EGYPT'S ECONOMIC

1. Introduction

• Project Overview

This project presents an in-depth analysis of the Egyptian economy from the year 2010 to 2023. The analysis covers a wide range of macroeconomic indicators to understand the economic performance and challenges Egypt has faced during this period. The project utilizes structured economic data to extract insights related to inflation, interest rates, balance of payments (BOP), domestic debt, GDP, and tourism, among others. The goal is to provide a comprehensive view of the Egyptian economy using historical data from credible national and international sources.

• Objectives

The primary objectives of this analysis are:

- To identify trends and patterns in key economic indicators over the past 14 years.
- To analyze the relationships between inflation, interest rates, and other macroeconomic variables.
- To assess the health of the Egyptian economy and provide data-driven insights for better decision-making.
- To support future economic forecasting and strategic planning based on historical trends.

• Stakeholders

The findings of this analysis are intended to serve multiple audiences:

- The **Digital Egypt Pioneers Initiative (DEPI)** as part of a graduation project.
- **Economic decision-makers** and **policymakers** in Egypt, particularly from institutions such as the **Central Bank of Egypt**, the **Ministry of Planning and Economic Development**, and the **Ministry of Finance**.
- **Researchers and analysts** who are interested in understanding Egypt's economic trajectory and formulating recommendations based on empirical evidence.

2. Data Collection

• Data Sources

The project integrates data collected from various credible sources to ensure comprehensive economic coverage:

- **Central Bank of Egypt (CBE)**: Provided data on inflation, interest rates (discount rate), balance of payments (BOP), and domestic debt.
- **CAPMAS (Central Agency for Public Mobilization and Statistics)**: Supplied tourism-related data such as inbound tourist numbers and tourism revenues.
- **World Bank**: Contributed macroeconomic indicators such as GDP (in both constant and current LCU), GDP growth, government expenditure, unemployment, and inflation using GDP deflator.
  The final dataset is a compilation of Excel and CSV files that were gathered from official portals and cross-referenced for accuracy.

• Data Description

The combined dataset spans from 2010 to 2023 and includes the following key variables:

Inflation (CPI Breakdown):

- All Items
- Food & Non-Alcoholic Beverages
- Alcoholic Beverages, Tobacco & Narcotics
- Clothing & Footwear
- Housing, Water, Electricity, Gas & Other Fuel
- Furnishings, Household Equipment & Routine Maintenance
- Health
- Transport
- Communications
- Culture & Recreation
- Education
- Restaurants & Hotels
- Miscellaneous Goods & Services

GDP:

- GDP (constant LCU)
- GDP (current LCU)
- Inflation, GDP deflator (annual %)

Balance of Payments (BOP):

- Export Receipts
- Import Payments
- Trade Balance
- Total Receipts
- Total Payments
- Services Balance
- Transfers

Domestic Debt:

- Net Domestic Debt of the Government
- Net Debt of Public Economic Authorities
- Net NIB Debt
- Intra-Debt

Interest Rate & Macroeconomic Indicators:

- Discount Rate
- Exchange Rate (LCU per USD)
- General Government Expenditure (% of GDP)
- Unemployment (% of total labor force)
- Inflation (Consumer Prices, annual %)
- GDP Growth (annual %)

Tourism:

- Number of Inbound Tourists
- Tourism Revenue (USD)
- Exchange Rates: USD, EUR, GBP, KWD

• Data Quality Assessment

- **Missing Values**: Some missing values were observed, particularly in early or recent years for certain indicators such as tourism revenue and specific inflation categories.
- **Duplicates**: The data was checked for duplication and found to be clean in terms of repeated rows.
- **Inconsistencies**: Minor inconsistencies were identified due to different naming conventions across sources (e.g., "GDP (current LCU)" vs. "GDP - Current"), which were standardized during preprocessing.
- **Format Differences**: Currency formats, date formatting, and column headers were normalized for consistency across datasets.

3. Data Cleaning & Preprocessing

• Handling Missing Values

Due to the sensitive and interconnected nature of economic data, the team made a deliberate effort to **retrieve all missing values** rather than delete or estimate them statistically. Missing values were cross-checked and filled using alternative sources from the Central Bank of Egypt, CAPMAS, and the World Bank to ensure the dataset was comprehensive and accurate. This process allowed for deeper and more reliable economic analysis.

• Data Transformation

Minimal transformation was applied beyond standardizing date formats and numerical precision. However, **base year adjustments** were necessary in some cases. For instance, inflation data had two different base years (2010 and 2018), which posed comparability issues. The team **fixed 2010 as the standard base year**, recalculating other values accordingly to ensure consistency throughout the time series.

