Global ECONOMICS VS Egypt ECONOMY

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Abstract

The **World Economics Dashboard System** is a comprehensive data analytics and visualization platform designed to unify, process, and interpret global economic indicators from multiple countries and regions.

The system integrates automated data cleaning, transformation, and modeling techniques to produce accurate and reliable economic metrics such as GDP, inflation, unemployment, debt-to-GDP ratio, interest rates, and population statistics.

Using Power BI as the primary visualization tool, the project delivers a suite of interactive dashboards—including Global Summary, Regional Breakdown, Indicator Correlation, Forecasting & Trends, and Insights & Recommendations—that allow policymakers, researchers, and analysts to explore macroeconomic patterns, compare regional performances, and understand key economic relationships.

The system's forecasting component adds predictive capabilities for future economic trends, while its correlation analytics reveal underlying dependencies among economic variables. Designed with usability, performance, and scalability in mind, the World Economics Dashboard System provides a powerful, data-driven foundation for informed decision-making in economic policy, academic research, and strategic planning.

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Project Planning & Management

Project Overview:

The World Economics Dashboard System is a data-driven platform built to analyze and visualize key global economic indicators including GDP, Inflation Rate, Interest Rate, Debt-to-GDP Ratio, and Unemployment. The purpose is to provide governments, economists, and policy analysts with actionable insights through interactive dashboards.

Objectives:

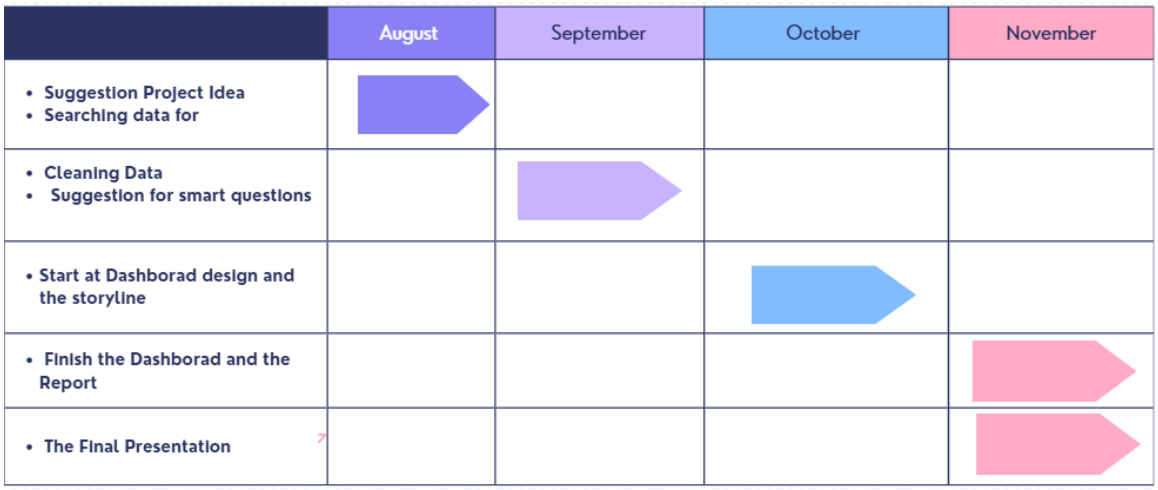
To centralize global economic data, perform automated cleaning and transformation, and provide dynamic Power BI dashboards for executive decision-making.

Scope:

The project covers data extraction, cleaning, modeling, dashboard development, analytical insight generation, and publication of reports.

Project Plan:

The development follows five key phases :



Literature Review

Literature Review :

Existing studies emphasize the importance of data visualization in macroeconomic analysis. Platforms like World Bank Data, IMF Statistics, and OECD Insights demonstrate how visual dashboards improve data accessibility and comprehension.

The World Economics Dashboard leverages similar principles while incorporating advanced analytics and user interactivity through Power BI. Key gaps identified include lack of unified visualization for cross-country economic comparison, limited forecasting integration, and insufficient data transparency for stakeholders.

This project addresses these gaps by combining real data analysis with modern BI technologies.

Data Gathering

Data Sources:

- Data .....(The Main Data)

About Dataset

This dataset was created as part of a web scraping practice project, combining information from two different sources:

- TradingEconomics.com → economic indicators such as GDP, growth, interest rate, inflation, unemployment, etc.
- REST Countries API → geographic and demographic details such as country name, currency, capital, language, borders, and more.

