



MODELLING THE IMPACT OF OIL PRICES AND STOCK MARKET PRICES ON GOLD PRICES USING LONG SHORT-TERM MEMORY (LSTM) AND VECTOR AUTOREGRESSIVE (VAR) MODELS

Examiner : PROF. MADYA DR. MOHD. SHAHIZAN
OTHMAN

Prepared by : UMMI FARIHAH BINTI ABD WAHID
MCSD231032

25 JULY 2024

BACKGROUND OF STUDY

- Gold is a valuable metal to the economy as it is said to be the main commodity to the country.
- Most often, gold is used to hedge against the macroeconomic events such as currency depreciation, inflation and deflation.
- There is a nearly common characteristic among gold, Islamic and conventional stock, and commodity markets, all of which have been commercialized as inflation hedges.
- Through an understanding of the relationship between these markets and commodities, and describing their changes over time can thus have significant implications for international investors, risk managers, and policymakers.

PROBLEM STATEMENT

- Gold price is affected by many factors, such as expected challenging economic climate in 2024, recent Covid-19 and external factors like oil prices and stock market prices.
- Past findings on the cointegration between Gold Price, Oil and Stock Market are not consistent.
- Most of the forecasted result is not applicable for future use due to different methods used and the data sources from.
- Few amount of research focusing specifically on the Gold, Oil and Stock Market Prices.

RESEARCH QUESTIONS

- How do the trends in the prices of gold, crude oil, palm oil, and the conventional stock market and Islamic stock market indexes look?
- Which variables have the cointegration to the price of gold when using the Malaysia data?
- How to forecast the price of gold by taking into account significant variables that affect the gold price?

RESEARCH OBJECTIVES

- To analyse the trend of gold price, crude oil price, palm oil price, Islamic and conventional stock market Index during year 2013 to 2023.
- To validate the causation and cointegration relationship between gold price, crude oil price, palm oil price, Islamic and conventional stock market Index using Granger Causality test, Johansen Cointegration method and Autoregressive Distributed Lag (ARDL) model.
- To forecast gold price for future years with integration of significant variables using the Long Short-Term Memory (LSTM) and Vector Autoregression (VAR) model.

SIGNIFICANT OF STUDY

1. FUTURE RESEARCHERS

- Enhance further analysis and implications of the study.

2. GOVERNMENT

- Supervising economic inflation, restoring and overcoming the black economy.

3. INDUSTRY

- Benefit to investors and investment portfolio managers.

4. PUBLIC

SCOPE & LIMITATIONS

- Covers the relationship of gold price, crude oil price, palm oil price, Islamic and conventional stock market Index in Malaysia.
- The results cannot represent other countries except Malaysia.
- Only focuses on the gold price.
- Unpredictably occurring events.

LITERATURE REVIEW

Each Variables LR

(Chai et al., 2021),
(Wen et al., 2017),
(Zaidi et al., 2021),
(Chikri & Hamiche, 2020)

(S Birruntha, 2022).
(Syahri & Robiyanto, 2020),
(Jabeur et al., 2021),

Causality & cointegration test LR

(Bent E. Sørensen, 2019).
(Abbas et al., 2017),
(Abbas et al., 2017)

(Patrick et. al, 2017),
(Thakolsri, 2021),
(Ali et al., 2022)

Forecast LR

(Azreen et al., 2017),
(Phaladisailoed and Naruetharadhol, 2019),
(Chen et al., 2020),
(Kristjanpoller et al., 2021)

LITERATURE REVIEW

RESEARCH GAP

1. Not enough attention to non-linear interactions and multivariate relationships.
2. lack of comprehensive studies compared with conventional studies Models.
3. lack of research on the effects of policy changes and macroeconomic shocks, such as the COVID-19 epidemic, major geopolitical events, or policy changes.

SOLUTIONS

1. Develop and implement LSTM and VAR models specifically designed to handle multivariate time series data.
2. Design a research study that benchmarks the performance of LSTM and VAR models against traditional econometric models such as GARCH and many more.
3. Use historical data to simulate macroeconomic shocks and policy changes within the LSTM and VAR framework, enabling the model to learn from past events and adapt its predictions.

