MINISTRY OF ECONOMY
DEPARTMENT OF STATISTICS MALAYSIA

Predictive Analysis of Malaysia's Food Price Index: An ARIMA Model Analysis

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INTRODUCTION

What is Consumer Price Index (CPI)?

Measurement of the percentage change in prices of a fixed basket that contains goods and services over time

CPI as Inflation Indicator

The CPI for Food and Non-Alcoholic Beverages (FNAB) in Malaysia has consistently stayed above 100 since June 2010, signaling ongoing food price inflation.

FNAB holds the largest weight (29.5%) in Malaysia's headline CPI, making it a major driver of the country's overall inflation rate.

OBJECTIVE

To generate the prediction ARIMA models of CPI of FNAB in Malaysia

To determine the future values of the CPI of FNAB in Malaysia 2 years ahead

METHODOLOGY

Source of Data

Monthly CPI between Jan 2011 until Aug 2023 (164 data) from DOSM

Stationarity Testing

Stationary assumptions

- Constant mean
- Constant variance
- Constant autocorrelation

ADF test

- H0: Series has unit root
- H1: Series has no unit root

Box Jenkins Methodology

Model Identification

- AR(*p*)

$$Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \ldots + \phi_p Y_{t-p} + \varepsilon_t$$

- I(*d*)

$$\Delta y_t = \Delta y_t - \Delta y_{t-1}$$

$$w_t = (1 - B) y_t$$

- MA(*q*)

$$Y_t = \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \ldots + \theta_p \varepsilon_{t-p} + \varepsilon_t$$

Model Evaluation

- Bayesian Information Criterion (BIC)