Columns:

Name: Country name

Currency: Main currency used

Capital: Capital city

Languages: Primary language

Latitude: Geographic latitude

Longitude: Geographic longitude

Area: Land area (km^2)

Region: Geopolitical region

Subregion: Geopolitical subregion

Borders: Neighboring countries

GDP: Gross Domestic Product (billion USD)

GDP: Growth Annual GDP growth rate (%)

Interest Rate: Central bank interest rate (%)

Inflation Rate: Inflation rate (%)

Jobless Rate: Unemployment rate (%)

Gov. Budget: Government budget balance (% of GDP)

Debt/GDP: Debt-to-GDP ratio (%)

Current Account: Current account balance (% of GDP)

Population: Total population (millions)

Egypt :

- the second source of data that we have .
- we collect the data from 2000 to 2030 ,including (years, GDP, current prices (Billions of U.S. dollars), Inflation rate, average consumer prices (Annual percent change), Population (Millions of people), Current account balance, percent of GDP (Percent of GDP), Unemployment rate (Percent), General government net lending/borrowing (Percent of GDP), General government gross debt (Percent of GDP), Interest Rate , Real GDP growth (Annual percent change))
- This data helps us to make more accurate results about the main goal of this dashboard (Egypt)

This data help us the fill some of missing data (monthly-interest-rates , Egypt-interest-rate)

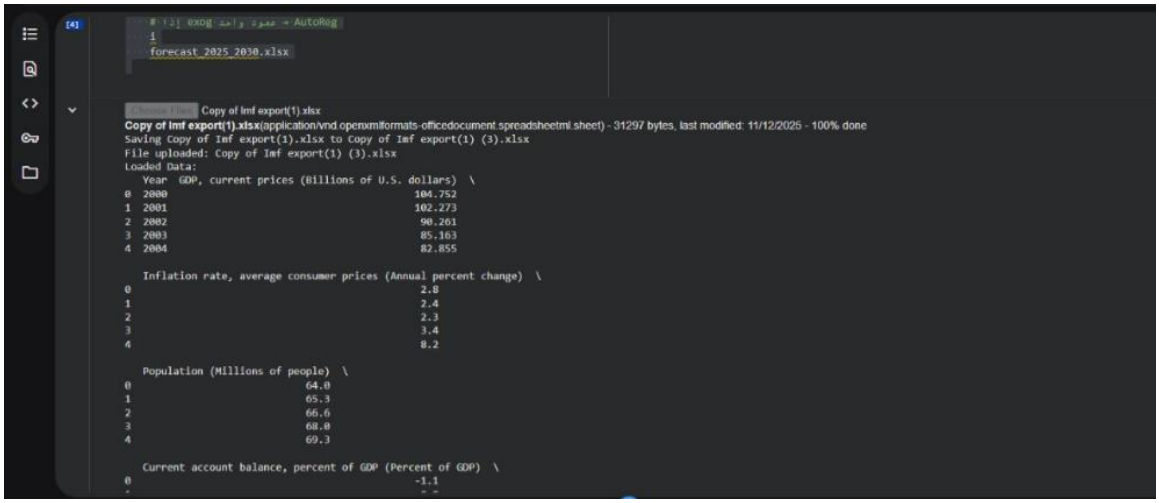
- But this data has missing values at column (Unemployment rate (Percent)) and Interest Rate.
- So to solve this problem we use python (Vector autoregretion) to predict the missing value.