RESEARCH METHODOLOGY

1. PROBLEM FORMULATION

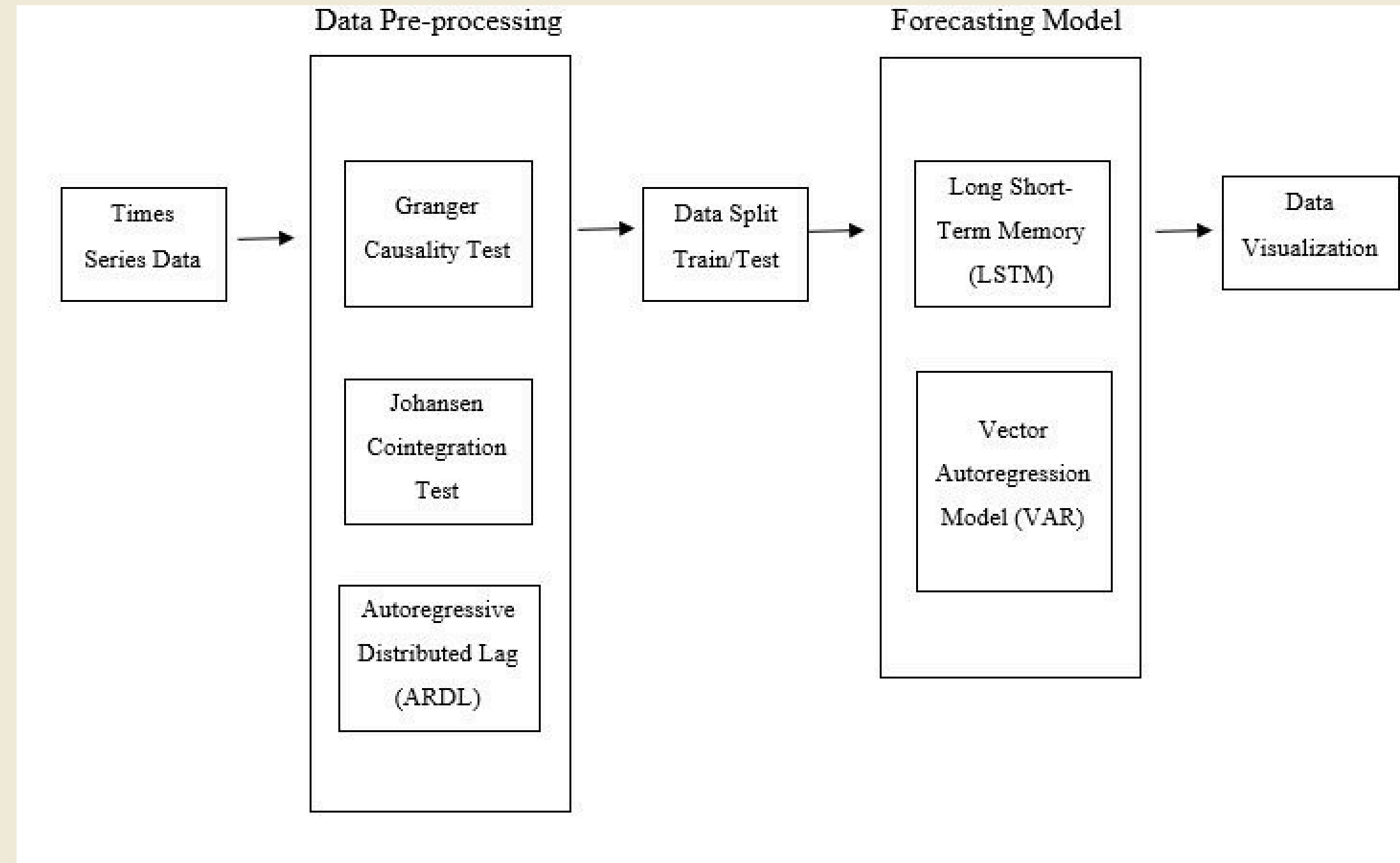
2. DATA DESCRIPTIONS

10-years period, of monthly data of gold, crude oil, palm oil, Islamic and conventional stock market from the year 2013 to 2023.

