axis_label="Country",
    y_axis_label="Average Economic Growth (%)",
    height=400, width=800
)

# Add vertical bars to represent economic growth per country
visual_growth.vbar(x="countries", top="avg_growth", source=source, width=0.5,
                   legend_label="Average Economic Growth (%)", color="green")
visual_growth.legend.location="top_left"

# Customize chart appearance
visual_growth.xaxis.major_label_orientation = "vertical"  # Rotate x-axis labels
visual_growth.title.align = "center"  # Center title
visual_growth.title.text_color = "red"  # Set title color

# Display the plot
show(visual_growth, notebook_handle=True)
```

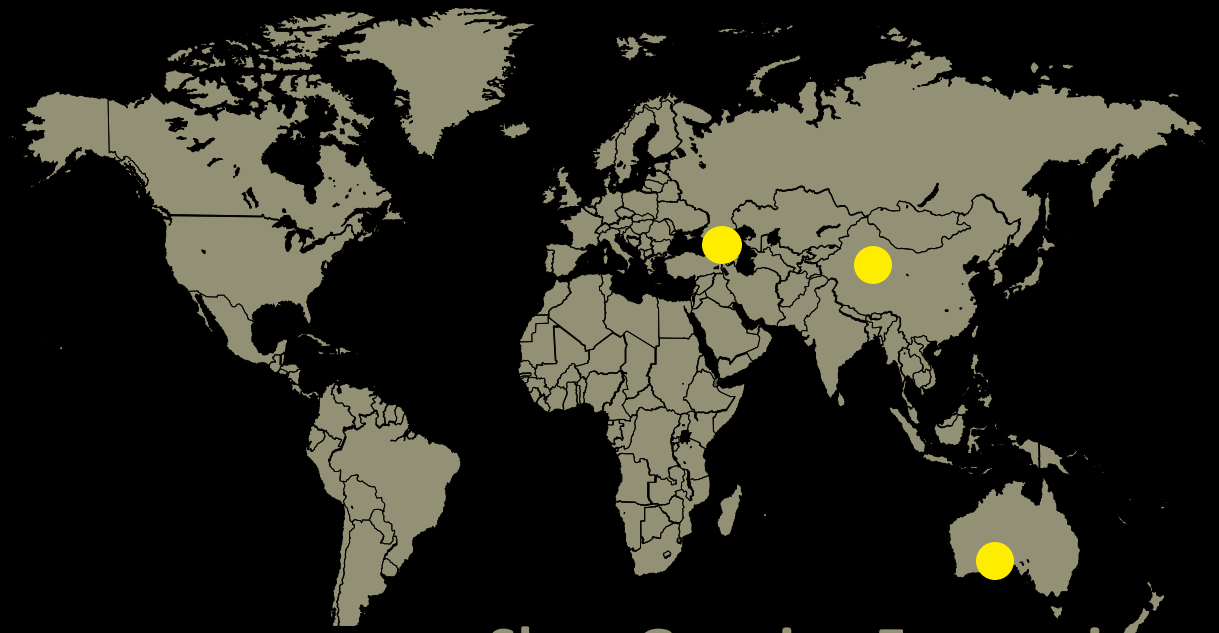
Average Economic Growth Across Countries 2010-2025