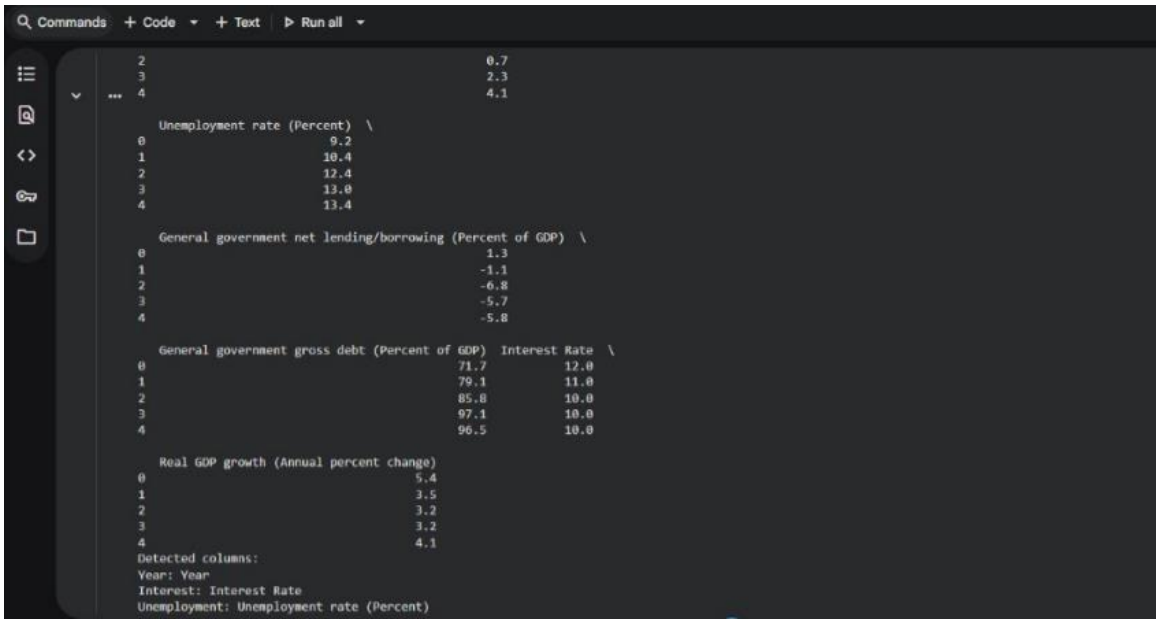
The code:

```
# ======= 1. استيراد المكتبات الأخرى =======
!pip install statsmodels openpyxl --quiet

from statsmodels.tsa.statespace.varmax import VARMAX
from statsmodels.tsa.api import VAR
from statsmodels.tsa.ar_model import AutoReg
import warnings
warnings.filterwarnings("ignore")


# ======= 2. التعرف التلقائي على أعمدة السنة والفائدة والبطالة =======
def find_first(cols, keywords):
    for c in cols:
        low = str(c).lower()
        if any(k in low for k in keywords):
            return c
    return None

cols = df_raw.columns.tolist()
year_col = find_first(cols, ["year", "date"])
interest_col = find_first(cols, ["interest", "interest rate", "policy", "repo"])
unemp_col = find_first(cols, ["unemployment", "unemployment rate"])

print("Detected columns:")
print("Year:", year_col)
print("Interest:", interest_col)
print("Unemployment:", unemp_col)

if year_col is None or interest_col is None or unemp_col is None:
    raise ValueError("تعذر التعرف على أعمدة السنة/الفائدة/البطالة. تأكد من أسماء الأعمدة.")
```

```python
# ======= 3. تجهيز البيانات =======
df = df_raw.copy()

# معالجة عمود السنة لو كان تاريخ
if np.issubdtype(df[year_col].dtype, np.datetime64):
    df[year_col] = pd.DatetimeIndex(df[year_col]).year

df[year_col] = df[year_col].astype(int)

# الأعمدة الرقمية
numeric = df.select_dtypes(include=[np.number]).columns.tolist()

# تأكيد أن interest & unemployment أعمدة رقمية
for c in [interest_col, unemp_col]:
    df[c] = pd.to_numeric(df[c], errors='coerce')

# المتغيرات الخارجية exogenous
exog_cols = [c for c in numeric if c not in [interest_col, unemp_col, year_col]]

print("Exogenous variables:", exog_cols)

df_used = df[[year_col, interest_col, unemp_col] + exog_cols].copy()
df_used = df_used.sort_values(by=year_col)
df_used = df_used.set_index(year_col)
df_used = df_used.interpolate(method="linear")

endog = df_used[[interest_col, unemp_col]]
exog = df_used[exog_cols] if len(exog_cols) > 0 else None


# ======= 4. وظيفة لتنبؤ المتغيرات الخارجية =======
def forecast_exog_series(exog_df, steps):
    from statsmodels.tsa.api import VAR
    from statsmodels.tsa.ar_model import AutoReg

    if exog_df.shape[1] == 0:
        return None
```

And the result is:



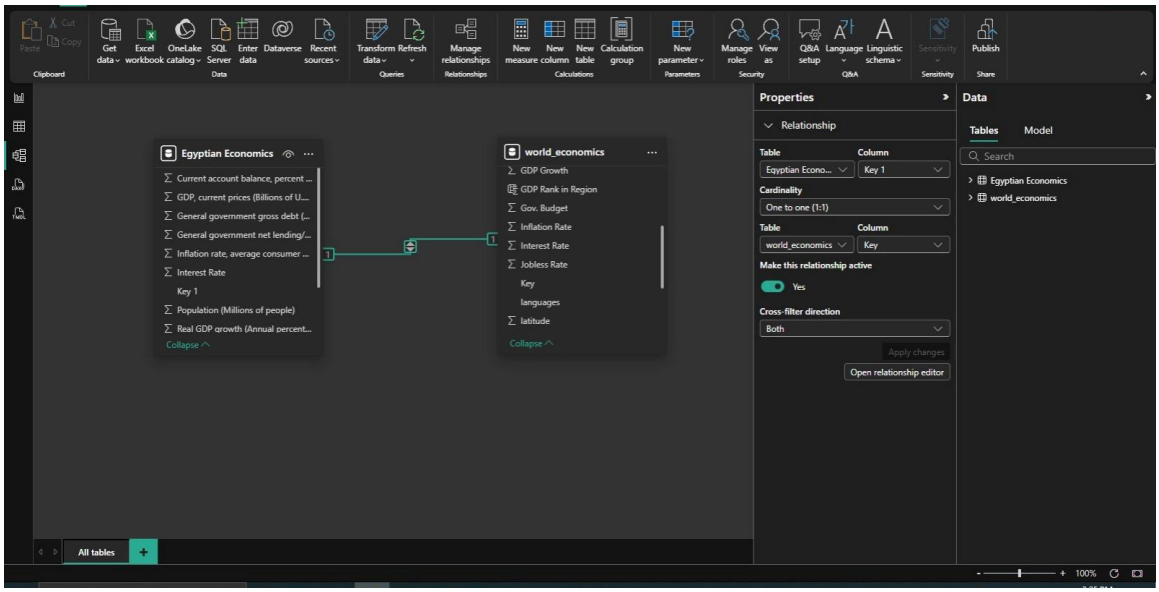


Data Cleaning and Modeling

Data Cleaning:

- Standardized column names to lowercase and underscores.
- Converted numeric-looking text fields to numeric (removed commas and `%`).
- Created `gdp_per_capita` (where `gdp` and `population` present).
- Did not automatically impute missing numeric values (I left them as `NaN` and documented which columns have lots of missing values).
- Dropped no rows for missingness (kept original row count).
- No duplicate rows were found.

Data Modeling:



The data model contains **two tables** linked together using a Key field.

- **world economics** is the **main cleaned table** with final economic indicators.
- **Egyptian economics** is the **raw data table** containing the original values.

The relationship is **One-to-One** and filters work in **both directions**, allowing all visuals and dashboards in Power BI to stay accurate and synchronized. This simple structure ensures clean data, correct calculations, and smooth filtering across the entire report.

Measures:

```
GDP Rank in Region = RANKX(
    FILTER('world_economics11', 'world_economics11'[region] = "Africa"),
    'world_economics11'[GDP],
    ,
    DESC
)

```

This measure calculates **Egypt's ranking** (or any selected country's ranking) **based on GDP within its region**, specifically **Africa**.

```
Total Debt ($) = 'world_economics11'[GDP] * 'world_economics11'[Debt/GDP] / 100

```

This measure calculates a country's **total government debt in dollars**.

Dashboards

Our Dashboard has 5 page :

- Home
- overview
- top 10
- bottom 10
- Egypt
- Egyptian Economics Over Time

Let’s explain them……..

Home :

we use canva to design this page including the details of our names and the group name and the title .

Overview:

1. Navigation Bar

At the top, there is a **navigation menu** that allows users to move between different report pages:

- **Home**
- **Overview** (current page)
- **Top 10**
- **Bottom 10**
- **Egypt**
- **Egyptian Economics Over Time**

This structure makes the report easy to explore and keeps all economic insights accessible.

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2. Key Performance Indicators (KPIs)

Across the top section, the dashboard shows the most important global economic metrics for 2025:

- **Total Global GDP – 107.4K**

- **Average GDP Growth – 0.9%**
- **Average Interest Rate – 6.86%**
- **Average Inflation Rate – 6.27%**
- **Average Jobless Rate – 7.04%**
- **Average Current Account – 0.36**

These KPIs allow users to instantly assess global economic health.

3.GDP by Region (Treemap)

The treemap divides total global GDP by regions:

- **Asia (largest share)**
- **Americas**
- **Europe**
- **Africa**
- **Oceania**

Each region's size is proportional to its contribution to the world economy.
This makes it easy to compare regions at a glance.

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4. World Map Visualization

The map displays all countries included in the dataset, marked with yellow dots.
Users can click on a dot to see detailed information about that country on other pages.

This helps visually understand the geographic distribution of economic activity.

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5. Country Flags Panel

On the right side, a panel of **country flags** acts as a slicer/filter.
Clicking any flag will:

- Filter the entire dashboard
- Update KPIs
- Update map
- Update regional visuals

This offers a simple and intuitive way to explore country-specific data.

