**Power BI Assessment: IMF iData Advanced Economic Data Analysis**

**Approach**

To meet the dashboard requirements, I downloaded data from the IMF World Economic Outlook (WEO) dataset for GDP growth, inflation, unemployment, and gross government debt across seven countries from 2010 to 2024. I imported this data into Power BI and used Power Query for cleaning and transformation. This included reshaping columns, ensuring consistent formatting across years and indicators, and removing or imputing missing values. A data model was built around a star schema with relationships defined as one-to-many between a central fact table and lookup tables for Country, Indicator, and Year.

**Performance Optimization**

To ensure the dashboard remained responsive, especially with multi-year data across several metrics, I:

* Used summary tables to reduce row count for repeated aggregations.
* Created aggregated measures in DAX.
* Removed unnecessary columns and filtered the data to only relevant years.
* Used DAX best practices such as variables in complex calculations and minimized calculated columns in favor of measures.

**Dashboard Design**

* **Line Chart**: Displays GDP growth and inflation rates with a dual Y-axis per country.
* **Bar Chart**: Compares unemployment and government debt for the most recent year.
* **Slicers**: Enable filtering by country, year.
* **KPI Cards**: Show average GDP growth, latest inflation, and total government debt change.

**Challenges & Solutions**

One key challenge was managing the large size of the dataset with long-format year data. I addressed this by importing only necessary indicators and implementing row-level filtering early in the Power Query stage. To improve usability for non-technical users, I added clear, formatted numbers consistently, and structured the report with intuitive navigation and legend placement.

**User Instructions**

Users can interact with the slicers to select specific countries, indicators, and years. Hovering over the charts provides precise values. Right-click on visual elements to access detailed drill through pages. KPI cards at the top update dynamically based on selected filters to provide real-time insight.

**Python Assessment: IMF iData API Integration & Advanced Analysis**

**Approach**

I created a reusable Python script to automate the analysis of economic indicators from the IMF WEO dataset. For this exercise, I downloaded the data manually and processed it using pandas. The script reshaped the dataset from wide to long format, filtered the necessary countries and indicators, and performed data normalization and analysis.

The script calculates:

* Year-over-year changes for each indicator.
* Z-score normalization to align all metrics on a common scale.
* A summary table with average GDP, inflation, and unemployment per country.

Visualizations include:

* A multi-line chart showing GDP trends over time.
* A grouped bar chart for inflation and unemployment.
* A heatmap visualizing correlation between metrics per country.

Charts are saved as images and embedded into an Excel file using **xlsxwriter** along with a programmatically generated narrative summary that highlights key trends.

**Automation & Reporting**

* The output Excel file contains sheets for raw data, summaries, pivot tables, embedded charts, and textual insights.
* The script is modular, allowing for future extension with CLI support or IMF API integration.

**Challenges & Solutions**

Although the original goal included using the IMF API, I initially worked with a downloaded CSV to focus on cleaning, analysis, and reporting. Handling missing values, such as incomplete records for inflation or unemployment, was addressed using dropna() for critical columns. For performance, charts were saved and inserted into Excel sheets instead of redrawing inside Excel, ensuring faster rendering.

**User Instructions**

To run the script:

1. Place the IMF CSV file in the same folder and update the file path.
2. Run the script in any Python environment with the required packages (pandas, matplotlib, seaborn, xlsxwriter).
3. Open the generated IMF\_Economic\_Summary.xlsx file to view insights and charts.

Filters and visualizations adjust automatically based on country and indicator selections in the dataset.