Result

Average Economic Growth Across Countries 2010-2025

Country	Average Economic Growth
Turkey	10.19%
Bangladesh	6.93%
China	6.32%



High Growth Countries

- Turkey, Bangladesh, and China show the highest average economic growth.
- Their economies benefit from rapid industrialization, exports, and investments.

Moderate & Stable Growth

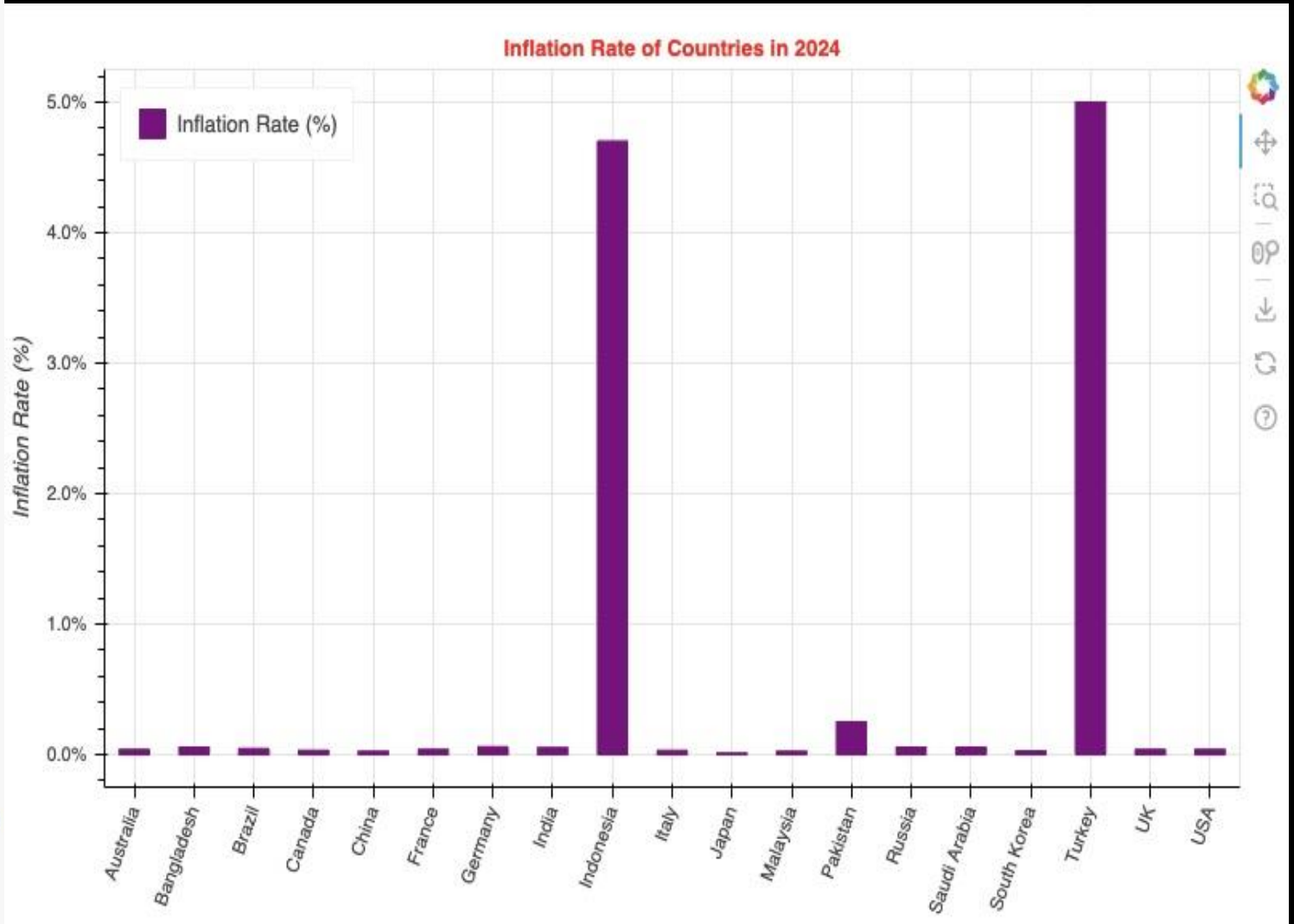
- Countries like India, Indonesia, and Malaysia experience steady but moderate growth.
- These nations maintain expansion but at a controlled pace.

Slow-Growing Economies

- Developed nations (USA, UK, Japan, Germany) have lower but stable growth rates.
- This is typical for mature economies with already high GDP.

