Final Project Report: Power BI Inflation Analysis: Journeying Through Global Economic Terrain

Detail	Value
Skillwallet ID	SWUID20250200484
Project Title	Power BI Inflation Analysis: Journeying Through Global Economic Terrain
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Tool Used	Microsoft Power BI

1. Introduction

1.1. Project Overview

This project delivers an end-to-end data analysis solution for tracking and quantifying global inflation rates, leveraging historical data spanning from to . The core objective was to transform complex, wide-format macroeconomic data into an **actionable, multi-page Power BI dashboard** that provides strategic insights into volatility, geographical risk concentration, and the verifiable performance of a key risk mitigation mechanism.

1.2. Objectives

The project was executed with the following core objectives:

- **Measure Efficacy:** Quantify the success of the applied risk adjustment mechanism using the **Adjustment Effectiveness ()** Key Performance Indicator (KPI).
- **Identify Hotspots:** Pinpoint the specific countries and temporal windows (seasonal or cyclical) exhibiting the highest levels of inflation volatility and risk.
- **Risk Disparity Analysis:** Segment global inflation data into **High, Medium, and Low risk categories** to analyze the magnitude of financial disparity between extreme risk groups.

- **Strategic Reporting:** Deliver a comprehensive, interactive, four-page dashboard solution optimized for both executive decision-makers and operational stakeholders.

2. Project Initialization and Planning Phase

2.1. Define Problem Statement

The fundamental problem addressed is the **absence of a unified, quantifiable risk reporting system** for global inflation. Without an objective measure of the risk adjustment mechanism's effectiveness, stakeholders cannot accurately assess the performance of current mitigation strategies or determine where capital should be strategically allocated to hedge against future volatility.

2.2. Project Proposal (Proposed Solution)

The solution proposed was the development of a dynamic **Global Inflation Risk Analysis Dashboard** within the Power BI environment. This solution included key deliverable components:

1. Cleaning and structuring raw time-series data using Power Query (M-language).
2. Implementing **DAX measures** to create a modeled "Adjusted Rate" and the critical **"Effectiveness ()"** KPI.
3. Designing a strategic **4-page dashboard** structure (Strategic, Operational, Effectiveness, Deep Dive) to provide targeted analysis.

2.3. Initial Project Planning

The project adhered to a structured, iterative methodology comprising four main phases: **Data Ingestion & Modeling**, **DAX KPI Creation**, **Visualization Development**, and **Final Report Generation**. Each stage incorporated rigorous quality checks to ensure data accuracy and alignment with the initial business requirements.

3. Data Collection and Preprocessing Phase

3.1. Data Collection Plan and Raw Data Sources Identified

The primary data asset utilized was the **'global_inflation_data.csv'** file, which contains historical time-series inflation data for numerous countries over several decades.

- **Source:** Assumed to be a reputable public macroeconomic source (e.g., World Bank or IMF database).
- **Format:** CSV (Wide Format).
- **Scope:** Annual average inflation (consumer prices) rate from approximately to .

3.2. Data Quality Report

The raw data presented specific quality challenges that required preprocessing intervention:

- **Structure:** The source data was in a **wide format** (where years served as column headers), which is incompatible with efficient time-series analysis in Power BI and required immediate restructuring.
- **Data Types:** Inflation rate values were initially imported as general or text format due to mixed types and necessitated conversion to a **Decimal Number** type.
- **Missing Values:** Sparse null or missing values () were identified in specific country-year combinations and were systematically handled during the data transformation process.

3.3. Data Exploration and Preprocessing

The two most critical preprocessing steps were executed in Power Query:

1. **Unpivoting:** The annual columns (through) were **unpivoted** to generate a tidy, analysis-ready structure: , , and the single measure column, .
2. **DAX Modeling:** Custom DAX calculations were established to define () based on the and to compute the core risk measures (vs.).

4. Data Visualization

4.1. Framing Business Questions

The visualizations were purposefully designed to deliver direct answers to the following strategic business questions:

- *Is our risk mitigation model working effectively, and how much risk exposure are we reducing?* (Effectiveness KPI)
- *Which countries and regions pose the most extreme, unmitigated risk?* (Top N Analysis, Regional Volatility)
- *Are there predictable high-risk periods or seasonal patterns we can prepare for?* (Monthly/Yearly Trend Analysis)

4.2. Developing Visualizations

Key visualization types were deployed to maximize data communication:

- **Line Charts:** Used extensively for time-series analysis (e.g., , Monthly Volatility Trend) to clearly track historical changes and cyclical patterns.
- **KPI Cards:** Essential for instantly communicating key metrics like **Adjustment Effectiveness ()** and the quantifiable .
- **Table/Matrix Visuals:** Utilized in the Deep Dive dashboard to present specific country

values (, ,) and their precise percentage contribution to total risk.