MODEL IDENTIFICATION

ADF Test: 0.9904

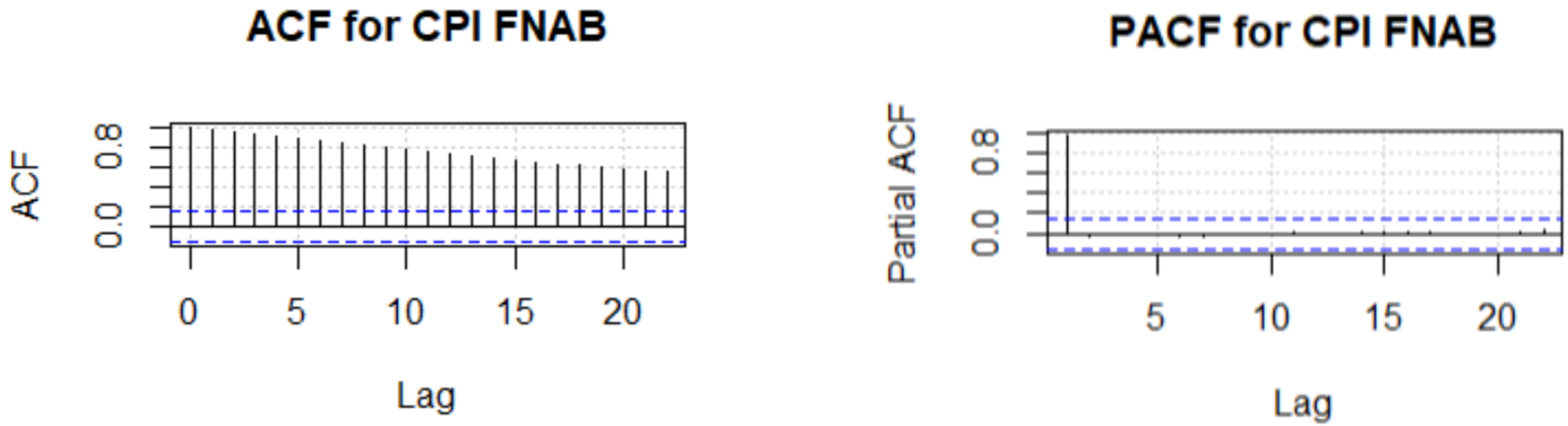

Figure 4.4: ACF and PACF series of CPI of FNAB

ARIMA MODEL ANALYSIS

MODEL IDENTIFICATION

ADF Test: 8.223962×10^−15

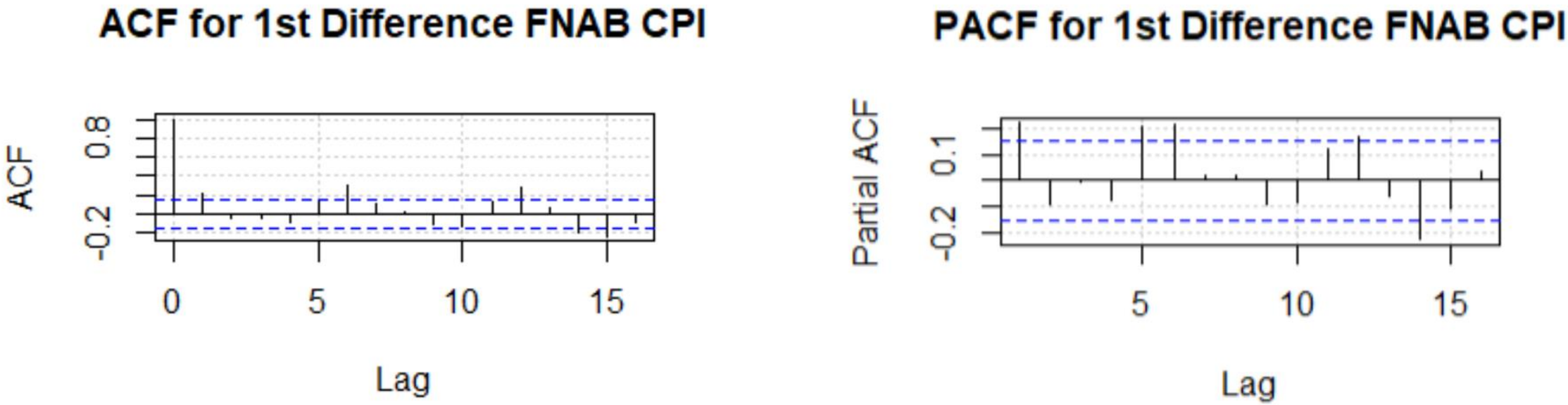

Figure 4.5: ACF and PACF series of CPI of FNAB after first-order differencing

MODEL ESTIMATION

- **ARIMA(3, 1, 2)**

$$w_t = 0.2667w_{t-1} + 0.9302w_{t-2} \cdot \cdot 0.1973w_{t-3} - -0.0067\varepsilon_{t-1} - 0.9677\varepsilon_{t-2} + \varepsilon_t$$

- **ARIMA(3, 1, 1)**

$$w_t = 0.196w_{t-1} - 0.3318w_{t-2} + 0.1319w_{t-3} - 0.9274\varepsilon_{t-1} + \varepsilon_t$$

- **ARIMA(2, 1, 2)**

$$w_t = 0.6723w_{t-1} + 0.3242w_{t-2} \quad 0.4013\varepsilon_{t-1} - 0.5181\varepsilon_{t-2} + \varepsilon_t$$

- **ARIMA(2, 1, 1)**

$$w_t = 1.2277w_{t-1} - 0.2279w_{t-2} - 0.9899\varepsilon_{t-1} + \varepsilon_t$$

- **ARIMA(1, 1, 2)**

$$w_t = 0.9999w_{t-1} - 0.7258\varepsilon_{t-1} - 0.2619\varepsilon_{t-2} + \varepsilon_t$$

MODEL EVALUATION

ARIMA Model	BIC
ARIMA(3, 1, 2)	229.4446
ARIMA(3, 1, 1)	224.2210
ARIMA(2, 1, 2)	224.1910
ARIMA(2, 1, 1)	220.9796
ARIMA(1, 1, 2)	**219.7365**

FORECAST MODEL OF CPI OF FNAB

Forecast values

- From September 2023 (152.8501), consistently rise until August 2025 (160.6154)
- Lowest 80% CI, 152.2700 while highest, 164.5163
- Lowest 95% CI, 151.7325 while highest, 166.5813