```python
# Enable Bokeh output for Jupyter Notebook
output_notebook()

# Filter dataset for the year 2024
df_filtered = df[df['Year'] == 2024]

# Group data by 'Country' and calculate the mean of numerical values
df_grouped = df_filtered.groupby('Country').mean().reset_index()

# Convert Inflation Rate to decimal format for percentage display
df_grouped['Inflation Rate (%)'] = df_grouped['Inflation Rate (%)'] / 100

# Prepare data for visualization using ColumnDataSource
source = ColumnDataSource(data={
    'Country': df_grouped['Country'].tolist(),
    'Inflation Rate (%)': df_grouped['Inflation Rate (%)'].tolist()
})

# Create the figure (bar chart setup)
inflation_by_country_fig = figure(
    title="Inflation Rate of Countries in 2024",
    x_range=FactorRange(*df_grouped["Country"]),
    y_axis_label="Inflation Rate (%)",
    width=800, height=500
)

# Add vertical bars to the chart
inflation_by_country_fig.vbar(
    x='Country', top='Inflation Rate (%)', source=source,
    color="#800080", width=0.5, legend_label="Inflation Rate (%)"
)

# Customize chart appearance
inflation_by_country_fig.legend.location = "top_left"
inflation_by_country_fig.title.align = "center"
inflation_by_country_fig.title.text_color = "red"
inflation_by_country_fig.xaxis.major_label_orientation = 1.2

# Format Y-Axis to show percentage values
inflation_by_country_fig.yaxis.formatter = PrintfTickFormatter(format="%0.1f%%")