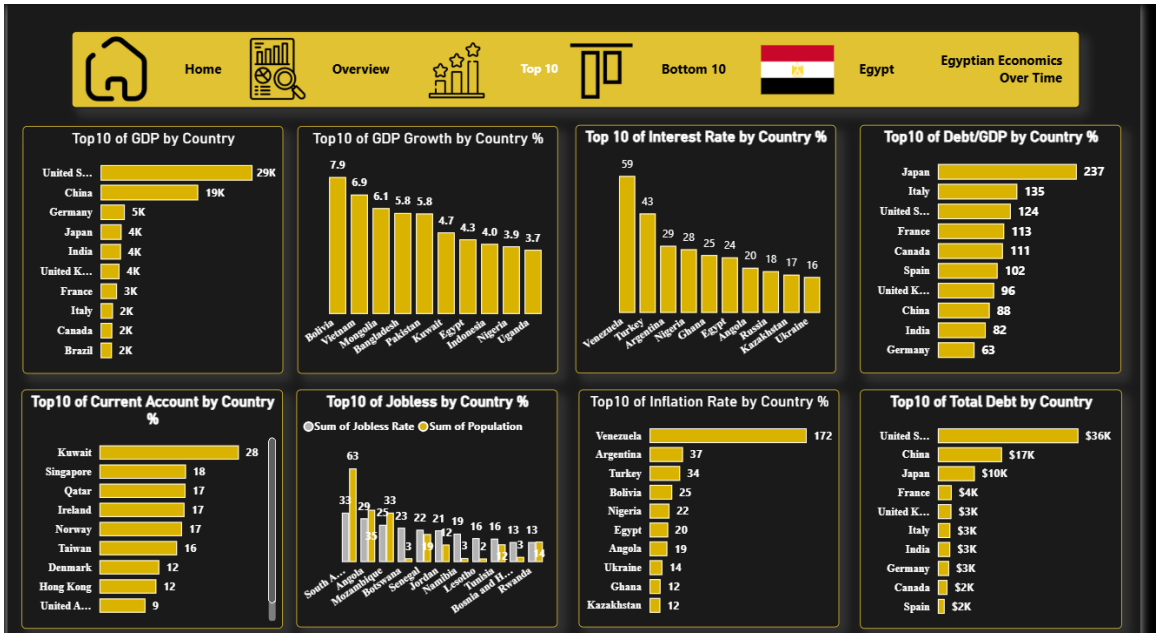
Summary

This dashboard gives a clear, interactive snapshot of global economic conditions.
It combines:

- KPIs
- Regional GDP comparison
- A world geographic view
- Country-level filtering

Together, these elements allow users to understand worldwide economic performance quickly and efficiently.

Top 10:



Top 10 Economic Indicators Dashboard – Explanation

This dashboard highlights the **Top 10 countries** across key economic indicators. It is designed to help users quickly identify leading countries in GDP, growth, interest rates, inflation, debt, and other major macroeconomic factors.

The layout provides clear comparisons using bar and column charts, making it easy to recognize the strongest or most extreme performers globally.

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1. Top 10 GDP by Country

This chart ranks countries with the **highest total GDP**:

- The **United States** leads significantly
- Followed by **China**, Germany, Japan, India, and other major economies

This visual shows which countries dominate global economic output.

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2. Top 10 GDP Growth by Country

This chart displays the countries with the **fastest-growing economies**:

- **Bolivia, Vietnam, Mongolia, Bangladesh**, and others appear on top
- These represent emerging or rapidly developing markets

It highlights global economic momentum and emerging growth hotspots.

---

3. Top 10 Interest Rate by Country

This chart lists countries with the **highest interest rates**, reflecting strict monetary policies:

- **Venezuela, Turkey, Argentina** show extremely high rates
- Indicates high inflation and economic instability

This helps understand global financial conditions.

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4. Top 10 Debt-to-GDP Ratio

Shows countries with the **highest government debt levels**:

- **Japan** leads with a very high debt-to-GDP ratio
- Followed by Italy, the U.S., France, and others

High debt levels impact credit ratings and economic stability.

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5. Top 10 Current Account Balance

Displays countries with the **strongest current account surpluses**:

- **Kuwait, Singapore, Qatar**, and other surplus nations
- Indicates strong export performance or resource-driven revenues

This reflects external economic strength.

6. Top 10 Jobless Rate (Unemployment)

Shows countries with the **highest unemployment rates**:

- **South Africa** and **Angola** lead this list
- Indicates weak labor markets and economic challenges

Useful for evaluating labor market stability.

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7. Top 10 Inflation Rate

Lists countries with the **highest inflation levels**:

- **Venezuela** has extremely high inflation
- Followed by Argentina, Turkey, and Nigeria

This highlights countries facing severe price instability.

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8. Top 10 Total Debt

This chart ranks countries with the **largest total debt** in absolute value:

- **United States** leads by a large margin
- Followed by China, Japan, and several European countries

This reflects borrowing capacity and financial scale.

