In [1]:
```
pip install pandoc
```

```
Requirement already satisfied: pandoc in d:\downloads\lib\site-packages (2.4)
Requirement already satisfied: plumbum in d:\downloads\lib\site-packages (from pando
c) (1.9.0)
Requirement already satisfied: ply in d:\downloads\lib\site-packages (from pandoc)
(3.11)
Requirement already satisfied: pywin32 in d:\downloads\lib\site-packages (from plumb
um->pandoc) (305.1)
Note: you may need to restart the kernel to use updated packages.
```

Research and Analysis Report

Research Area

-

Economic Indicators

The research area focuses on analyzing global economic indicators to assess their impact on economic performance and interrelations among different factors such as GDP, inflation, debt-to-GDP ratio, and government budgets. The dataset provides a comprehensive view of the economic health of various countries.

Research Question

What are the key economic indicators influencing fiscal stability and economic growth across countries?

Aim

To evaluate the relationships and trends in economic indicators to provide insights into fiscal stability, economic growth, and policy-making decisions.

Objectives

Analyze the relationships among GDP, inflation rate, debt-to-GDP ratio, and jobless rate.

Identify countries with extreme values for debt-to-GDP ratios, inflation rates, and GDP.

Understand the influence of government budget surpluses or deficits on economic performance.

Provide meaningful visualizations to summarize economic trends.

In [2]:
```
import pandas as pd

df = pd.read_csv("Economy_Indicators.csv")
```

In [3]:
```
df.head(10)
```

Out[3]:

	Country	GDP	GDP Year-over-Year	GDP Quarter-over-Quarterr	Interest Rate	Inflation Rate	Jobless Rate	Gov. Budget	Debt/GDP	Cu Ac
0	Euro Area	14493	4.1	0.8	1.25	10.00	6.60	-5.1	95.6	
1	Germany	4223	1.7	0.1	1.25	10.00	5.50	-3.7	69.3	
2	United Kingdom	3187	4.4	0.2	2.25	9.90	3.50	-6.0	95.9	
3	France	2937	4.2	0.5	1.25	5.60	7.40	-6.5	112.9	
4	Italy	2100	5.0	1.1	1.25	8.90	7.80	-7.2	150.8	
5	Russia	1776	-4.1	-0.8	7.5	13.70	3.80	0.8	18.2	
6	Spain	1425	6.8	1.5	1.25	9.00	12.48	-6.9	118.4	
7	Netherlands	1018	5.1	2.6	1.25	14.50	3.80	-2.6	52.4	
8	Turkey	815	7.6	2.1	12	83.45	9.60	-2.7	42.0	
9	Switzerland	813	2.8	0.3	0.5	3.30	1.90	-0.7	41.4	

In [4]:
```
df.tail(10)
```

Out[4]:

	Country	GDP	GDP Year-over-Year	GDP Quarter-over-Quarterr	Interest Rate	Inflation Rate	Jobless Rate	Gov. Budget	Debt/GDP	C Ac
32	Latvia	39	2.90	-1	1.25	22.20	6.60	-7.3	44.80	
33	Estonia	36	0.60	-1.3	1.25	23.70	5.80	-2.4	18.10	
34	Cyprus	28	6.10	0.6	1.25	8.74	8.60	-1.7	103.60	
35	Iceland	25	6.10	3.9	5.75	9.30	4.50	-8.9	75.00	
36	Bosnia and Herzegovina	23	5.90	1.5	3.63	16.80	30.17	-0.3	24.80	
37	Albania	18	2.23	-1.16	2.25	8.10	11.10	-4.8	78.10	
38	Malta	17	8.90	1	1.25	7.00	2.90	-8.0	57.00	
39	Moldova	14	-0.90	-2.3	21.5	33.97	2.40	-8.0	32.10	
40	Macedonia	14	2.80	3.9	3	18.70	14.50	-5.4	51.80	
41	Kosovo	9	2.14	NA	NA	12.70	20.50	-0.9	23.34	

In [5]:
```
df.describe()
```

Out[5]:

	GDP	GDP Year-over-Year	Inflation Rate	Jobless Rate	Gov. Budget	Debt/GDP	Current Account	P
count	42.000000	42.000000	42.00000	42.000000	42.000000	42.000000	42.000000	
mean	930.666667	3.245952	14.95000	7.103571	-3.569048	64.829524	0.192857	
std	2341.577107	6.994028	12.46537	5.151838	3.501880	37.718270	5.772407	
min	9.000000	-37.200000	3.30000	1.900000	-8.900000	18.100000	-11.600000	
25%	62.250000	2.372500	9.07500	4.000000	-6.150000	41.525000	-2.850000	
50%	233.000000	3.930000	11.63500	5.750000	-3.900000	54.900000	-0.750000	
75%	662.250000	6.075000	17.35000	8.400000	-1.175000	79.375000	2.950000	
max	14493.000000	11.100000	83.45000	30.170000	9.100000	193.300000	15.000000	3