# Display the chart
show(inflation_by_country_fig)
```

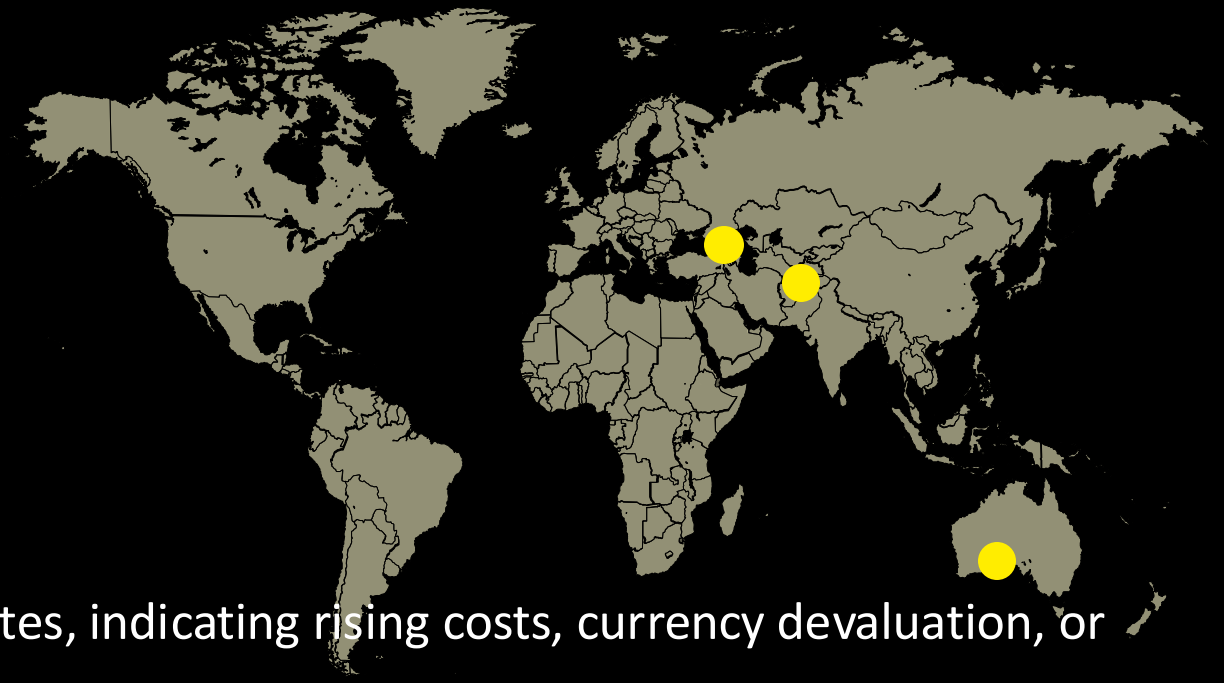
Inflation Rate of Countries in 2024



Result

Inflation Rate of Countries in 2024

Country	Average Economic Growth
Turkey	5.0%
Indonesia	4.7%
Pakistan	0.25%



High Inflation Countries:

•Turkey and Indonesia have the highest inflation rates, indicating rising costs, currency devaluation, or economic instability.

•These countries may face higher living costs and reduced consumer confidence.

Moderate Inflation Nations:

•Countries like Pakistan and Malaysia experience moderate inflation, balancing growth and price stability.

Low or Stable Inflation:

•Developed economies (USA, Canada, UK, Japan, Germany) tend to have low and stable inflation, reflecting strong monetary policies.

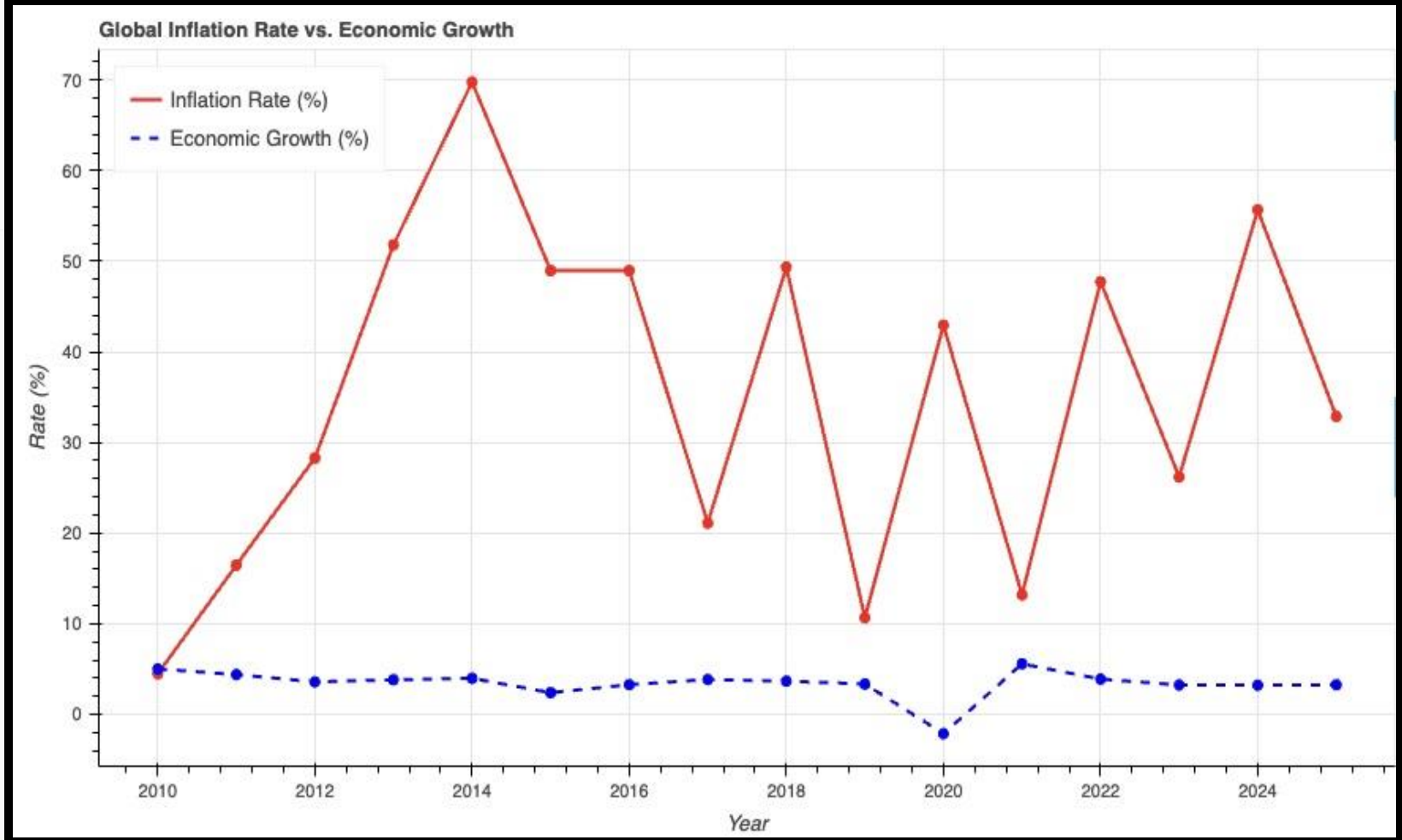
•Lower inflation ensures stable purchasing power and economic predictability.