• Feature Engineering

Several derived metrics and custom features were created to enable more meaningful insights and validate the accuracy of raw indicators:

- **Tourism – Average Exchange Rate Change**:
  Exchange rates (USD, EUR, GBP, KWD) were only available as periodic figures. The team calculated **average annual exchange rates** for analysis, since daily rates were unavailable.
- **GDP – Real vs Nominal Comparison**:
  Both **real (constant LCU)** and **nominal (current LCU)** GDP values were analyzed. The **GDP deflator** was independently verified by computing the relative difference between the two to check the validity of the provided inflation indicators.
- **Inflation (CPI) – Contribution Analysis**:
  CPI components were used to calculate the **inflation rate of each individual category** (e.g., food, health, transport). Additionally, **the contribution of each item to total inflation** was estimated to determine which categories had the greatest impact over time.
- **Inflation Growth**:
  Year-over-year inflation growth was calculated to monitor acceleration or deceleration in price increases across categories and in the overall CPI.

These engineered features helped the team correlate macroeconomic behaviors and trends, such as the impact of food prices on total inflation or the effect of currency fluctuations on tourism revenue.

4. Exploratory Data Analysis (EDA)

• Summary Statistics

Although detailed descriptive statistics like mean or standard deviation were not the primary focus, the team conducted extensive **correlation and regression analysis** using both Python and Excel to explore interdependencies among the economic variables. These statistical techniques were used to assess the strength and direction of relationships—such as how inflation interacts with interest rates, or how exchange rates may affect tourism revenue.

• Data Visualization

A wide variety of visual tools were employed to uncover patterns and present trends across the different datasets. These visualizations played a key role in identifying shifts, trends, and comparative insights over time. Charts included:

- Time-series and categorical visualizations
- Proportional representations
- Comparative multi-axis displays
- Distribution and relationship plots

These visuals were customized for each dataset—such as inflation, GDP, BOP, debt, and tourism—to support better interpretation and communication of the economic dynamics.

• Outliers & Anomalies

Several inconsistencies or unusual shifts appeared during the data exploration phase, particularly in inflation data due to differences in base years (2010 and 2018). These were resolved by **standardizing the base year to 2010**, ensuring consistent inflation comparisons across the entire analysis period. Other anomalies, such as sharp currency fluctuations or sudden changes in sector performance, were examined further through context-aware calculations and cross-validation against multiple data sources.

5.Results & Insights

Key Findings:

- Inflation in Egypt increased by approximately 243% from 2010 to 2022. The highest rate was in 2017 (~30%) following the currency flotation. Food was the main contributor (39.9%) of the consumer basket), while the lowest inflation (2%) occurred in 2019.
- GDP growth over the years was mainly nominal, driven by inflation. For example, in 2017, nominal growth was 34.93% vs. real growth at only 4.18%.
- A strong positive correlation was observed between the exchange rate and inflation. The discount rate peaked at 18.75% in 2023 to contain inflation after devaluation.
- Tourism generated an average of $9.43B annually with 10.28M tourists—mostly from Russia. Surprisingly, the exchange rate had a weak impact on tourism numbers.
- Public debt grew at an average of 16.13% per year, reaching EGP 5T in 2020—mainly domestic debt.
- Egypt experienced a consistent trade deficit ($36.36B/year on average), partially offset by remittances ($23.36B/year).

Implications:

- Insights help understand how macroeconomic policies like devaluation affect inflation and monetary responses.
- Enables forecasting and proactive planning in monetary, fiscal, and investment strategies.
- Supports prioritizing sectors (e.g., tourism, exports) to improve foreign currency inflows and reduce deficits.

Limitations:

- Challenges in data collection from multiple sources.
- Inconsistent base years required standardization.
- Outliers needed to be addressed to avoid skewed results.
- Entity-Relationship Diagram (ERD) development was necessary to link data effectively (especially year-based tables) in Power BI.

6. Recommendations & Next Steps

Actionable Insights:

- Focus on sustainably increasing tourism as a key foreign currency source.
- Diversify exports to reduce dependency and trade imbalance.
- Tackle inflation through both monetary tools and structural improvements (e.g., production and supply chain reforms).

6. Conclusion

This analysis provided valuable insights into Egypt's macroeconomic trends from 2010 to 2023. It highlighted the impact of policies like currency flotation, revealed key challenges like inflation and

debt, and identified areas of opportunity such as tourism and export diversification. The findings serve as a foundation for data-driven policymaking and future research.

8. Appendices

- Data Dictionary (indicator definitions and units)
- Sample ERD diagram used in Power BI
- Key visualizations (inflation trend, exchange rate vs. inflation, GDP breakdown)
- Code snippets for Power BI transformations and analysis