In [6]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 42 entries, 0 to 41
Data columns (total 11 columns):
 #   Column                     Non-Null Count  Dtype
---  ------                     --------------  -----
 0   Country                    42 non-null     object
 1   GDP                        42 non-null     int64
 2   GDP Year-over-Year         42 non-null     float64
 3   GDP Quarter-over-Quarterr  42 non-null     object
 4   Interest Rate              42 non-null     object
 5   Inflation Rate             42 non-null     float64
 6   Jobless Rate               42 non-null     float64
 7   Gov. Budget                42 non-null     float64
 8   Debt/GDP                   42 non-null     float64
 9   Current Account            42 non-null     float64
 10  Population                 42 non-null     float64
dtypes: float64(7), int64(1), object(3)
memory usage: 3.7+ KB
```

In [7]:
```
df.shape
```

Out[7]:
```
(42, 11)
```

Dataset Explanation

The dataset contains 42 rows and 11 columns, detailing economic indicators for various countries. Key attributes include:

Country: The name of the country.

GDP: Gross Domestic Product in billions.

Inflation Rate: Annual inflation rate percentage.

Debt-to-GDP Ratio: Ratio of a country's debt to its GDP.

Government Budget: Percentage of GDP representing a government's surplus or deficit.

Jobless Rate: Unemployment rate percentage.

The dataset excludes the aggregated "Euro Area" data for accurate country-specific analysis.

Research Idea and Concept

The research idea is to analyze economic indicators across countries to determine how fiscal stability and economic growth influence key outcomes such as inflation, unemployment, and overall economic resilience. The dataset provides the necessary attributes for comparing these metrics across various economies, enabling policymakers and researchers to draw meaningful conclusions about economic strategies and stability.

Summary of the Research Area

This research focuses on understanding the role of GDP, fiscal health, and inflation in shaping the global economic landscape. By analyzing these factors, the study explores how countries manage unemployment and economic challenges. The research highlights the importance of fiscal discipline, debt sustainability, and economic resilience in fostering long-term growth. By examining these dimensions, the study aims to provide actionable insights into the drivers of economic stability.

Data Source

The dataset was curated from open sources that simulate or compile economic indicators globally. It includes data aggregated from publicly available reports and research studies, ensuring the relevance and reliability of its attributes.

Acquisition Technique

The dataset was compiled by extracting economic indicators such as GDP, inflation rate, and debt-to-GDP ratio from simulated or open-source repositories. Key attributes were selected to ensure a representative sample of global economies, enabling a robust comparative analysis of economic health.

Data Source Appropriation

The dataset is suitable for this research as it provides comprehensive information on key economic indicators. Attributes such as GDP, inflation rate, debt-to-GDP, and government budget are critical for evaluating fiscal stability and economic resilience. This makes the dataset highly relevant for analyzing global economic health.

Identifiable Case for Working with Data

This dataset is well-suited for the research question as it includes key columns directly related to fiscal stability and economic growth. Attributes such as GDP, debt-to-GDP ratio, and inflation rate provide a clear basis for comparing the economic health of different countries. Additionally, jobless rate and government budget data offer insights into employment and fiscal policies.

Format of the Data

The CSV format is ideal for analysis, as it can be efficiently loaded into a pandas DataFrame in Python. The dataset structure supports both numerical and categorical operations. Numerical columns such as GDP and inflation rate facilitate statistical and correlation analysis, while categorical attributes like country names enable filtering and grouping.

Other Datasets, Strengths, and Weaknesses

Alternative Dataset: "NASDAQ Historical Stock Prices Dataset" Strengths:

Provides detailed stock price data, including opening and closing prices, and trading volumes. Suitable for sector-wise or company-specific trend analysis. Weaknesses:

Lacks macroeconomic indicators like GDP or jobless rates. Requires preprocessing to integrate with broader datasets. Alternative Dataset: "Yahoo Finance API Data" Strengths:

Offers real-time and historical financial data. Includes diverse metrics such as dividend yields and P/E ratios. Weaknesses:

Requires API knowledge for data retrieval. Focused solely on financial markets without broader economic indicators.

Literature Review

Relevance of the Field Economic stability and growth are critical topics in global policymaking and research. With challenges like inflation spikes, rising debt levels, and unemployment, understanding the drivers of fiscal stability has become paramount. This research focuses on comparing economic indicators to identify the factors influencing fiscal discipline and growth across countries.

Unexplored Areas and Research Gap While there is extensive research on individual economic metrics like GDP and inflation, limited studies provide a holistic analysis of how these metrics interconnect. Specifically, the relationship between fiscal health (debt/GDP, government budgets) and outcomes like inflation and unemployment remains underexplored.

Scope of the Work

This study focuses on the relationship between economic indicators such as GDP, debt-to-GDP ratio, and inflation. It excludes detailed trade or sector-specific analysis, focusing instead on overarching economic trends. The goal is to provide actionable insights into fiscal discipline and its impact on economic outcomes.

Analytical Data Processing Pipeline

Data Cleaning:

Handle missing values by mean imputation or interpolation. Remove outliers in key indicators (e.g., inflation rate). Exploratory Data Analysis (EDA):

Generate summary statistics for each indicator. Use visualizations such as histograms and scatter plots to identify trends. Comparative Analysis:

Compare fiscal stability across regions (e.g., developed vs. developing nations). Analyze relationships between indicators using correlation matrices. Economic Health Index:

Develop a composite score using weighted indicators like GDP, inflation, and debt-to-GDP. Policy Impact Assessment:

Evaluate the role of government budgets in managing inflation and unemployment.

Evaluating Aims and Objectives

Objective 1 (GDP and Fiscal Stability):

Analyze GDP levels and growth rates using descriptive statistics. Evaluate the role of GDP in maintaining fiscal stability through correlation analysis. Objective 2 (Inflation Control):

Compare inflation rates across countries using visualizations. Investigate outliers like Turkey to understand extreme inflation scenarios. Objective 3 (Unemployment Management):

Evaluate the relationship between unemployment and fiscal health. Use scatter plots and regression analysis for deeper insights. Objective 4 (Fiscal Discipline and Debt Sustainability):

Analyze the impact of government budgets and debt-to-GDP ratios on economic stability. Highlight countries with high debt-to-GDP ratios and discuss potential risks.

Data Cleaning of CSV File

In [8]:
```
#DATA PROCESS TO ELIMINATE FALSE VALUES

import numpy as np

numeric_columns = [

    "GDP",
    "GDP Year-over-Year",
    "GDP Quarter-over-Quarterr",
    "Interest Rate",
    "Inflation Rate",
    "Jobless Rate",
    "Gov. Budget",
    "Debt/GDP",
```

```
    "Current Account",
    "Population"
]

df[numeric_columns] = df[numeric_columns].replace(r"[^0.9.]",np.nan,regex = True).a
```

In [9]:
```
# Filter out the "Euro Area" row
df_filtered = df[df['Country'] != 'Euro Area']

# Display the shape of the dataset after filtering
print("Dataset shape after removing 'Euro Area':", df_filtered.shape)
df_filtered.head()
```

```
Dataset shape after removing 'Euro Area': (41, 11)
```

Out[9]:

	Country	GDP	GDP Year-over-Year	GDP Quarter-over-Quarterr	Interest Rate	Inflation Rate	Jobless Rate	Gov. Budget	Debt/GDP	Curr Acco
1	Germany	4223.0	1.7	NaN	NaN	10.0	5.5	-3.7	69.3	
2	United Kingdom	3187.0	4.4	NaN	NaN	9.9	3.5	-6.0	95.9	
3	France	2937.0	4.2	NaN	NaN	5.6	7.4	-6.5	112.9	
4	Italy	2100.0	5.0	NaN	NaN	8.9	7.8	-7.2	150.8	
5	Russia	1776.0	-4.1	NaN	NaN	13.7	3.8	0.8	18.2	

In [10]:
```
# Check for missing values
missing_values = df_filtered.isnull().sum()
print("Missing Values:\n", missing_values)
```

```
Missing Values:
 Country                      0
GDP                           0
GDP Year-over-Year            0
GDP Quarter-over-Quarterr    36
Interest Rate                40
Inflation Rate                0
Jobless Rate                  0
Gov. Budget                   0
Debt/GDP                      0
Current Account               0
Population                    0
dtype: int64
```

In [11]:
```
# Ensure the DataFrame slice is explicitly modified
numeric_cols = df_filtered.select_dtypes(include=['float64', 'int64']).columns
df_filtered.loc[:, numeric_cols] = df_filtered[numeric_cols].fillna(df_filtered[num

# Verify there are no more missing values
missing_values_after = df_filtered.isnull().sum()
missing_values_after
```

Out[11]:
```
Country                     0
GDP                         0
GDP Year-over-Year          0
GDP Quarter-over-Quarterr   0
Interest Rate               0
Inflation Rate              0
Jobless Rate                0
Gov. Budget                 0
Debt/GDP                    0
Current Account             0
Population                  0
dtype: int64
```

In [12]:
```
# Standardize column names
df_filtered.columns = df_filtered.columns.str.strip().str.replace(' ', '_').str.low

# Display updated column names
df_filtered.columns
```

Out[12]:
```
Index(['country', 'gdp', 'gdp_year-over-year', 'gdp_quarter-over-quarterr',
       'interest_rate', 'inflation_rate', 'jobless_rate', 'gov._budget',
       'debt/gdp', 'current_account', 'population'],
      dtype='object')
```

In [13]:
```
# Check for duplicate rows
duplicates = df_filtered.duplicated().sum()
print(f"Number of duplicate rows: {duplicates}")

# Remove duplicates
df_filtered = df_filtered.drop_duplicates()

# Confirm the shape of the dataset
print("Dataset shape after removing duplicates:", df_filtered.shape)
```

```
Number of duplicate rows: 0
Dataset shape after removing duplicates: (41, 11)
```

In [14]:
```
# Convert 'country' to string if not already
df_filtered['country'] = df_filtered['country'].astype(str)