```python
# Import necessary Bokeh modules
from bokeh.plotting import figure, show
from bokeh.io import output_notebook
from bokeh.models import ColumnDataSource, HoverTool, CrosshairTool,
PrintfTickFormatter
import pandas as pd

# Enable Bokeh to display in Jupyter Notebook
output_notebook()
# Group Data by Year and Compute Averages Across All Countries
global_trends = df.groupby("Year", as_index=False)[["Inflation Rate (%)",
"Economic Growth (%)"]].mean()

# Convert DataFrame Columns into Lists
year = global_trends["Year"].tolist()
inflation_rate = global_trends["Inflation Rate (%)"].tolist()
economic_growth = global_trends["Economic Growth (%)"].tolist()

# Create a ColumnDataSource for Bokeh
source = ColumnDataSource(data={
    "Year": year,
    "Inflation Rate (%)": inflation_rate,
    "Economic Growth (%)": economic_growth
})

# Create a Bokeh Figure
global_trend_chart = figure(
    title="Global Inflation Rate vs. Economic Growth",
    x_axis_label="Year",
    y_axis_label="Rate (%)",
```

```python
# Add Inflation Rate Line (Red)
global_trend_chart.line(
    x="Year", y="Inflation Rate (%)",
    source=source, color="red",
    legend_label="Inflation Rate (%)", line_width=2
)
global_trend_chart.scatter(
    x="Year", y="Inflation Rate (%)",
    source=source, color="red", size=6
)

# Add Economic Growth Line (Blue)
global_trend_chart.line(
    x="Year", y="Economic Growth (%)",
    source=source, color="blue",
    legend_label="Economic Growth (%)", line_width=2, line_dash="dashed"
)
global_trend_chart.scatter(
    x="Year", y="Economic Growth (%)",
    source=source, color="blue", size=6
)

global_trend_chart.legend.click_policy = 'hide'
global_trend_chart.add_tools(CrosshairTool())
global_trend_chart.add_tools(HoverTool(
    tooltips=[
        ("Inflation Rate (%)", "@{Inflation Rate (%)}{0.1f}%"),
        ("Economic Growth (%)", "@{Economic Growth (%)}{0.1f}%")
    ]
))