Summary

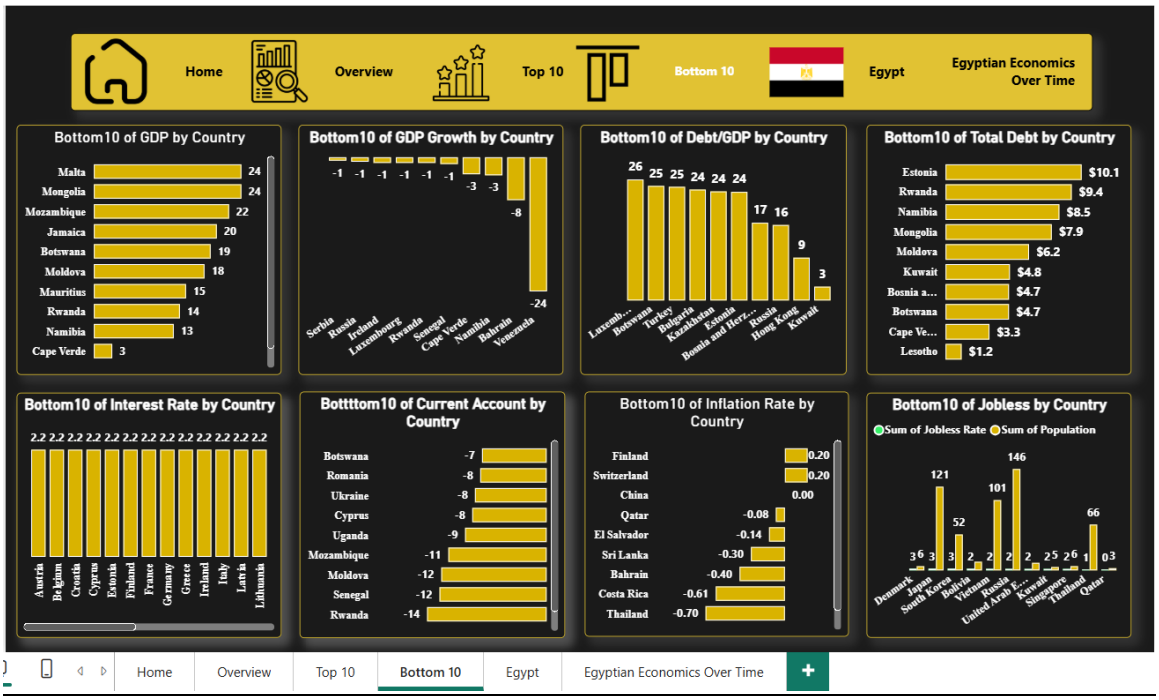
The **Top 10 Dashboard** provides a fast and comprehensive snapshot of global economic leaders and extremes. By focusing on top performers across multiple indicators, users can easily:

- Identify global economic powerhouses
- Recognize fastest-growing economies
- Detect countries with financial instability

- Understand which nations carry the heaviest debt burdens

This dashboard is essential for comparing countries and gaining strategic insights across the world economy.

Bottom 10:



Bottom 10 Economic Indicators Dashboard – Explanation

The **Bottom 10 Dashboard** identifies the countries that rank the lowest across major economic indicators. This page helps users understand which countries face the greatest economic challenges, whether in GDP size, growth, inflation, debt, or unemployment.

The visuals collectively highlight global weak points and provide insight into struggling economies.

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1. Bottom 10 of GDP by Country

Displays the countries with the **lowest GDP values**:

- Countries like **Malta, Mongolia, Mozambique**, and **Cape Verde** appear at the bottom.
- Indicates very small economies with limited economic output.

2. Bottom 10 of GDP Growth

Shows countries experiencing the **lowest or negative GDP growth**:

- Examples include **Serbia, Russia, Ireland**, and **Venezuela (lowest)**.
- Countries with negative growth indicate recession or economic contraction.

3. Bottom 10 of Debt-to-GDP Ratio

Lists countries with the **lowest government debt relative to GDP**:

- Countries like **Luxembourg, Botswana, Turkey**, and **Kuwait**.
- Low debt-to-GDP can indicate strong fiscal management or underdeveloped borrowing markets.

4. Bottom 10 of Total Debt

Shows countries with the **lowest total government debt** volume (absolute value):

- **Estonia, Rwanda, Namibia**, and **Lesotho** appear at the bottom.
- These countries have very small debt levels due to their small economies.

5. Bottom 10 of Interest Rate

Shows countries with the **lowest interest rates**, often at **2.2%**:

- Includes Austria, Belgium, Cyprus, Finland, France, Italy, Latvia, etc.
- Low interest rates reflect stable and low-inflation environments.

6. Bottom 10 of Current Account Balance

Countries with the **lowest (most negative) current account balances**:

- **Botswana, Romania, Ukraine, Cyprus**, etc.
- Negative balances mean higher imports than exports, leading to deficits.

7. Bottom 10 of Inflation Rate

Countries with the **lowest inflation**, some even negative (deflation):

- **Finland, Switzerland, China**, Qatar, Sri Lanka, Bahrain, etc.
- Negative inflation suggests reduced prices or weak consumer demand.

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8. Bottom 10 of Jobless Rate

Shows countries with the **lowest unemployment rates**:

- Examples: **Denmark, Japan, South Korea, Singapore, Thailand**, and Qatar.
- These countries typically have strong labor markets.