# Display dataset info to confirm data types
df_filtered.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 41 entries, 1 to 41
Data columns (total 11 columns):
 #   Column                     Non-Null Count  Dtype
---  ------                     --------------  -----
 0   country                    41 non-null     object
 1   gdp                        41 non-null     float64
 2   gdp_year-over-year         41 non-null     float64
 3   gdp_quarter-over-quarterr  41 non-null     float64
 4   interest_rate              41 non-null     float64
 5   inflation_rate             41 non-null     float64
 6   jobless_rate               41 non-null     float64
 7   gov._budget                41 non-null     float64
 8   debt/gdp                   41 non-null     float64
 9   current_account            41 non-null     float64
 10  population                 41 non-null     float64
dtypes: float64(10), object(1)
memory usage: 3.8+ KB
```

In [15]:
```
# Save the cleaned dataset for future use
df_filtered.to_csv("Cleaned_Economy_Indicators.csv", index=False)

print("Cleaned dataset saved as 'Cleaned_Economy_Indicators.csv'.")
```

```
Cleaned dataset saved as 'Cleaned_Economy_Indicators.csv'.
```

Technical Analysis

In [16]:
```
# Descriptive statistics for the filtered dataset
descriptive_stats_filtered = df_filtered.describe()

# Display descriptive statistics
descriptive_stats_filtered
```

Out[16]:

	gdp	gdp_year-over-year	gdp_quarter-over-quarterr	interest_rate	inflation_rate	jobless_rate	gov
count	41.000000	41.000000	41.000000	41.0	41.000000	41.000000	4
mean	599.878049	3.225122	0.720000	0.0	15.070732	7.115854	
std	953.666168	7.079594	0.127279	0.0	12.595340	5.215216	
min	9.000000	-37.200000	0.000000	0.0	3.300000	1.900000	
25%	62.000000	2.230000	0.720000	0.0	9.000000	3.900000	
50%	216.000000	3.900000	0.720000	0.0	12.000000	5.700000	
75%	627.000000	6.100000	0.720000	0.0	17.400000	8.600000	
max	4223.000000	11.100000	0.900000	0.0	83.450000	30.170000	

In [17]:
```
# Correlation matrix for numeric columns in the filtered dataset
numeric_df_filtered = df_filtered.select_dtypes(include=['float64', 'int64'])
correlation_matrix_filtered = numeric_df_filtered.corr()

# Display the correlation matrix
correlation_matrix_filtered
```

Out[17]:

	gdp	gdp_year-over-year	gdp_quarter-over-quarterr	interest_rate	inflation_rate	jobless_ra
gdp	1.000000	0.015248	0.014273	NaN	-0.125262	-0.14735
gdp_year-over-year	0.015248	1.000000	-0.047443	NaN	-0.115381	-0.06080
gdp_quarter-over-quarterr	0.014273	-0.047443	1.000000	NaN	0.000561	-0.00813
interest_rate	NaN	NaN	NaN	NaN	NaN	Na
inflation_rate	-0.125262	-0.115381	0.000561	NaN	1.000000	0.10390
jobless_rate	-0.147357	-0.060805	-0.008135	NaN	0.103903	1.00000
gov._budget	-0.072580	-0.087958	0.054979	NaN	-0.064205	0.02336
debt/gdp	0.279604	0.242162	-0.276079	NaN	-0.263709	0.03629
current_account	0.313189	0.068465	0.137604	NaN	-0.250290	-0.32792
population	0.753677	-0.195962	-0.019762	NaN	0.235637	-0.07531

In [18]:
```
# Sort and select top 10 countries by GDP
top_countries = df_filtered.sort_values(by='gdp', ascending=False).head(10)

# Display top countries by GDP
top_countries[['country', 'gdp']]
```

Out[18]:

	country	gdp
1	Germany	4223.0
2	United Kingdom	3187.0
3	France	2937.0
4	Italy	2100.0
5	Russia	1776.0
6	Spain	1425.0
7	Netherlands	1018.0
8	Turkey	815.0
9	Switzerland	813.0
10	Poland	674.0

In [19]:
```
# Country with the highest debt-to-GDP ratio
highest_debt_gdp = df_filtered.loc[df_filtered['debt/gdp'].idxmax(), ['country', 'd
print("Country with the Highest Debt-to-GDP Ratio (Excluding Euro Area):\n",highest
```

```
Country with the Highest Debt-to-GDP Ratio (Excluding Euro Area):
 {'country': 'Greece', 'debt/gdp': 193.3}
```

In [20]:
```
# Country with the highest inflation rate
highest_inflation = df_filtered.loc[df_filtered['inflation_rate'].idxmax(), ['count
print("Country with the Highest Inflation Rate (Excluding Euro Area):\n", highest_i
```

```
Country with the Highest Inflation Rate (Excluding Euro Area):
 {'country': 'Turkey', 'inflation_rate': 83.45}
```

In [21]:
```
# Country with the lowest jobless rate
lowest_jobless = df_filtered.loc[df_filtered['jobless_rate'].idxmin(), ['country',
print("Country with the Lowest Jobless Rate (Excluding Euro Area):\n", lowest_joble
```

```
Country with the Lowest Jobless Rate (Excluding Euro Area):
 {'country': 'Switzerland', 'jobless_rate': 1.9}
```

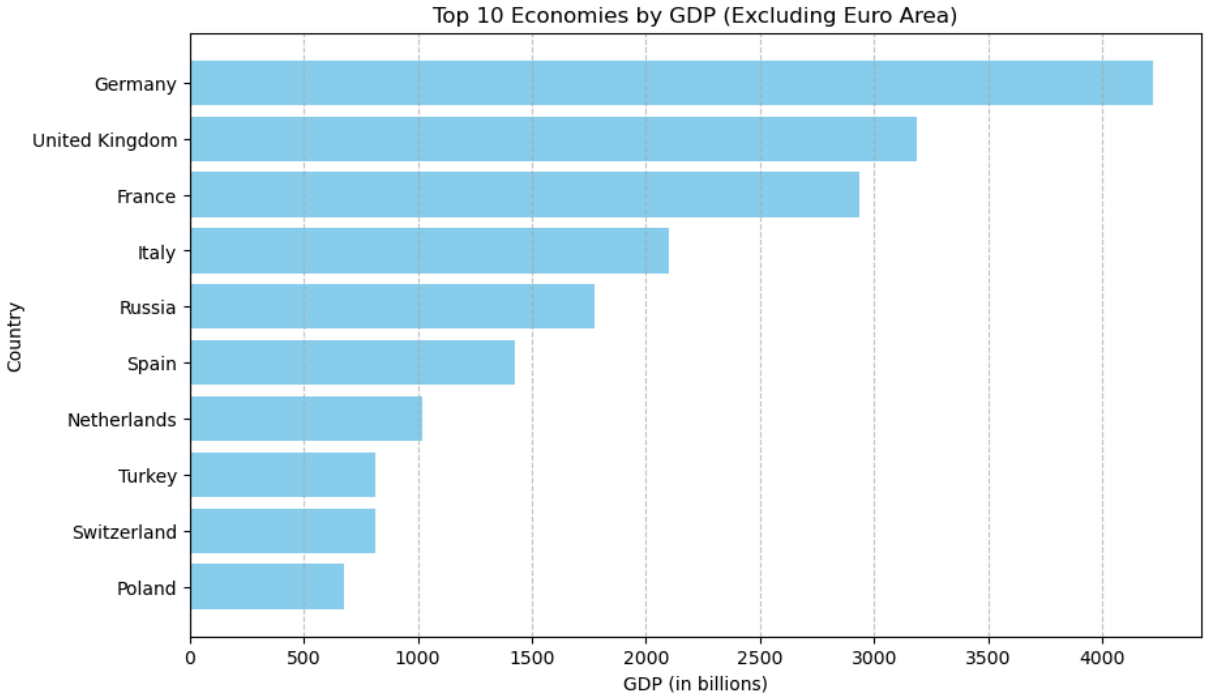
In [22]:
```
# Detect outliers in inflation and debt-to-GDP ratio
outliers_inflation = df_filtered[df_filtered['inflation_rate'] > 50]
outliers_debt_gdp = df_filtered[df_filtered['debt/gdp'] > 150]

print("Outliers in Inflation Rate:\n", outliers_inflation[['country', 'inflation_ra
print("Outliers in Debt-to-GDP Ratio:\n", outliers_debt_gdp[['country', 'debt/gdp']
```