3. DATA PRE-PROCESSING

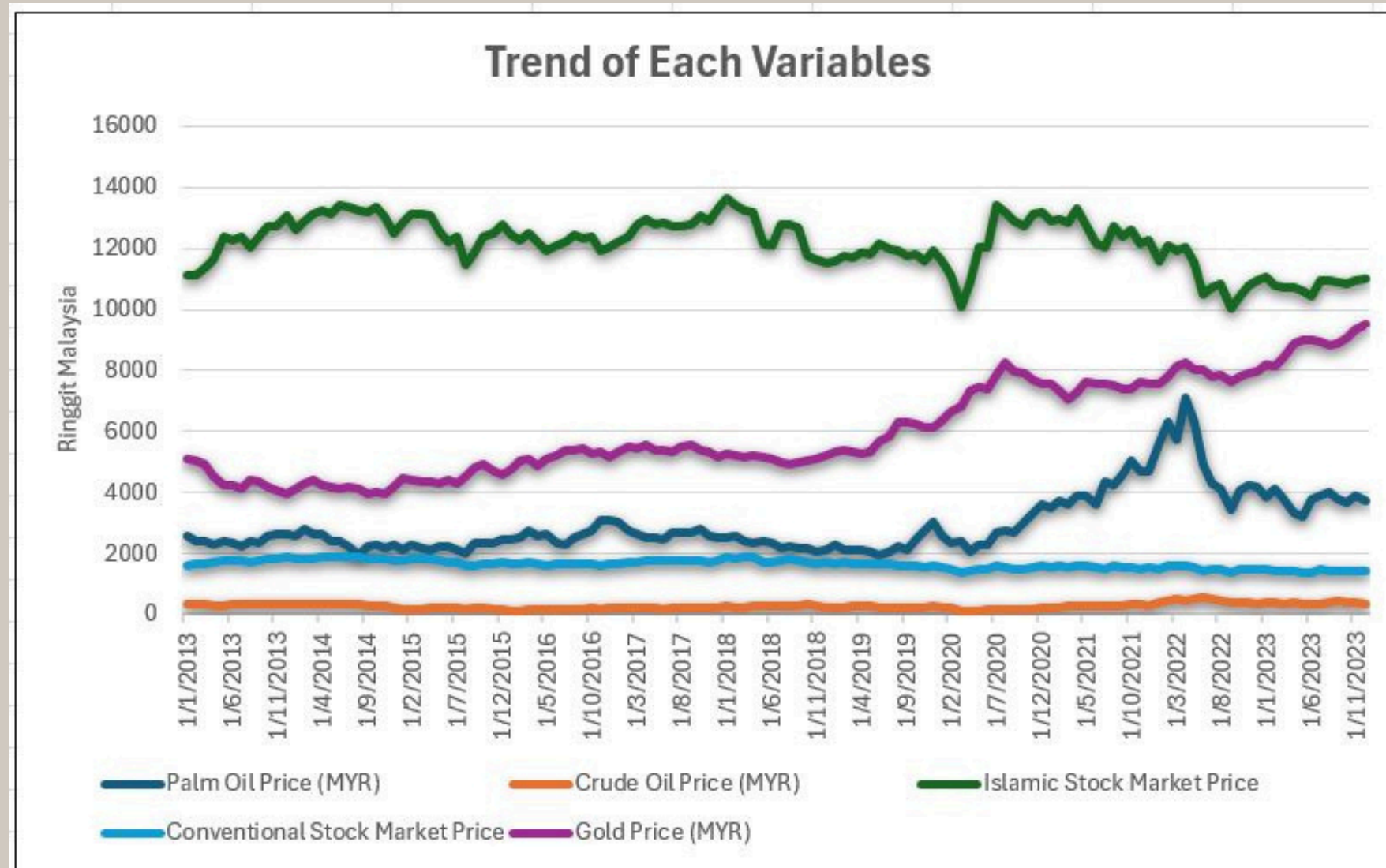
- Preliminary analysis
- Data Cleaning
- Data Concatenation
- Data Visualization