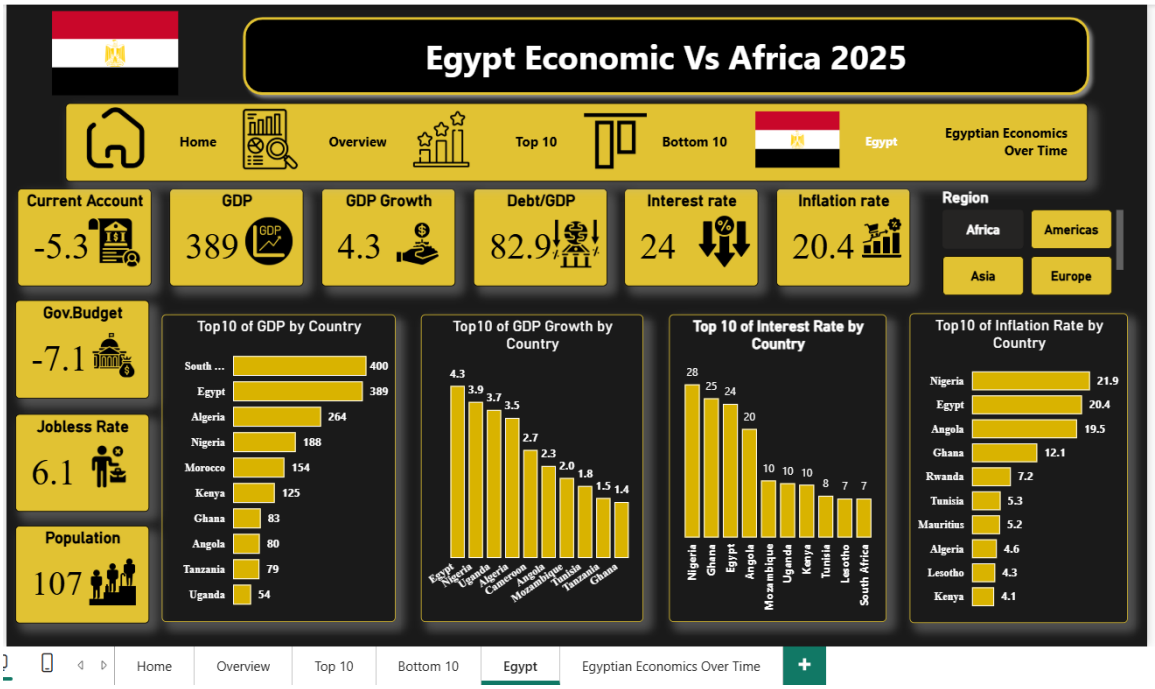
Summary

The Bottom 10 Dashboard gives insight into countries that:

- Have the smallest economies
- Experience low or negative economic growth
- Maintain low debt or interest rates
- Have extremely low inflation
- Or possess very low unemployment

This dashboard is essential for identifying global economic weaknesses, recession trends, and countries facing structural economic challenges.

Egypt



Egypt Economic vs Africa 2025 – Dashboard Explanation

This dashboard provides a focused comparison between **Egypt's economic performance in 2025** and the leading African economies. It highlights Egypt's strengths, weaknesses, and position among other countries across key macroeconomic indicators.

The goal of this dashboard is to show where Egypt stands in Africa economically, using clear visual comparisons and important KPIs.

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1. Egypt's Key Economic Indicators (KPIs)

The left section displays Egypt's main economic metrics:

- **Current Account: -5.3**
- **GDP: 389**
- **GDP Growth: 4.3%**
- **Debt-to-GDP: 82.9%**
- **Inflation Rate: 20.4%**
- **Government Budget: -7.1**
- **Jobless Rate: 6.1%**
- **Population: 107 million**

2. Region Filter Panel

Users can filter the comparison by region:

- **Africa (default)**
- Americas
- Asia
- Europe

This allows the dashboard to position Egypt globally, not only in Africa.

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3. Top 10 GDP in Africa

This chart shows the highest GDP countries in Africa:

- **South Africa (400)**
- **Egypt (389)**
- **Algeria (264)**
- **Nigeria (188)**

Egypt ranks **2nd in Africa**, showing strong economic influence.

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4. Top 10 GDP Growth in Africa

Egypt appears strongly in the ranking:

- Egypt: **4.3%** (one of the highest in Africa)
- Followed by Nigeria, Algeria, etc.

This highlights Egypt's strong economic expansion compared to other African nations.

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5. Top 10 Interest Rate

Egypt ranks high:

- Nigeria (28%)
- Ghana (25%)
- **Egypt (24%)**

The high interest rate reflects efforts to fight inflation.

6. Top 10 Inflation Rate (Africa)

This chart shows countries with the highest inflation:

- Nigeria (21.9%)
- **Egypt (20.4%)**
- Angola, Ghana, Tunisia, etc.

Egypt is among the highest, highlighting inflation as a major challenge.

Summary

The **Egypt vs Africa 2025 dashboard** clearly shows:

Egypt's Strengths:

✓ One of the largest GDPs in Africa
✓ Strong GDP growth
✓ Competitive unemployment levels
✓ Large population supporting economic potential

This dashboard provides a powerful visual comparison that helps decision-makers understand Egypt's regional economic position and identify areas of opportunity and concern.

Egyptian Economics Over Time – Dashboard Explanation

The **Egyptian Economics Over Time** dashboard provides a comprehensive historical analysis of Egypt's key economic indicators across multiple years. It visually tracks how GDP, population, inflation, unemployment, government debt, and current account balances have evolved, helping users understand long-term economic trends, cycles, and structural changes within the Egyptian economy.