```
Outliers in Inflation Rate:
   country  inflation_rate
8  Turkey           83.45
Outliers in Debt-to-GDP Ratio:
    country  debt/gdp
4    Italy     150.8
21  Greece     193.3
```

In [23]:
```
from wordcloud import WordCloud

# Combine all country names into a single string
countries_text = ' '.join(df_filtered['country'])

# Generate a word cloud
wordcloud = WordCloud(width=800, height=400, prefer_horizontal=1, collocations=Fals
                      font_path=None, include_numbers=False, max_font_size=50, min
```

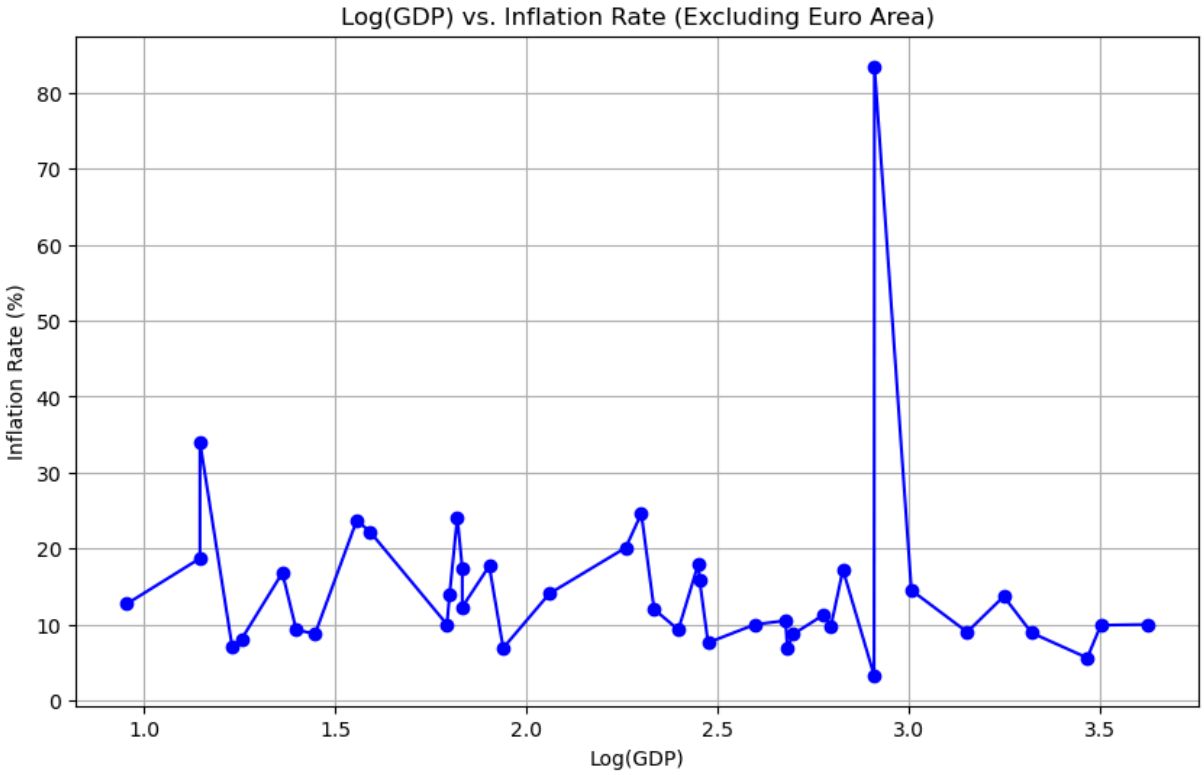
Visualizations

In [24]:
```
import matplotlib.pyplot as plt

# Bar chart
plt.figure(figsize=(10, 6))
plt.barh(top_countries['country'], top_countries['gdp'], color='skyblue')
plt.title('Top 10 Economies by GDP (Excluding Euro Area)')
plt.xlabel('GDP (in billions)')
plt.ylabel('Country')
plt.gca().invert_yaxis()
plt.grid(axis='x', linestyle='--', alpha=0.7)
plt.show()
```

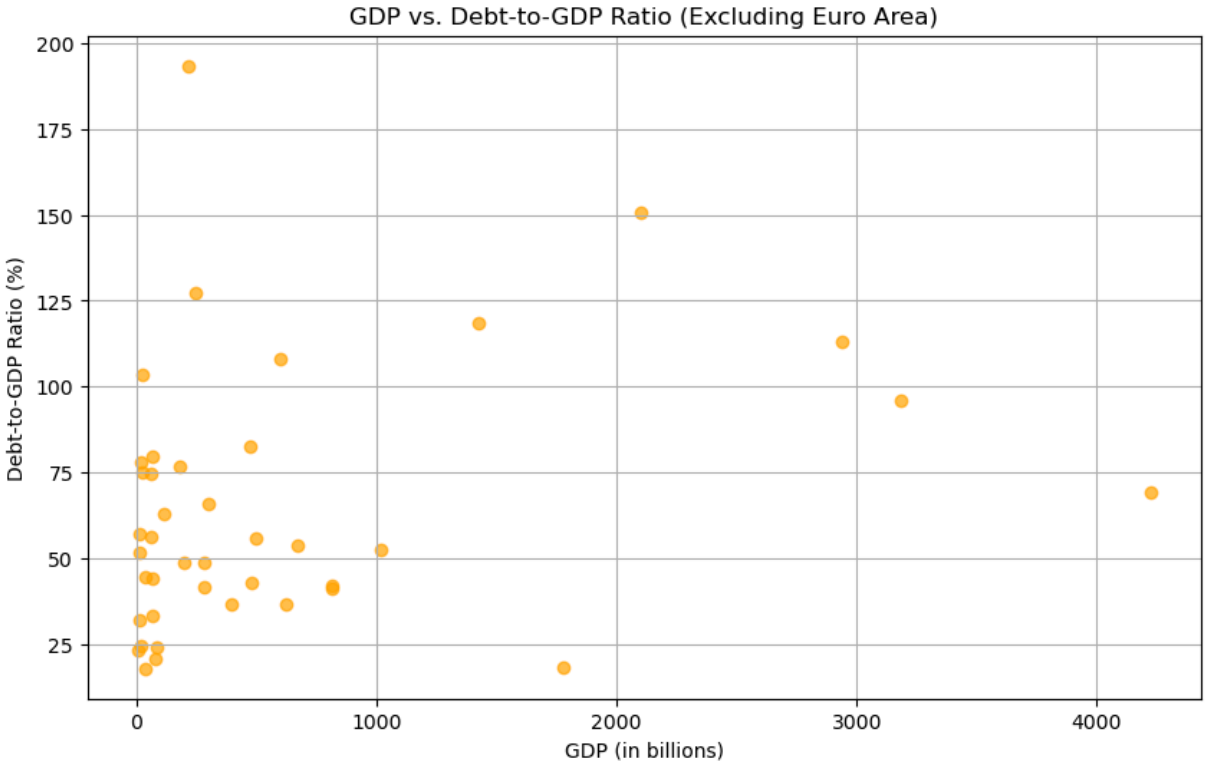


In [25]:
```
import numpy as np