# Customize Legend
global_trend_chart.legend.location = "top_left"
global_trend_chart.legend.click_policy = "hide"  # Allows clicking to hide/show
lines
```

Average Global Inflation vs. Economic Growth

2010 to 2025



Result

Average Global Inflation vs. Economic Growth Trends Across Countries- 2010 to 2025

Stable inflation = Steady growth
High inflation = Economic risk
Deflation = Growth slowdown

Inflation Trends (Red Line)

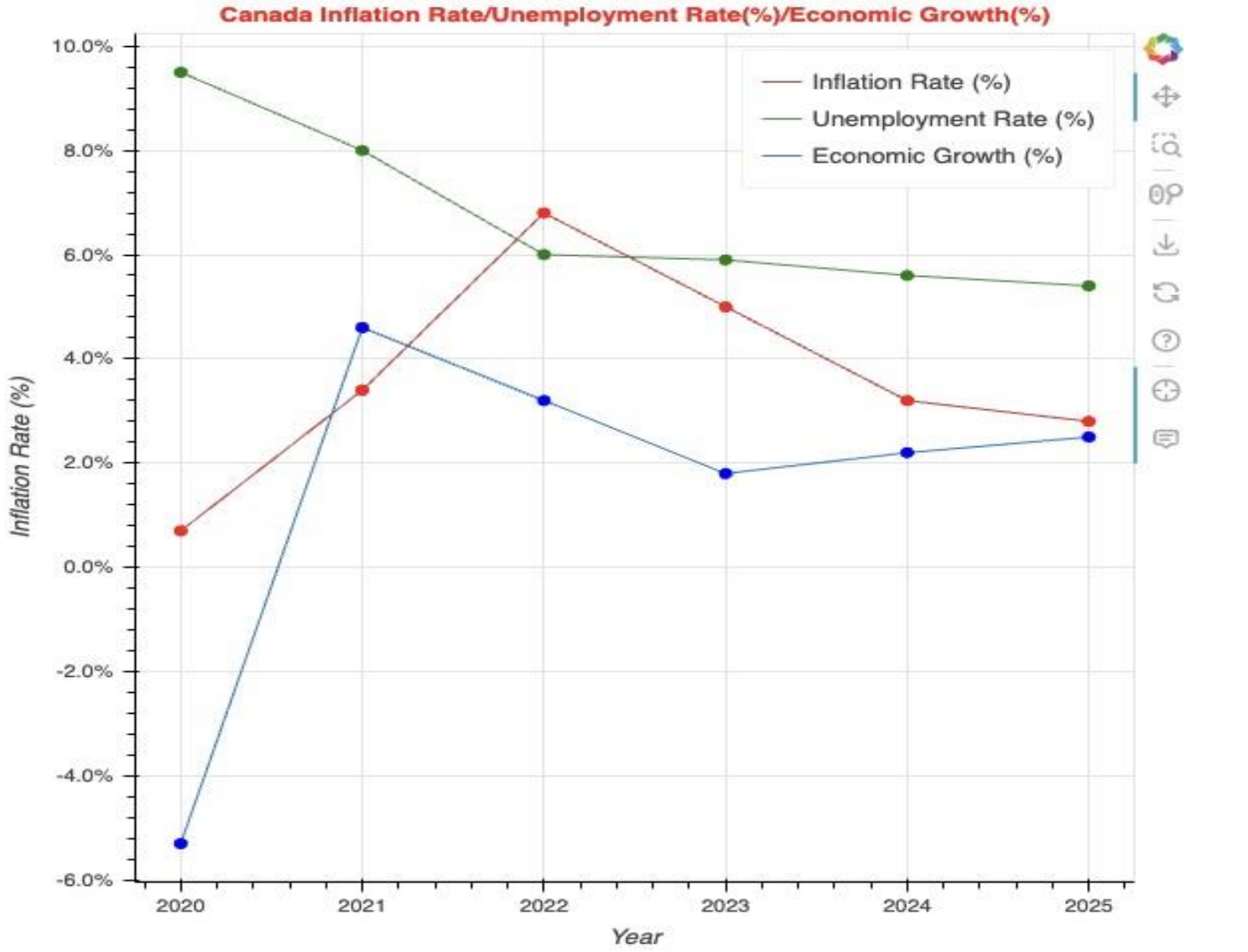
1- High inflation leads to slower growth, showing a negative correlation between inflation and economic expansion.
2- Periods of controlled inflation (1-3%) align with stronger economic growth, ensuring stability.
3- Sharp inflation spikes (>6-7%) often result in economic downturns, likely due to rising costs and interest rate hikes.
4- Deflation (negative inflation) also harms growth, discouraging spending and investment.

Key points

-Stable inflation supports steady growth.
-High inflation weakens economies, while moderate inflation is ideal.
-Effective policies are essential to balance inflation and growth.

