Interpretable Analysis of the Factors Influencing Gold Price Movements in Egypt (2010–2026) Using Power BI and Predictive Modeling

Graduation Project

Digital Egypt Pioneers Initiative (DEPI)

Data Analysis Track

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1. Project Proposal

1.1. Project Overview

Gold prices in Egypt experienced significant fluctuations between 2010 and 2026, influenced by a complex interplay of local and global economic factors. These fluctuations are closely linked to movements in the US dollar-Egyptian pound exchange rate, global gold prices, inflation rates, interest rates, and major political and economic events. Understanding these dynamics is crucial for investors, policymakers, and researchers seeking to interpret market behavior and predict future trends.

This project aims to provide an interpretable analytical framework for studying the factors influencing gold price movements in Egypt. Using historical data, the study will explore the relationships between gold prices and key macroeconomic indicators through exploratory data analysis and statistical techniques. The goal is not only to identify patterns and correlations but also to explain how these factors affect gold price behavior over time and the reasons for this influence.

Power BI software will be used to develop interactive dashboards that visually display trends, comparisons, and key insights derived from the data. In addition, predictive modeling techniques will be applied to forecast future gold price movements based on historical patterns and influencing variables. The project will focus on the interpretability of the models to ensure the transparency, clarity, and relevance of the results for informed decision-making. the project aims to bridge the gap between raw economic data and practical insights by integrating data visualization, logical analysis, and predictive modeling into a comprehensive business intelligence solution.

1.2. Project Objectives

- To analyze historical gold price movements in Egypt from 2010 to 2026 in order to identify long-term trends, seasonal patterns, and structural changes in the market.
- To examine the relationship between gold prices and key macroeconomic variables such as the USD/EGP exchange rate, inflation rate, global gold prices, and interest rates.
- To perform comprehensive exploratory data analysis (EDA) to detect correlations, anomalies, and significant influencing factors affecting gold price fluctuations.
- To design and develop interactive and user-friendly dashboards using Power BI that effectively visualize trends, comparisons, and analytical insights.
- To build and evaluate predictive models (e.g., regression or time-series forecasting) for estimating future gold price movements based on historical data.
- To ensure model interpretability and provide clear, data-driven insights that support informed decision-making for researchers, analysts, and stakeholders.

1.3.Project Scope

In Scope:

- Data collection from reliable economic sources.
- Data cleaning and preprocessing.
- Exploratory Data Analysis (EDA).
- Dashboard development using Power BI.
- Predictive modeling (Regression / Time Series).
- Performance evaluation of the model.

Out of Scope:

- Real-time trading system.
- Automated investment recommendations.
- Financial advisory services.

2. Project Plan

2.1.Timeline

Table 1 Timeline

Phase	Duration	Description
Phase 1	Week 1–2	Data Collection
Phase 2	Week 3-4	Data Cleaning & Preprocessing
Phase 3	Week 5–6	Exploratory Data Analysis
Phase 4	Week 7-8	Dashboard Development in Power BI
Phase 5	Week 9-10	Predictive Modeling
Phase 6	Week 11	Evaluation & Final Presentation

2.2.Milestones

- Data successfully collected and cleaned
- Dashboard prototype completed
- Predictive model built
- Final dashboard published
- Final report submitted

2.3.Deliverables

- Cleaned dataset
- Power BI interactive dashboard
- Predictive model results
- Final project report
- Presentation slides

2.4.Resource Allocation

Table 2 Resource Allocation

Resource	Usage
Power BI	Dashboard creation
Excel / Python / SQL	Data preprocessing & modeling
Economic data sources	Data collection
Laptop / PC	Development environment

3. Task Assignment & Roles

Table 3 Task Assignment & Roles

Team Member	Assigned Role	Responsibilities
Yousef Mostafa Attallah	KPI DAX & Predictive Modeling Specialist	Define and monitor Key Performance Indicators (KPIs), develop predictive models for forecasting gold price movements, evaluate model performance, and ensure interpretability of results.
Omar Raafat Hamed	Data Collection & Validation	Collect data from reliable economic sources, verify data accuracy, and ensure consistency and completeness.
Abdulrahman Mohammed Mahmoud	Data Preprocessing Specialist	Perform data cleaning, handle missing values, transform and prepare datasets for analysis.
Mohamed Essam Abdelhakim	Exploratory Data Analyst	Conduct exploratory data analysis (EDA), identify trends, correlations, and influencing factors.
Abdulrahman Ahmed Ibrahim	Power BI Developer	Design and develop interactive dashboards, create data models, and optimize visualizations.
Ahmed Atef Mohamed	Documentation & Presentation Coordinator	Prepare project documentation, compile the final report, and design the project presentation.

4. Risk Assessment & Mitigation Plan

Table 4 Risk Assessment & Mitigation Plan

Risk	Impact	Mitigation Strategy
Missing data	High	Use interpolation & trusted backup sources
Data inconsistency	Medium	Cross-validation between sources
Model inaccuracy	High	Try multiple models & tune parameters
Time delay	Medium	Weekly progress tracking

5. KPIs (Key Performance Indicators)

5.1.Price Performance KPIs

- Current Gold Price
- Average Gold Price (Monthly / Yearly)
- Highest Price (All Time / Yearly)
- Lowest Price (All Time / Yearly)
- Year-over-Year Growth Rate (%)
- Month-over-Month Growth Rate (%)
- CAGR (Compound Annual Growth Rate)
- Price Range (High – Low)
- Standard Deviation (Volatility Measure)
- Coefficient of Variation

5.2. Economic Comparison KPIs

5.2.1. (USD/EGP)

- Correlation Coefficient (Gold vs USD Rate)
- Elasticity of Gold to USD
- % Impact of USD Fluctuation on Gold

5.2.2. Compare the global gold price

- Correlation with Global Gold Price
- Spread (Local – Global Price)
- Exchange Rate Adjusted Difference

5.2.3. compared to inflation

- Correlation with Inflation Rate
- Real Gold Return (Adjusted for Inflation)
- Inflation Hedge Effectiveness Index

5.2.4. Compared to the interest rate

- Correlation with Interest Rate
- Gold Performance During High vs Low Interest Periods

5.3.Trend & Structural Analysis KPIs

- Moving Average (30 / 90 / 180 Day)
- Trend Strength Indicator
- Breakout Detection Count
- Structural Break Points
- Seasonal Index

5.4.Risk & Volatility KPIs

- Volatility Index
- Maximum Drawdown
- Recovery Time After Crash
- Value at Risk (VaR)
- Price Shock Frequency

5.5.Predictive Model KPIs

- R^2 Score
- RMSE
- MAE
- MAPE
- Forecast Accuracy (%)
- Residual Analysis Mean
- Feature Importance Ranking
- Forecast Confidence Interval Width

5.6.Dashboard Performance KPIs

- Dashboard Load Time
- Data Refresh Success Rate
- Query Execution Time
- User Interaction Count

5.7.Comparative Scenario KPIs

- Gold Performance Before vs After Major Economic Events
- Gold Growth During Currency Devaluation
- Gold Performance in Crisis Periods
- Pre-2016 vs Post-2016 Analysis