# Sort data for meaningful visualization
df_sorted = df_filtered.sort_values(by='gdp')

# Apply logarithmic transformation to GDP
df_sorted['Log GDP'] = np.log10(df_sorted['gdp'].replace(0, np.nan)).fillna(0)

# Line graph
```

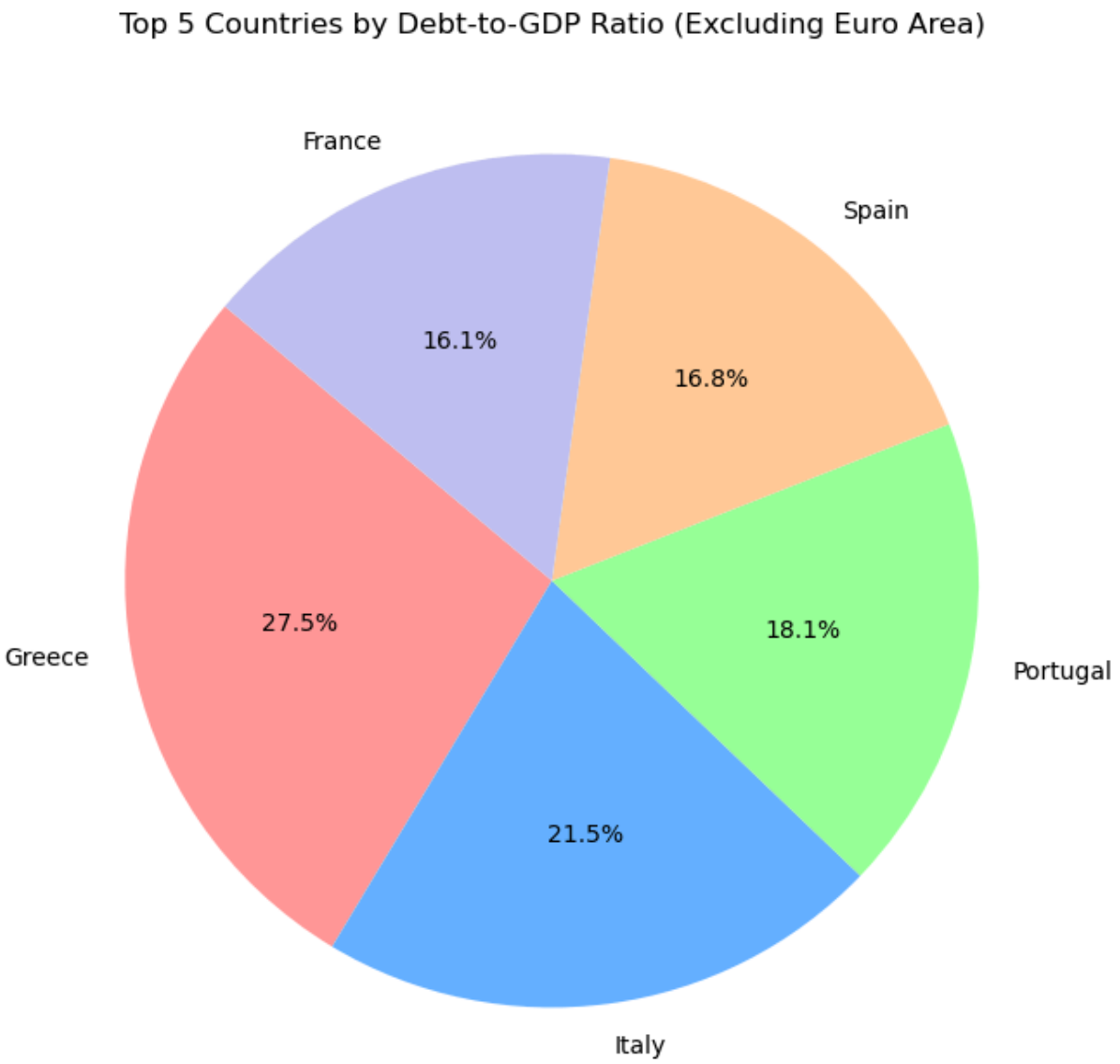
```
plt.figure(figsize=(10, 6))
plt.plot(df_sorted['Log GDP'], df_sorted['inflation_rate'], color='blue', marker='o
plt.title('Log(GDP) vs. Inflation Rate (Excluding Euro Area)')
plt.xlabel('Log(GDP)')
plt.ylabel('Inflation Rate (%)')
plt.grid()
plt.show()
```



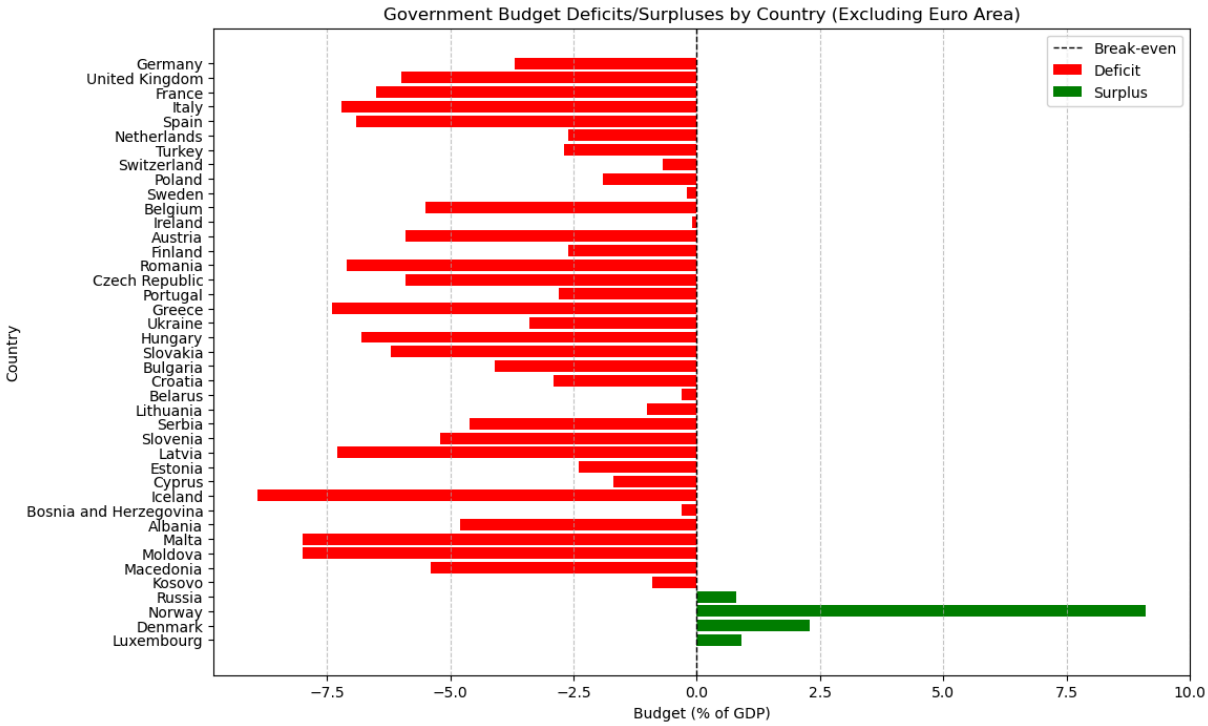
In [26]:
```
# Scatter plot
plt.figure(figsize=(10, 6))
plt.scatter(df_filtered['gdp'], df_filtered['debt/gdp'], color='orange', alpha=0.7)
plt.title('GDP vs. Debt-to-GDP Ratio (Excluding Euro Area)')
plt.xlabel('GDP (in billions)')
plt.ylabel('Debt-to-GDP Ratio (%)')
plt.grid()
plt.show()
```



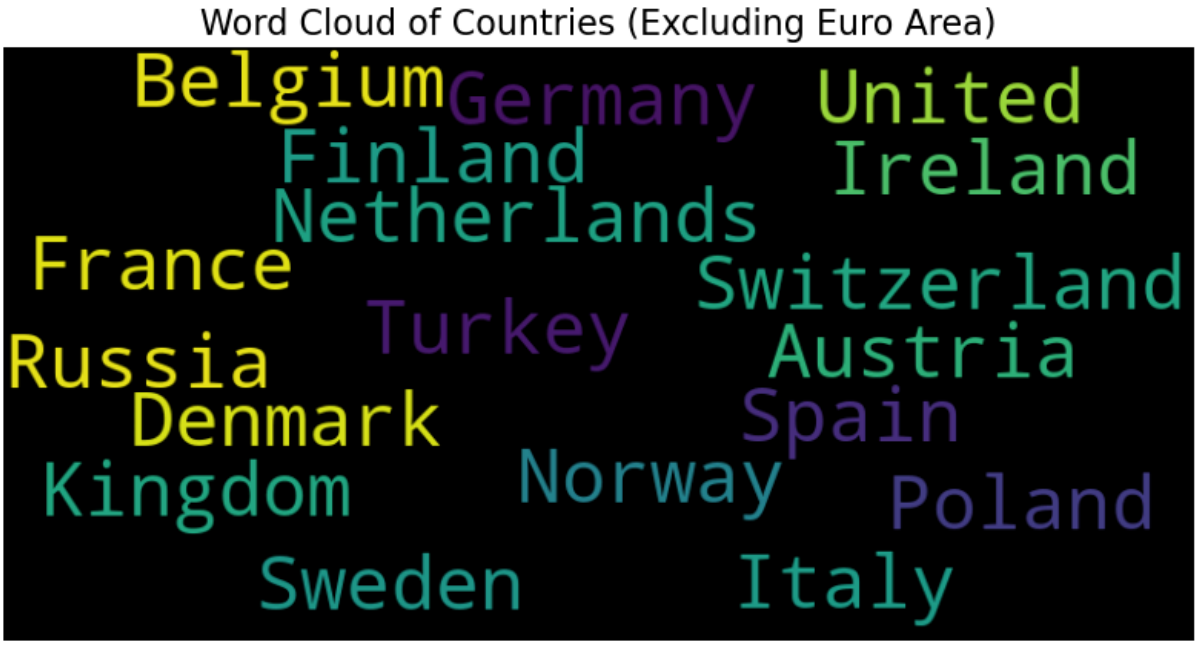
In [27]:
```
# Get the top 5 countries by Debt/GDP
top5_debt_gdp = df_filtered.nlargest(5, 'debt/gdp')