```python
# Filter dataset for Canada (Year ≥ 2020)
df_filtered = df[(df['Year'] >= 2020) & (df['Country'] == "Canada")].copy()

print(df_filtered[['Year', 'Inflation Rate (%)']])

df_filtered['Inflation Rate (%)'] = df_filtered['Inflation Rate (%)']
df_filtered["Unemployment Rate (%)"] = df_filtered["Unemployment Rate (%)"]
df_filtered["Economic Growth (%)"] = df_filtered["Economic Growth (%)"]

year = df_filtered['Year'].to_list()

inflation_rate = df_filtered['Inflation Rate (%)'].to_list()
unemp_rate = df_filtered["Unemployment Rate (%)"].to_list()
economic_growth = df_filtered["Economic Growth (%)"].to_list()
gdp = df_filtered['GDP (in billion USD)'].tolist()

# Create a ColumnDataSource for Bokeh visualization
source = ColumnDataSource(data={
    'Year': year,
    'Inf_Rate': inflation_rate,
    'Unemp_Rate': unemp_rate,
    'Economic Growth': economic_growth,
    'GDP (in billion USD)': gdp
})

# Create a figure for the line chart
canada_inf_unemp_rate = figure(
    title="Canada Inflation Rate/Unemployment Rate(%)/Economic Growth(%)",
    x_axis_label="Year",
    y_axis_label="Inflation Rate (%)"
)

# Add multiple line plots (Inflation, Unemployment, and Economic Growth)
canada_inf_unemp_rate.line(x='Year', y='Inf_Rate', color="#D32F2F",
source=source, legend_label='Inflation Rate (%)')
canada_inf_unemp_rate.line(x='Year', y='Unemp_Rate', color="#388E3C",
source=source, legend_label='Unemployment Rate (%)')
canada_inf_unemp_rate.line(x='Year', y='Economic Growth', color="#1976D2",
source=source, legend_label='Economic Growth (%)')
# Customize legend and interaction tools
canada_inf_unemp_rate.legend.click_policy = 'hide'  # Allow clicking to hide/
show lines
canada_inf_unemp_rate.add_tools(CrosshairTool())  # Enable crosshair for better
reading
# Add HoverTool to display additional data on hover
canada_inf_unemp_rate.add_tools(HoverTool(
    tooltips=[
        ('Inflation Rate (%)', '@Inf_Rate{0.1f}'),
        ('Unemployment Rate (%)', '@Unemp_Rate{0.1f}'),
        ('Economic Growth (%)', '@{Economic Growth}{0.1f}'),
        ('GDP (in billion USD)', '@{GDP (in billion USD)}{0.0f}')
    ]
))

# Add scatter markers for better visualization
canada_inf_unemp_rate.scatter(x='Year', y='Inf_Rate', source=source,
color="red", size=6)
canada_inf_unemp_rate.scatter(x='Year', y='Unemp_Rate', source=source,
color="green", size=6)
canada_inf_unemp_rate.scatter(x='Year', y='Economic Growth', source=source,
color="blue", size=6)

# Customize chart appearance
canada_inf_unemp_rate.title.align = 'center'  # Center title
canada_inf_unemp_rate.title.text_color = "red"  # Set title color to red