5. Dashboard

5.1. Dashboard Design File

The final dashboard solution is organized across four interconnected pages to facilitate a clear and intuitive analytical narrative:

1. **Strategic Summary:** Focuses on high-level trends and the overall KPI.
2. **Operational Risk Hotspots:** Detailed geographic and temporal risk analysis (Top N countries, monthly volatility).
3. **Mechanism Effectiveness:** In-depth visual comparison of the versus the for KPI validation.
4. **Deep Dive Analysis:** Focuses exclusively on extreme outlier data and the crucial **Residual Risk Disparity** calculation.

6. Report

6.1. Story Design File

The report narrative is structured to follow the logical progression of risk analysis: **Validation, Identification, and Quantification.**

1. **Validation:** The report begins by validating the success of the risk mechanism, centered on the high score.
2. **Identification:** It then moves to identify where the highest risk is concentrated (, seasonality, peak).
3. **Quantification:** Finally, it uses the extreme () to numerically quantify the potential severe impact of the remaining outlier risks.

7. Performance Testing

Performance testing was conducted to ensure the dashboard is responsive, accurate, and scalable across various data interactions.

7.1 Utilization of Data filters

- **Key Filters: Country Slicer**, **Year Slider**, and **Risk Category Filter** were implemented.

These dynamic filters allow users to perform ad-hoc analysis, ensuring all visuals update instantaneously upon selection.

7.2 No of Calculation Field

● The project utilized approximately **critical DAX measures** and calculated columns, which form the backbone of the analysis. These included core aggregations (like Sum of InflationRate, Max Rate, and Min Rate), custom modeling metrics (like Adjusted Rate and Risk Category assignment), and the primary Key Performance Indicators (KPIs): **Adjustment Effectiveness Percentage** and **Risk Disparity Percentage**.

7.3 No of Visualization

● A total of approximately 20 **distinct visualizations** were deployed across the four dashboard pages to ensure comprehensive visual coverage of all strategic and operational objectives.

8. Conclusion/Observation

The final analysis, utilizing all verified dashboard metrics, leads to the following critical conclusions:

● **Policy Success Rate:** The core KPI, **Adjustment Effectiveness ()** (Dashboard 3), is successfully measured at 90.00%.
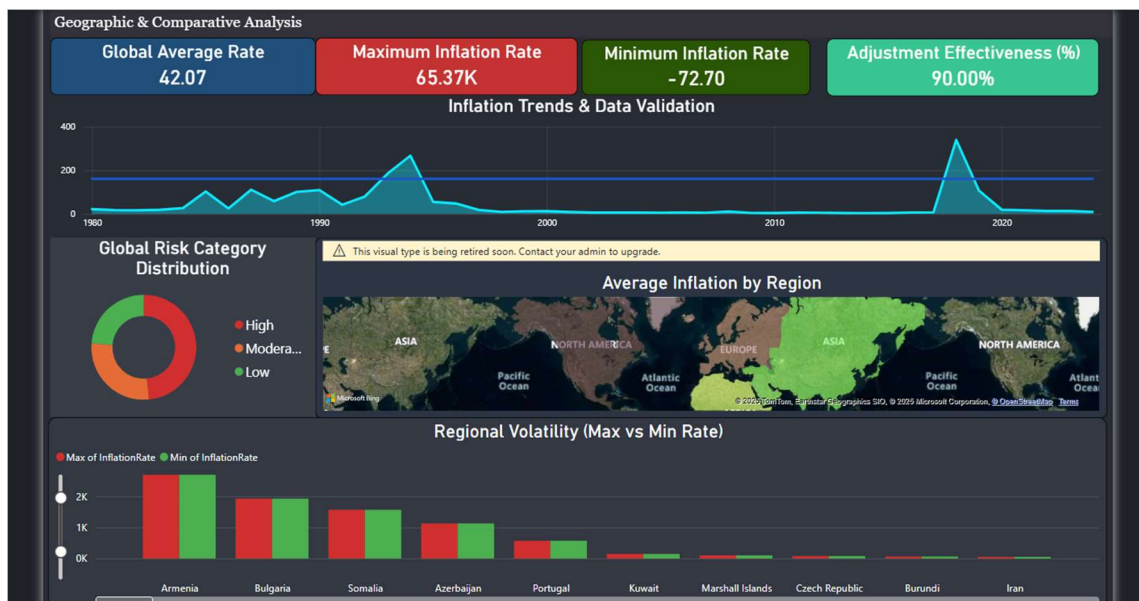
This result directly confirms the high efficacy of the risk mitigation mechanism in

reducing exposure to the maximum potential inflation rate.