4. DATA MODELLING



INITIAL RESULT

1. TREND OF EACH VARAIBLES

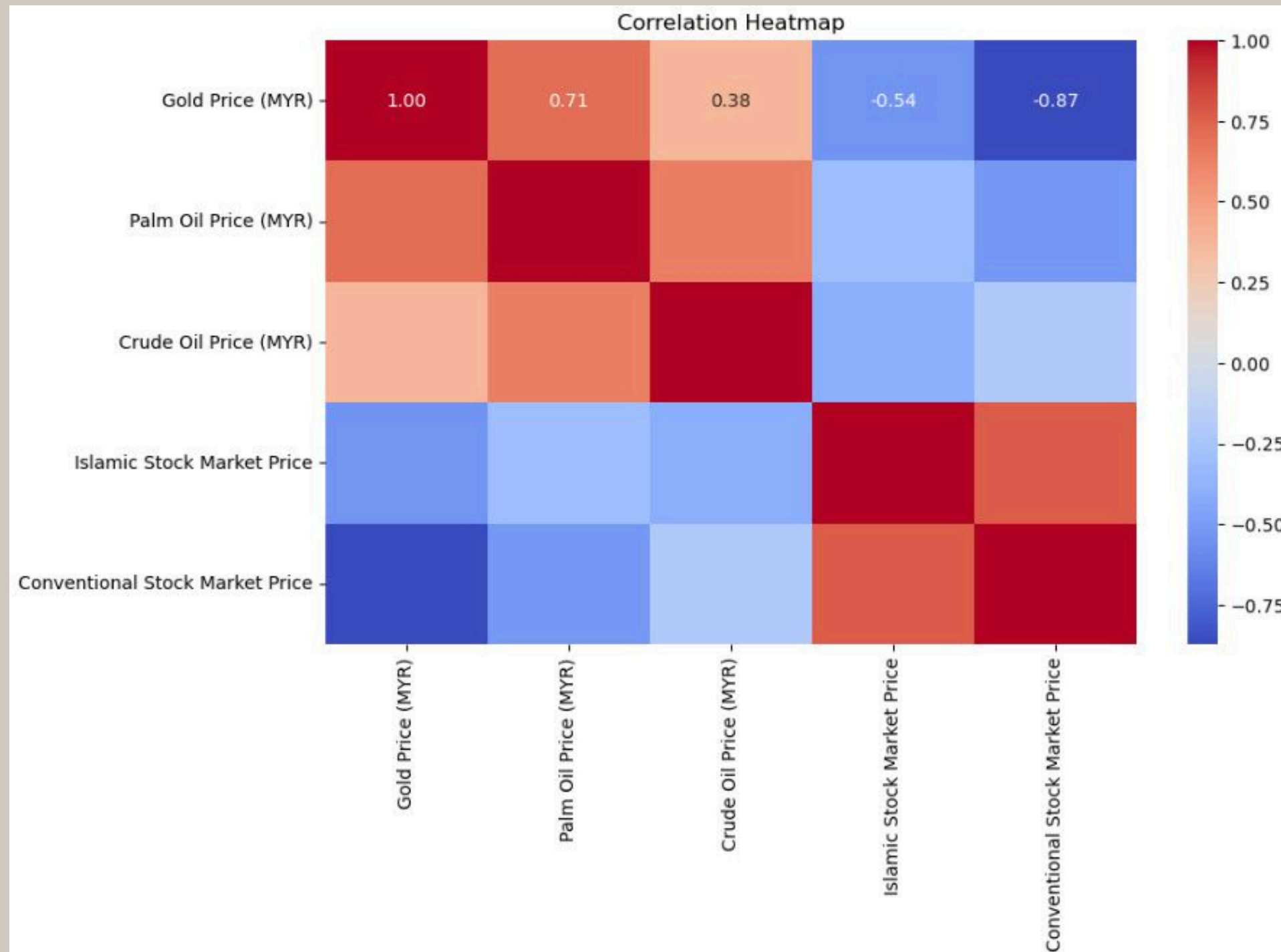


2. DESCRIPTIVE ANALYSIS

Table 4.1 Descriptive Analysis

Statistic	Palm Oil Price (MYR)	Crude Oil Price (MYR)	Islamic Stock Market Price (MYR)	Conventional Stock Market Price (MYR)	Gold Price (MYR)
count	132.00	132.00	132.00	132.00	132.00
mean	2956.55	278.57	12168.67	1649.53	6018.09
std	985.30	89.12	845.34	137.10	1565.96
min	1929.00	91.64	10008.03	1350.89	3928.61
25%	2305.75	210.73	11655.75	1555.76	4847.53
50%	2576.00	261.50	12256.17	1653.67	5377.01
75%	3517.25	338.29	12814.04	1764.22	7551.68
max	7104.00	546.13	13658.05	1882.71	9494.30

INITIAL RESULT



2.CORRELATION HEATMAP RESULT

Based on result of Correlation Heatmap test, Gold price have very positive relationship with Palm Oil Price and Crude Oil price. While, Islamic and Stock Market show negative relationship.

SUMMARY

1. TREND ANALYSIS AND ECONOMIC INFLUENCE

indicate that commodity and stock market prices are influenced by economic and financial situations.

2. COINTEGRATION AND DYNAMIC INTERACTIONS

ARDL and Johansen Cointegration test use to explore significant correlations, while Granger Causality test use to determine the direction impacts.

3. FORECASTING GOLD PRICES

LSTM and VAR models approach provides valuable insights for policymakers and investors, which help them predict market movements and make informed decisions.

FUTURE WORKS

- Gaps and Suggestions for Future Research
- Suggestions for Future Researchers
- Government and Investor Implications



THANK YOU

Examiner : PROF. MADYA DR. MOHD. SHAHIZAN
OTHMAN

Prepared by : UMMI FARIHAH BINTI ABD WAHID
MCSD231032