#  Format y-axis as percentage correctly
canada_inf_unemp_rate.yaxis.formatter = PrintfTickFormatter(format="%0.1f%%")
```

Canada Inflation Rate/Unemployment Rate(%)/Economic Growth(%) 2020-2025



Result

Average Global Inflation vs. Economic Growth Trends -2020 to 2025

Inflation Trends (Red Line)

• 2020-2022: Inflation rose sharply due to supply chain issues and post-pandemic recovery.

•2022 Peak: Inflation reached its highest point.

•After 2022: It gradually declined, likely due to central bank actions (interest rate hikes).

Unemployment Trends (Green Line)

• The unemployment rate was high in 2020, reflecting COVID-19-related job losses.

• It steadily declined after 2021, suggesting job market recovery and economic stabilization.

Economic Growth (Blue Dot-Dash Line)

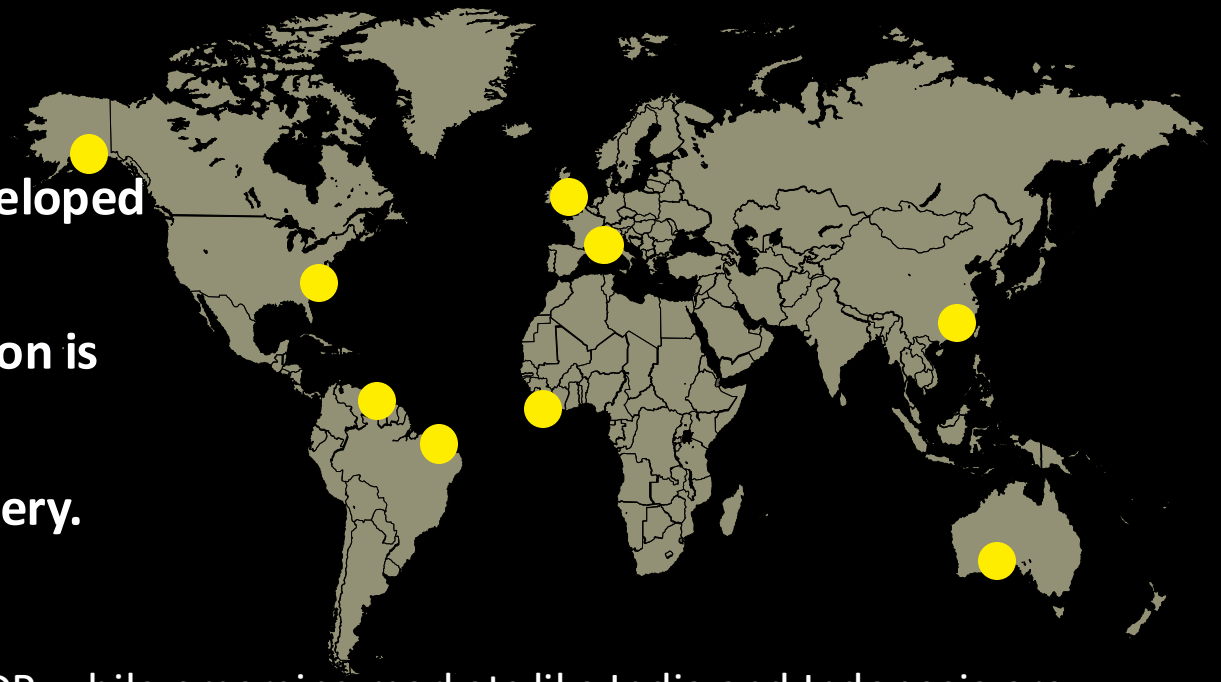
• 2020: Sharp decline due to recession (likely from lockdowns).

•2021: Strong recovery, then slower but steady growth.

•Recent years: Stable but lower growth, impacted by interest rates and inflation control.

Conclusion

- ✓ **Emerging economies are growing fast, while developed nations remain stable.**
- ✓ **High inflation weakens growth; controlled inflation is ideal.**
- ✓ **Post-2020 job markets improved, signaling recovery.**



1-GDP Trends: The USA, China, and Japan have the highest GDP, while emerging markets like India and Indonesia are growing rapidly.

2- Economic Growth: Turkey, Bangladesh, and China show the fastest growth, while developed nations grow at a slower but stable rate.

3-Inflation (2024): Turkey and Indonesia have the highest inflation, which can reduce purchasing power and economic stability.

4-Inflation vs. Growth: High inflation slows economic growth, while moderate inflation (1-3%) supports stability. Deflation also harms economies.

5- Canada’s Economy (2020-2025): Inflation peaked in 2022 but declined, unemployment improved, and growth stabilized, showing effective economic management.