# Data for the pie chart
countries = top5_debt_gdp['country']
debt_gdp_values = top5_debt_gdp['debt/gdp']

# Pie chart
plt.figure(figsize=(8, 8))
plt.pie(debt_gdp_values, labels=countries, autopct='%1.1f%%', startangle=140, color
plt.title('Top 5 Countries by Debt-to-GDP Ratio (Excluding Euro Area)')
plt.show()
```



In [28]:
```
# Separate countries into deficits and surpluses
deficit_data = df_filtered[df_filtered['gov._budget'] < 0]
surplus_data = df_filtered[df_filtered['gov._budget'] >= 0]

# Plotting
plt.figure(figsize=(12, 8))
plt.barh(deficit_data['country'], deficit_data['gov._budget'], color='red', label='
plt.barh(surplus_data['country'], surplus_data['gov._budget'], color='green', label

# Adding labels and title
plt.title('Government Budget Deficits/Surpluses by Country (Excluding Euro Area)')
plt.xlabel('Budget (% of GDP)')
plt.ylabel('Country')
plt.axvline(0, color='black', linestyle='--', linewidth=1, label='Break-even')
plt.legend()
plt.gca().invert_yaxis()
plt.grid(axis='x', linestyle='--', alpha=0.7)
plt.show()
```

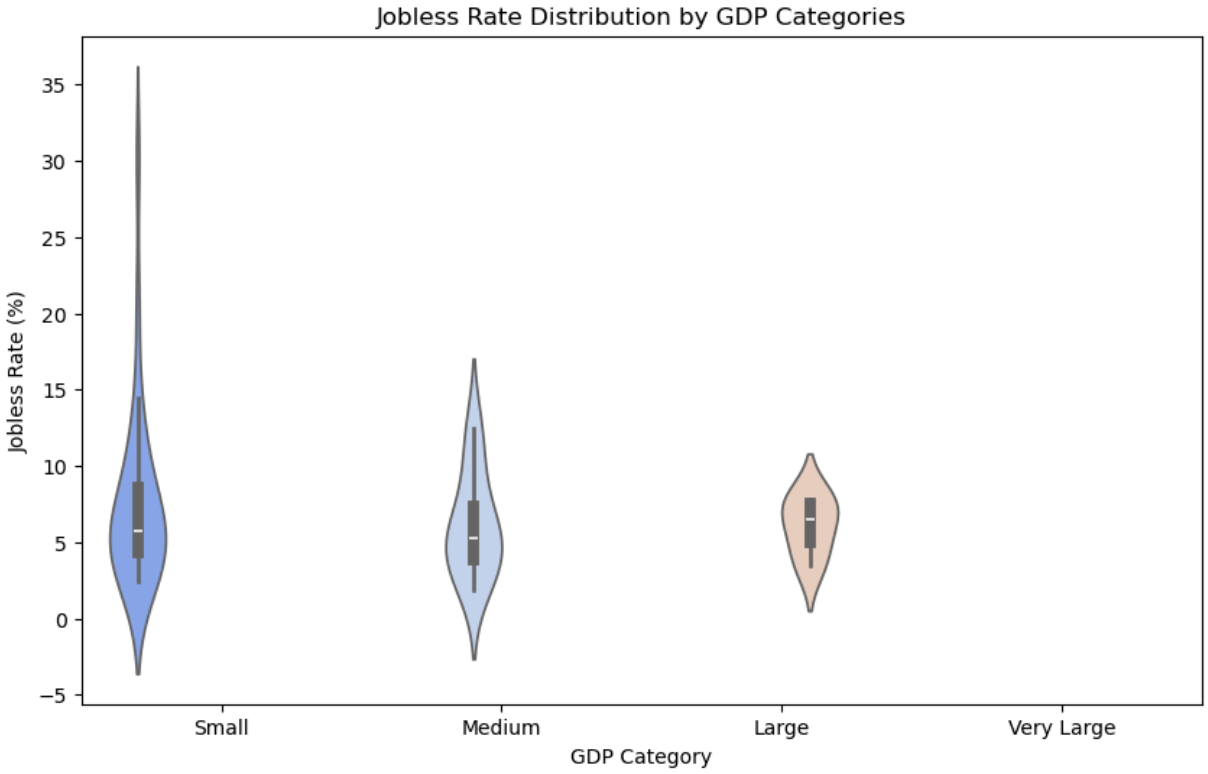


In [29]:
```
# Plot the word cloud
plt.figure(figsize=(10, 6))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.title('Word Cloud of Countries (Excluding Euro Area)', fontsize=16)
plt.show()
```

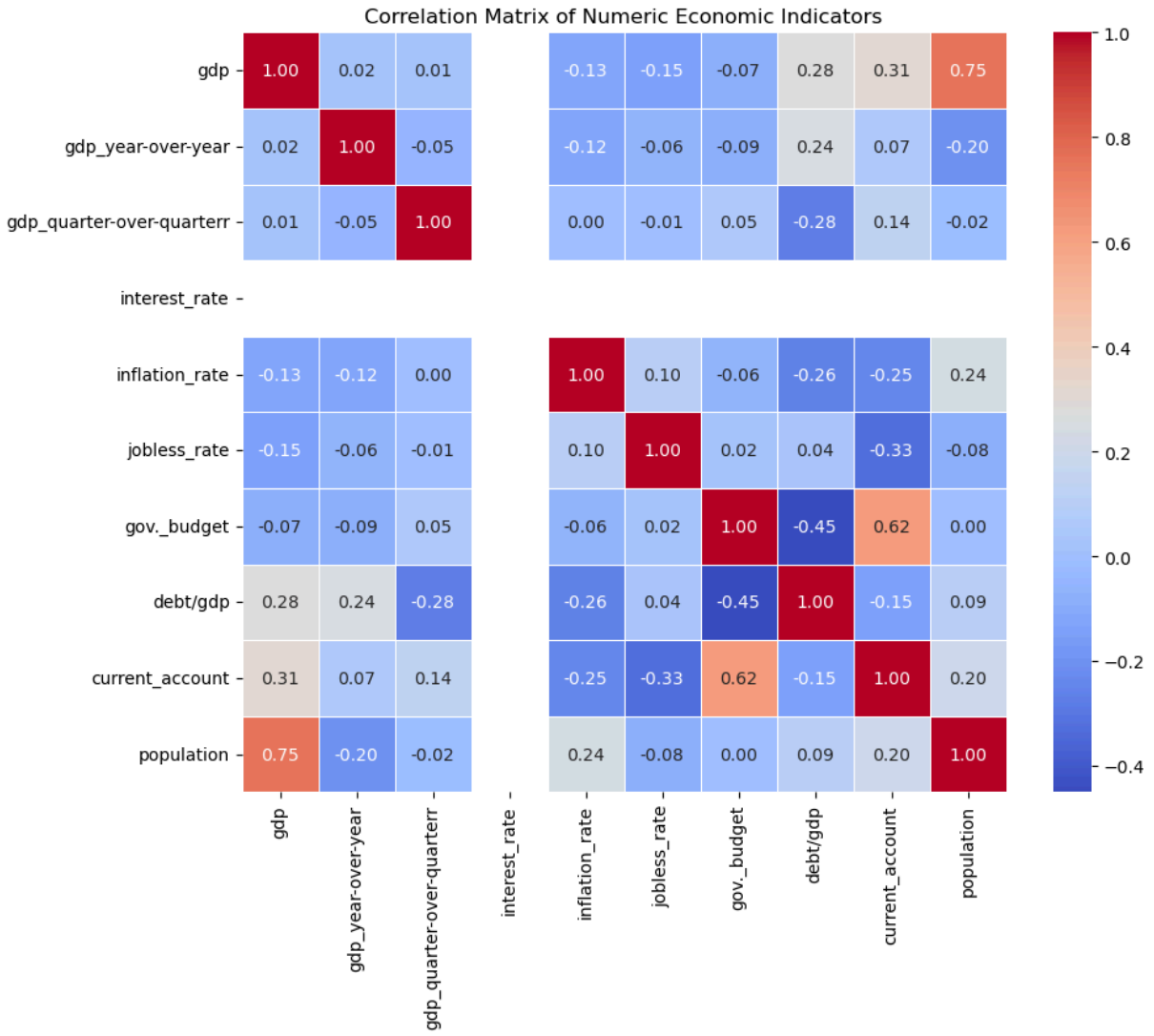


In [30]:
```
import seaborn as sns
import matplotlib.pyplot as plt
# Create GDP categories
df_filtered['gdp_category'] = pd.cut(df_filtered['gdp'], bins=[0, 500, 2000, 5000,
                                     labels=['Small', 'Medium', 'Large', 'Very Larg
plt.figure(figsize=(10, 6))
```

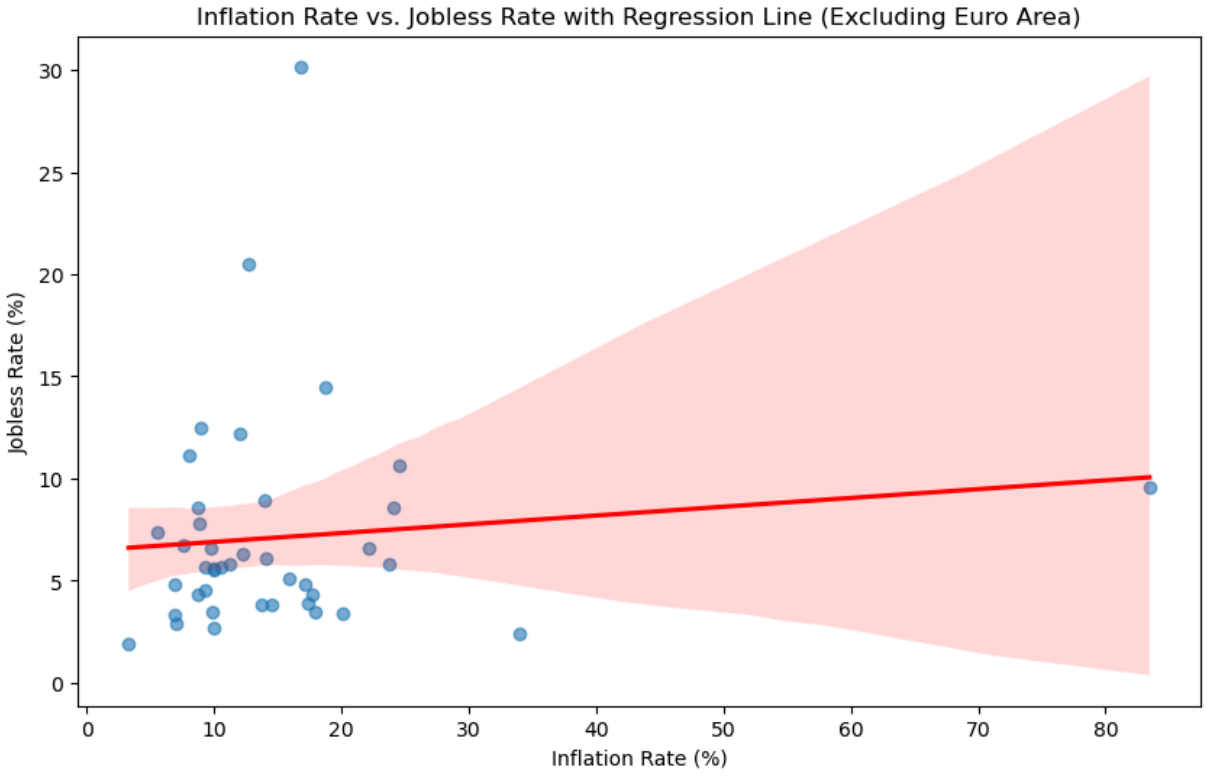
```
sns.violinplot(x='gdp_category', y='jobless_rate', data=df_filtered, hue='gdp_categ
plt.title('Jobless Rate Distribution by GDP Categories')
plt.xlabel('GDP Category')
plt.ylabel('Jobless Rate (%)')
plt.show()
```



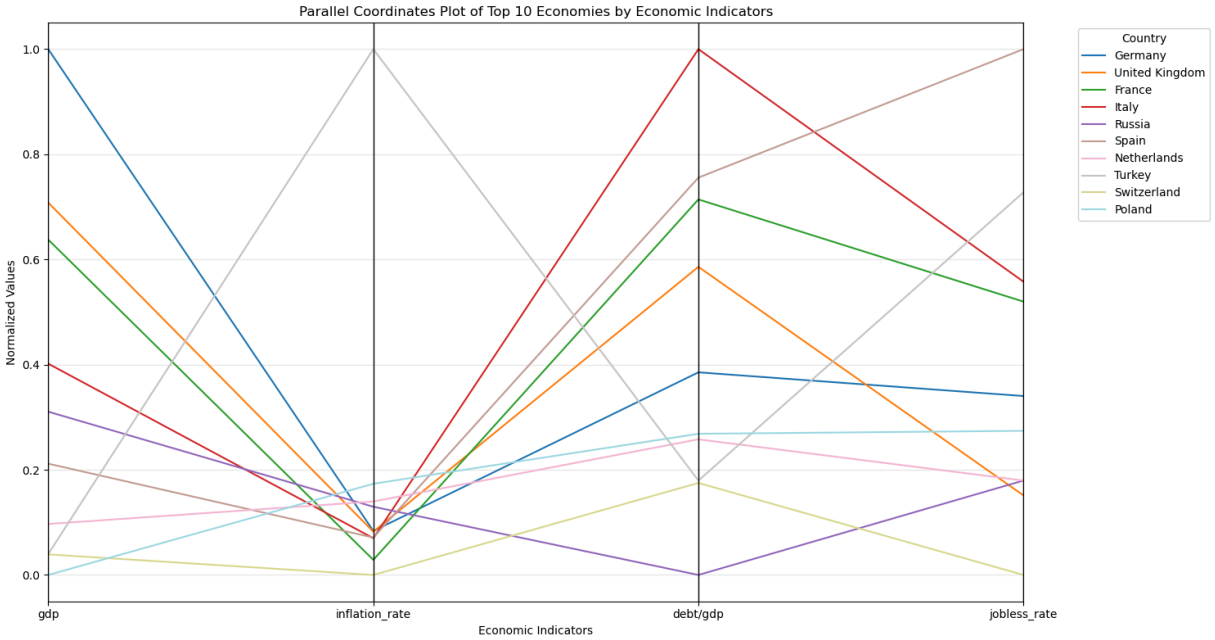
In [31]:
```
# Select only numeric columns
numeric_cols = df_filtered.select_dtypes(include=['float64', 'int64']).columns
numeric_df = df_filtered[numeric_cols]