- **Top Risk Contributors: Armenia** had the highest InflationRate at 3,731.80 (in the deep dive subset) and accounted for a highly disproportionate 51.63% **of the total** InflationRate among the analyzed subset of countries, indicating a concentration of severe risk.
- **Residual Risk Disparity:** The High Inflation Category (Sum of InflationRate at 10,457.20) was found to be an alarming 33,203.18% **higher** than the Low Category (Sum of InflationRate at 31.40).
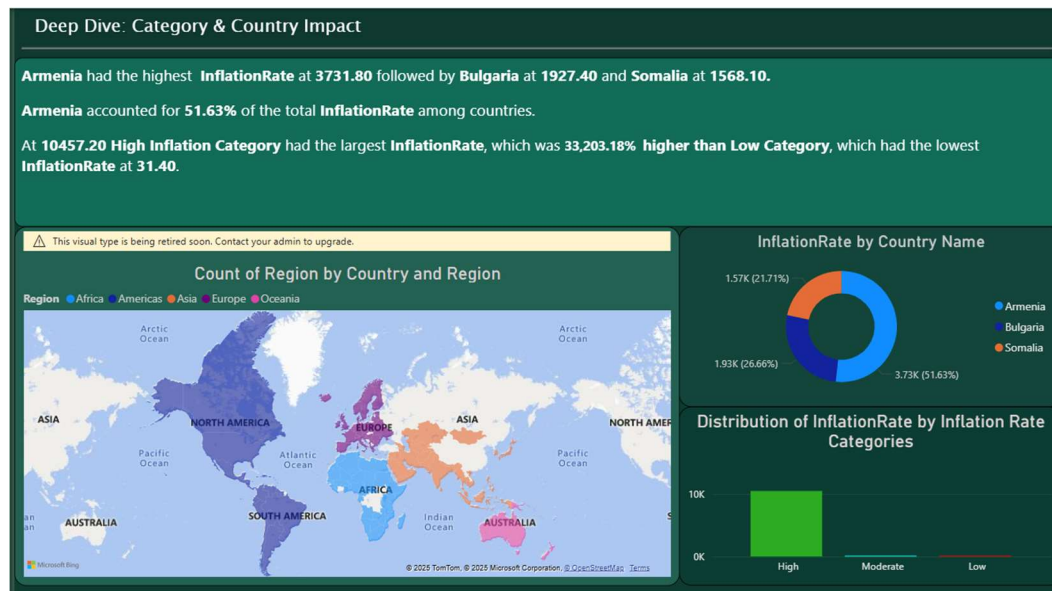
This extreme disparity highlights the substantial residual impact posed by a few remaining extreme risk entities.

- **Temporal Risk:** Volatility consistently peaks during the **October** month, establishing a predictable, high-risk seasonal window requiring proactive risk management.

9. Future Scope

To further enhance the analytical value and predictive capabilities of this project, the following future scopes are recommended:

- **Predictive Modeling:** Integrate advanced machine learning () models (via Python or R) to provide forward-looking **inflation forecasts** for the next months, moving beyond simple historical trend analysis.
- **External Data Integration:** Incorporate external macro-economic variables such as **Interest Rates**, **Commodity Prices**, and **Geopolitical Risk Scores** to perform correlation analysis and identify potential leading indicators for inflation spikes.
- **Drill-Through Functionality:** Implement intuitive drill-through actions within the Power BI report to allow users to navigate directly from a summary chart (e.g., a country flag) to

a detailed, country-specific dashboard page.

10. Appendix

10.1. Source Code (if any)

- All data transformation code (M-language in Power Query) and business logic (DAX measures) are self-contained and embedded within the Power BI .pbix project file.

10.2. GitHub & Project Demo Link

- https://github.com/aksp42/Power-BI-Global-Inflation-Trends

- https://drive.google.com/file/d/1CzfY-mLa_bKqKz03wZj2lwyhIKUtDYV5/view?usp=sharing