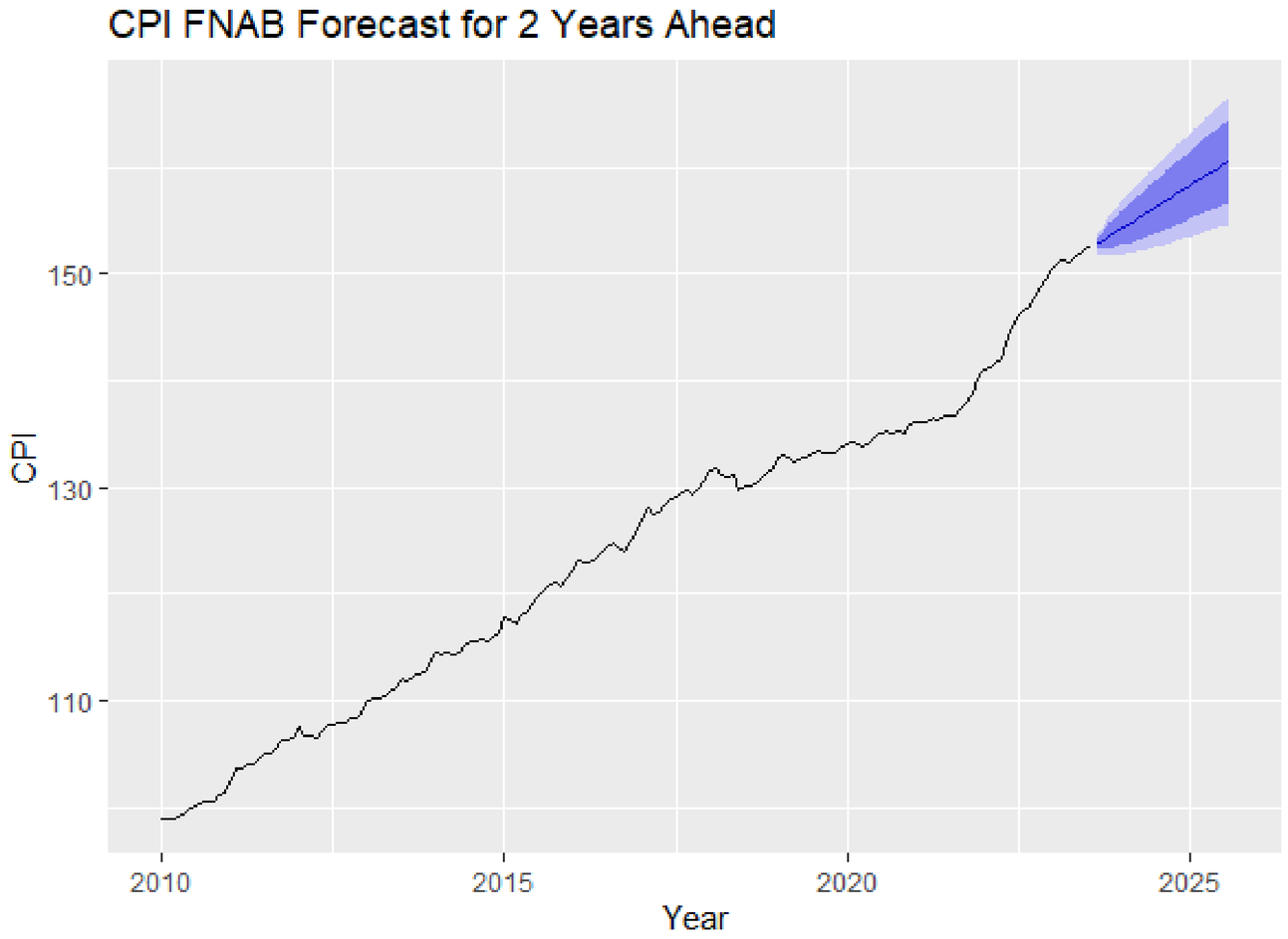

Figure 4.9: Forecast of CPI of FNAB for 2 years by ARIMA(1, 1, 2)

DISCUSSION AND CONCLUSION

FNAB's high CPI weight (29.54%) is key to understanding Malaysia's inflation.

ARIMA (1,1,2) was selected as the best model for forecasting FNAB's CPI.

The forecast shows FNAB's CPI rising steadily from 151.73 in Sep 2023 to 166.58 in Aug 2025

There's a lack of research on FNAB CPI forecasting, especially in Malaysia

Thank you