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1. Summary Indicators (KPIs)

Located on the left, these KPIs provide a quick overview of Egypt's economic totals and averages:

- **GDP Total – 8.96K (Billion USD)**
- **Population – 2.80K (Million People)**
- **Average Income Per Capita – 3.20**
- **Average Inflation Rate – 10.79%**

These KPIs give the user an immediate understanding of the general economic trends without deep analysis.

---

2. Unemployment Rate vs Population (Pie Chart)

This visualization compares:

- Number of unemployed individuals
- Total population

It shows the **percentage of unemployed** relative to the entire population.

What it reveals:

- A small portion of the population is unemployed (~7%)
- The majority (~92%) represents the working-age and general population
- Useful to see the unemployment burden in a clear visual form

---

3. Relationship Between Government Debt and Population Over Time (Line & Area Chart)

This dual-line chart tracks two critical metrics:

- **Population** (steady increase)
- **Government Gross Debt (% of GDP)** (fluctuating across years)

- **Key insights:**

- Population rises steadily from 2000 to 2030
- Debt % fluctuates with major political and financial events
- Post-2015 period shows increasing debt pressure
- By 2030, projected population and debt continue rising

This helps analysts understand debt sustainability relative to population growth.

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4. Current Account Balance (% of GDP) Over Time (Bar Chart)

This chart shows Egypt's external economic balance:

Highlights:

- Surpluses appear occasionally in early years

- Persistent deficits dominate the post-2010 period
- Deep negative values coincide with global and local crises
- Recent years show attempts to stabilize but still remain negative

This measure is vital for understanding trade competitiveness and currency pressure.

---

5. GDP vs Real GDP Growth (Combined Line & Bar Chart)

This visualization compares:

- **GDP (bars)** → Egypt's economic size
- **Real GDP Growth (line)** → how fast the economy is growing

- **What it reveals:**

- GDP increases steadily over time
- Real growth fluctuates sharply
- High peaks around 2008 and mid-2010s
- Sharp drops during crisis years
- Recent trends show moderate positive growth

This helps distinguish **economic expansion** from **economic volatility**.

---

6. GDP Over Time (Line Chart)

This chart isolates GDP alone to show:

- Long-term upward trend
- Periods of stagnation
- Sharp increases during strong development phases
- Future projections until 2030

It provides a clear picture of the economic trajectory.

---

7. Economic Indicators Over Time (Interactive Visual)

This allows users to analyze:

- GDP
- Inflation
- Unemployment

over specific years using a **slider** and **year selector**.

Benefits:

- Supports dynamic comparison
- Allows focusing on specific time periods
- Enhances user interaction and deeper understanding

---

8. Year Selector Timeline (2000–2030)

A horizontal strip of clickable years lets users jump between years and instantly update all visuals.
This enhances navigation and makes year-by-year analysis efficient.

Final Insight

This dashboard provides a **complete, time-based perspective** of Egypt's economy. It combines structural indicators, growth metrics, and financial balances to show how Egypt's economic performance has changed over decades.

Strengths observed:

- Steady GDP growth
- Rising population supporting economic expansion
- Positive recovery in several years
- Consistent long-term upward GDP trend

Challenges highlighted:

❗ High inflation
❗ Increasing government debt

Together, these visuals offer a powerful decision-support tool for economists, researchers, policymakers, and students analyzing Egypt's long-term economic development.

Implementation &Source code

Implementation (Source Code & Execution):

Technologies Used: Power BI, Python (pandas, matplotlib), SQL, and Excel.

Code Structure: The Python scripts handle data preprocessing, missing value handling, and creation of derived metrics (e.g., GDP per capita).

Version Control: The source code and dashboards are maintained on GitHub using GitFlow strategy for branch management.

Deployment: Dashboards are published to Power BI Service with scheduled refresh from the clouddataset.

Conclusion

- The *World Economics Dashboard System* successfully delivers a comprehensive, interactive, and data-driven platform for analyzing global economic performance. By integrating reliable datasets, applying effective data cleaning and modeling techniques, and presenting insights through visually rich Power BI dashboards, the project achieves its main objective: enabling users to understand worldwide economic conditions quickly and accurately.

- Through a series of well-structured dashboards—Global Overview, Top 10, Bottom 10, Egypt vs Africa, and Egyptian Economics Over Time—the system highlights key macroeconomic indicators such as GDP, inflation, unemployment, government debt, interest rates, and current account balances. These dashboards not only present comparative insights between countries and regions but also allow dynamic exploration through slicers, filters, and interactive visuals.

- The project demonstrates the value of modern business intelligence tools in simplifying complex datasets and turning them into meaningful insights. The data modeling approach ensures clean relationships and reliable calculations, while forecasting and trend analysis provide a forward-looking perspective on economic performance.

Overall, the system serves as a practical tool for economists, policymakers, students, and researchers. It enhances understanding, supports strategic decision-making, and improves the ability to monitor economic trends across time and geography. With its scalable design and modular structure, the dashboard can be further expanded to include more countries, additional indicators, or advanced analytics in the future.