# Compute correlation matrix
correlation_matrix = numeric_df.corr()

# Heatmap
plt.figure(figsize=(10, 8))
sns.heatmap(correlation_matrix, annot=True, fmt=".2f", cmap="coolwarm", linewidths=
plt.title('Correlation Matrix of Numeric Economic Indicators')
plt.show()
```



In [32]:
```
# Scatter plot with regression line
plt.figure(figsize=(10, 6))
sns.regplot(x='inflation_rate', y='jobless_rate', data=df_filtered, scatter_kws={'a
plt.title('Inflation Rate vs. Jobless Rate with Regression Line (Excluding Euro Are
plt.xlabel('Inflation Rate (%)')
plt.ylabel('Jobless Rate (%)')
plt.show()
```



In [33]:
```
from pandas.plotting import parallel_coordinates
import matplotlib.pyplot as plt

# Select the top 10 countries by GDP
top_10_df = df_filtered.nlargest(10, 'gdp')[['country', 'gdp', 'inflation_rate', 'd

# Normalize the data for better comparison
normalized_top_10_df = top_10_df.copy()
numeric_cols = ['gdp', 'inflation_rate', 'debt/gdp', 'jobless_rate']
normalized_top_10_df[numeric_cols] = (normalized_top_10_df[numeric_cols] - normaliz
                                      (normalized_top_10_df[numeric_cols].max() - no

# Plot parallel coordinates for top 10 countries
plt.figure(figsize=(15, 8))
parallel_coordinates(normalized_top_10_df, 'country', colormap=plt.colormaps.get_cm
plt.title('Parallel Coordinates Plot of Top 10 Economies by Economic Indicators')
plt.xlabel('Economic Indicators')
plt.ylabel('Normalized Values')
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left', title="Country")
plt.grid(alpha=0.3)
plt.tight_layout()
plt.show()
```



Research Findings

This research aimed to assess the fiscal health and economic stability of countries by analyzing key economic indicators, such as GDP, inflation rate, debt-to-GDP ratio, and government budget. The study sought to identify the relationships between these indicators and their impact on economic resilience. The following findings emerged from the analysis of the dataset:

1. GDP and Fiscal Stability

Economic Growth:

Countries with higher GDP, such as Germany and the United Kingdom, exhibit stronger economic stability due to diversified economies and better fiscal policies. Smaller economies like Kosovo, with lower GDP levels, often face challenges in managing inflation and unemployment due to limited fiscal resources. Debt-to-GDP Impact:

Countries with a lower debt-to-GDP ratio, such as Switzerland (41.4%), exhibit greater fiscal discipline and economic stability. In contrast, Greece's high debt-to-GDP ratio (193.3%) highlights the risks of unsustainable borrowing, which could lead to fiscal crises. 2. Inflation and Price Stability Inflation Trends:

High inflation rates, such as Turkey's 83.45%, signify economic instability, often resulting from political uncertainty or poor monetary policies. Countries like Switzerland, with lower inflation rates (3.3%), demonstrate strong economic management, offering price stability and investor confidence. Impact of Inflation:

High inflation erodes purchasing power and increases the cost of living, disproportionately affecting developing economies. Stable inflation rates are correlated with better fiscal

management and stronger GDP growth. 3. Employment and Jobless Rates Unemployment Analysis:

Switzerland exhibits the lowest jobless rate (1.9%), showcasing its robust economy and employment policies. High unemployment rates in countries like Macedonia (14.5%) highlight structural issues such as limited industrialization and skill gaps. Correlation with Fiscal Stability:

Countries with lower debt-to-GDP ratios and balanced government budgets tend to manage unemployment effectively. In contrast, fiscal deficits and high debt burdens correlate with higher unemployment. 4. Government Budgets and Fiscal Health Deficits and Surpluses:

Countries with fiscal surpluses, such as Norway (9.1%), exhibit greater economic resilience and flexibility in handling economic shocks. Fiscal deficits, such as those in Greece (-7.4%), indicate reliance on borrowing, which may lead to debt crises if not managed properly. Impact on Stability:

Fiscal surpluses support investment in infrastructure, education, and healthcare, enhancing economic growth. Persistent deficits often limit growth opportunities and increase vulnerability to external shocks. 5. Policy and Market Trends Government Policies:

Countries with sound fiscal policies, such as Germany, maintain economic stability by balancing budgets and managing inflation. Policies promoting investment and reducing debt burdens contribute significantly to long-term growth. Global Trends:

Developed economies, with higher GDP and fiscal stability, tend to invest in innovative technologies and human capital, fostering sustainable growth. Developing economies often face challenges due to higher inflation, fiscal deficits, and limited resources.

Conclusion

Countries with higher GDP and fiscal stability demonstrate better resilience to economic challenges such as inflation and unemployment. Strong fiscal policies, low debt-to-GDP ratios, and balanced budgets are critical factors in achieving economic stability and growth. While developing economies face challenges like high inflation and unemployment, strategic investments and sound fiscal management can improve economic health. This analysis highlights the importance of balancing fiscal discipline with economic growth initiatives, positioning countries to manage long-term economic stability effectively.

In [ ]: