



FACTORS THAT INFLUENCE FOOD PRICE INFLATION IN MALAYSIA

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Abstract: In Malaysia, there has been a noticeable and enduring issue of food inflation in recent times, making it a prevalent concern. Given these concerns, the objective of this study is to identify the factors influencing the Malaysian food price index, specifically examining the world food price index, labour costs, the real effective exchange rate, and oil prices. The research investigates the determinants of food prices in Malaysia from the supply side, utilizing a Johansen Co-integration Test to assess the long-term relationships between these variables. Additionally, Vector Autoregression (VAR) and the Augmented Dickey Fuller (ADF) unit root test are employed. This study adopts a dynamic approach and uses quarterly time series data spanning from 1987 to 2022. The results of this study indicate that all the time series variables analysed in this investigation exhibit first-order differencing, denoted as $I(1)$, suggesting stationarity at the first difference level. Furthermore, the Vector Autoregression (VAR) test reveals that the optimal lag is at the ninth lag, as indicated by the Akaike value (AIC). The Johansen Juselius cointegration test confirms the presence of two cointegration vectors between the components and the Malaysia food price index, indicating long-term equilibrium among the variables. Additionally, the Granger causality test identifies one-way causality, with the world food price index and the real effective exchange rate influencing the Malaysian food price index, yielding probability values of 0.0037 and 0.0138, respectively. This research can provide policymakers with valuable insights into the dynamics of food price inflation in Malaysia. Consequently, it underscores the importance of the government's role in maintaining food price stability through a multifaceted approach involving various policies and measures.

Keywords: Food price inflation, food price index, labour cost, real effective exchange rate, oil price, Malaysia



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INTRODUCTION

Food price inflation refers to the increase in the cost of food over time. It is a measure of the rate at which the prices of food items are increasing in an economy. Food price inflation can have a significant impact on consumers, those with lesser incomes who spend a greater amount of their income on food, in particular. Consumers may have to spend more money on food if

food costs increase, which may limit their ability to buy other products and services. Food insecurity can also result from rising food prices, as some consumers would not be able to buy enough food to meet their basic needs (Yamauchi & Larson, 2019). Governments and policymakers often monitor food price inflation closely, as it can be an indicator of broader economic trends. High levels of food price inflation can be a sign of economic instability, while low levels of food price inflation can indicate a healthy and stable economy.

The world food price index, labour cost, real effective exchange rate and oil price are components that affect food price index in Malaysia. As a result, the recent increase in the volatility of international food prices is a major source of concern. These variable and unpredictable prices may weaken farmers' incentives to respond to high price levels with the crucial increase in production required to bring food prices down. For most price-taking developing countries, international prices are opportunity costs and are critical in determining an optimal distribution of domestic resources. When long-term international prices are slowly and inadequately transmitted to domestic markets, consumers and producers make decisions based on prices that do not accurately reflect their true social costs and benefits.

In addition, retail prices are derived from farm gate prices of basic commodities as well as processing and marketing costs. Because the food sector is still labour-intensive, the food processing bill includes a significant labour cost. As people consume more processed and prepared foods, the demand for inputs, most notably labour, rises, driving up production costs. Another contributing factor to food price inflation is the increasing demand for oil price in developed countries. According to Samal (2022), biofuels are seen as a renewable energy source, but their production competes with the production of foodstuff. Furthermore, oil prices affect food prices by influencing transportation and fertilizer costs, as well as input costs for powering equipment. In addition, the recent price deregulation of gasoline and diesel has led to the market-based determination of these prices. Oil price shocks may have an impact on domestic food prices at many stages along the supply chain, notably production, processing, and distribution at both the national and local levels.

Similarly, the real effective exchange rate is another factor that impacts food inflation in Malaysia. This rate measures the value of a nation's currency in relation to a basket of other currencies, accounting for variations in inflation levels. Moreover, a depreciation of the Malaysian Ringgit (MYR) relative to other currencies can lead to higher costs for imported food items. Malaysia imports a significant amount of its food, including items like rice, wheat, and cooking oil. When the MYR weakens, it takes more Ringgit to purchase the same quantity of foreign goods, leading to higher prices for imported foods.

Food price inflation in Malaysia, like in many other countries, has been a significant economic concern with far-reaching implications for consumers, businesses, and policymakers. This phenomenon refers to the price increases for staple foods that are sustained over time. Prior research has laid the groundwork for understanding this intricate issue, but a comprehensive synthesis of existing literature is essential to provide a holistic perspective on the subject. For example, Norazman, Khalid & Ghani (2018) conducted a study on the determinants of food inflation in Malaysia from 1991 to 2013. Hence, this study will add time series data to update the research on this topic. This study will employ monthly time series data from 2010 to 2022. Moreover, quarterly data is preferred in this study because it allows for

more detailed analysis and a finer level of granularity. Quarterly data captures shorter-term fluctuations and trends in the data, which can be missed when analysing data at a yearly level.

Understanding the factors that influence food prices is therefore vital to support the stability of such prices. In addition, a country's economy will expand if food prices are steady and predictable. To evaluate the factors that drive food price inflation in Malaysia, variables such as the world food price index, labour cost, real effective exchange rate, and oil price were used. The study's main objective is to examine the long-term effects of the determinant factors, including labour costs, real effective exchange rates, and oil prices, on the inflation of food prices in Malaysia. As a result, the following is the research hypothesis:

H_0 : There is no long-run relationship between the factors and food price inflation.

H_1 : There is a long-run relationship between the factors and food price inflation.

To attain the primary objective of this study, we will employ the time series testing approach utilized by Rambeli, Podivinsky, and Jalil (2019). The motivation for carrying out this study relates to the fact that the food price inflation in Malaysia has been a significant issue over the past years, as indicated by the continuous rise in food prices. For instance,

LITERATURE REVIEW

According to Norazman et al. (2018), Malaysia's food price inflation is mostly explained by global food commodity prices and real effective exchange rates. They look on the key factors and price transmission systems of Malaysian food inflation. Furthermore, the study used a vector error correction model (VECM) to examine the determinants of Malaysian food prices. The analysis is based on the data from 1991 to 2013 that collected monthly. According to the study, the key factors of Malaysian food prices are global food commodity prices and the actual effective exchange rate. Government pricing controls and subsidy programs, as well as industry organization, may have dampened changes in the vertical transmission channel. This discovery aligns with the research conducted by Samal, Ummalla, and Goyari (2022). Their study, which utilized monthly time series data spanning from January 2006 to March 2019, aimed to examine how macroeconomic factors influence food price inflation in India. To establish the enduring relationship among these variables, the study employed the ARDL limits testing approach for cointegration. Furthermore, it utilized the vector error correction model (VECM) to investigate causal relationships in both the short and long term. The outcomes indicate that, over the long term, global food prices have a substantial and positive impact on food price inflation. In the short term, however, the real exchange rate positively affects food price inflation, but the coefficient is statistically insignificant.

In addition, according to the research by Hasan and Mashi (2018), the long-term relation between food prices and currency rates is symmetric, but the short-term relationship is asymmetric. It is difficult for policy makers to manage the volatility of the Malaysian exchange rate to control food prices because it is the most exogenous variable in the study and Malaysia has a flexible exchange regime. Research on the impact of temperature and oil prices on food inflation in Latin American nations is done by Kose and Unal (2022) between January 2003

and December 2020. The effects of temperature change, WTI oil price, nominal exchange rate, and salaries in the agriculture sector on food prices were examined in this study using a structural vector autoregression (SVAR) model and a panel Granger causality test. In this work, the short-run model also made use of the SVAR (p) specification. Particularly in labour-intensive economies like emerging countries, labour costs play a significant role in manufacturing costs and have an impact on food prices. To investigate their impact on food costs, agriculture industry earnings were included as a variable in the study. Wages in the agriculture industry were included as a variable in the analysis to analyse their impact on food costs. According to the empirical data, wages in the agriculture industry have a direct impact on inflation, including food inflation.

Additionally, in their examination of the influence of oil prices on global food prices, Zmami and Ben-Salha (2019) identified an asymmetrical relationship. They observed that short-term adverse oil price shocks have a negligible influence on the prices of select crucial agricultural products, whereas prolonged favourable oil price shocks exert a substantial impact on the overall food price index. To investigate the repercussions of oil price shocks on food prices, they employed both linear and nonlinear Autoregressive Distributed Lag (ARDL) models to scrutinize short- and long-term effects. On the other hand, Bhattacharya and Sen Gupta (2018) utilizes a Structural Vector Autoregression (SVAR) and Structural Vector Error Correction Model framework to analyse the factors that contribute to food inflation in India, including agricultural wage inflation, oil price inflation, international prices, and the food-to-non-food pass-through effects and headline inflation from 2006 to 2013. The findings revealed that, oil price inflation has a minor influence on food inflation, with varied effects over commodities. They also stated that the recent quick spike in fuel prices has a moderate impact on food prices in India. Furthermore, it's worth mentioning that the increase in food inflation prompts labourers to request higher wages, leading to a subsequent escalation in production costs. Ibrahim (2015) also conducted research on food inflation in Malaysia. In this study, a Nonlinear Autoregressive Distributed Lags (NARDL) model was employed to examine the connections between food prices and oil prices in Malaysia. The results reveal that certain variables, such as food prices, oil prices, and real GDP, are cointegrated. Over time, a robust correlation exists between the upsurge in oil expenses and the escalation in food prices. Conversely, there is no enduring association between declining oil prices and the upswing in food prices. Moreover, it's important to note that only increases in oil prices exert a substantial short-term impact on food price inflation.

METHODOLOGY

Data Collection

This study consists of two types of variables, namely the dependent variables which is Malaysia food price index (MFPI) and the independent variables which are World Food Price Index (WFPI), Labour Cost (LCOST) and Real Effective Exchange Rate (REER). Secondary data is being used in this study. This study employed secondary data, extracted from numerous credible sources such, The World Bank, Trading Economics and The Department of Statistics Malaysia. This study makes use of quarterly data from 1987 through 2022.

Model Specification

The study's model formulation was motivated by Norazman et al. (2018).

$$\ln MFPI_{it} = \alpha_0 + \alpha_1 \ln WFPI_{it} + \alpha_2 \ln LCOST_{it} + \alpha_3 \ln REER_{it} + \alpha_4 \ln OILPRICE_{it} + \varepsilon_{it}$$

were,

$MFPI_{it}$	= Malaysia food price index for a specific 'i' and time 't'
$WFPI_{it}$	= World food price index for particular 'i' and time 't'
$LCOST_{it}$	= Real labour cost in manufacturing sector for specific 'i' and time 't'
$REER_{it}$	= Real effective exchange rate for a given 'i' and time 't'
$OILPRICE_{it}$	= Oil prices 'i' and time 't'
ε_{it}	= signifies the error term for the specific 'i' and time 't'
α_{it}	= Coefficient associated with the variables

The research methodology utilized by Rambeli, Podivinsky, and Jalil (2019) will be used in this study. The Augmented Dickey Fuller unit root test (ADF), vector autoregression analysis (VAR), Johansen Juselius Cointegration Test, and Granger Causality Test will be used in the analysis in this method.

Unit Root Test

To assess the stationarity of the data, a unit root test is employed. This test, known as the Augmented Dickey-Fuller (ADF) Test, was developed by David Dickey and Wayne Fuller. If the time series data does not exhibit stationarity at the original level, denoted as $I(0)$, the stationary characteristics can be observed in higher orders, such as the first difference, denoted as $I(1)$, or the second difference, denoted as $I(2)$. The hypotheses in the study were as follows:

Null Hypothesis (H_0): $\delta = 0$ (Unit Root Exists)

Alternative Hypothesis (H_1): $\delta \neq 0$

Decision Rule:

If the computed t^* statistic exceeds the ADF critical value, a unit root is detected, and the null hypothesis cannot be rejected. While, if the computed t^* statistic is less than the ADF critical value, a unit root is not found, and the null hypothesis must be rejected.

Augmented Dickey-Fuller Test (ADF)

Dickey-Fuller (1979) popularized the stationary test, which is used to determine the degree of integration of each variable. This test is often referred to as the unit root test. If a variable

becomes stationary after being distinguished by d times ($0 = \text{level}$, $1 = \text{first level difference}$, $2 = \text{second level difference}$), it is said to have degree of integration equal to d . The purpose of this test is to prepare for the co-integration test and to avoid false regression. A set of data is stationary when the mean is zero, the constant variant is zero, and the covariant value between two time periods is determined only within that time period rather than in real time where the covariant value is generated. The ADF test's null hypothesis is that the time series has a unit root, suggesting non-stationarity. The null hypothesis is rejected if the test statistic is considerably different from zero, indicating stationarity.

Vector Autoregression (VAR)

The study used a vector autoregression approach to determine whether a lead lag impact exists. Sims (1980) suggested VAR techniques, which can be stated in a general manner as follows:

$$y_t = v + A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t$$

where,

y_t	= Exogenous variable vector
A_1 to A_p	= Matrix of coefficients
v	= intercept vector
u_t	= White noise vector

The VAR process estimation consists of two phases. The first stage is to determine the VAR lag length (p) using specified procedures such as lag length selection criteria. The second step is to use regression analysis to estimate the numerical values for the intercept and parameters. This research is limited to determining the genuine lag length (p) using several commonly used lag length selection criteria (Liew, 2004).

Johansen Juselius Cointegration Test

Once the matching level of integration is established for each variable, the Johansen and Juselius (1990) cointegration test will be applied to ascertain the count of cointegration vectors within the equation system. This Johansen test serves the purpose of assessing the number of cointegrating vectors through an examination of the long-term relationships between the variables.

FINDINGS AND ANALYSIS

The findings of the analysis, including the Augmented Dickey Fuller unit root test (ADF), vector autoregression analysis (VAR), Johansen Juselius cointegration test, and Granger Causality Test, will be discussed in these sections.

Unit Root Test (ADF)

Table 1 The Stationarity Test Results of the Factors Influencing Food Price Inflation in Malaysia

Time series data	Level	Trend and intercept	1st Difference	
	Intercept		Intercept	Trend and intercept
MFPI	-2.327638 (Lag 7)	-0.138510 (Lag 9)	-5.094013 (Lag 8)	-5.897076 (Lag 8)
WFPI	-1.013352 (Lag 9)	-2.042408 (Lag 9)	-5.415582 (Lag 7)	-5.379243 (Lag 7)
LCOST	-2.558589 (Lag 7)	-1.788583 (Lag 9)	-7.496578 (Lag 9)	-5.594485 (Lag 9)
REER	-0.824710 (Lag 9)	-3.060579 (Lag 9)	-4.304796 (Lag 7)	-4.277349 (Lag 7)
OILPRICE	-1.684078 (Lag 9)	-2.446116 (Lag 9)	-12.84597 (Lag 9)	-12.79491 (Lag 9)

Note: Numbers in parentheses are lag orders selected based on AIC.

The results of ADF unit root tests, both at levels and at first differences, are shown in Table 1. This unit root test considers the random walk model with intercept, trend, and intercept. Table 1 also displays the statistical results of the t-test for all data series examined, namely the Malaysia Food Price Index (MFPI), the World Food Price Index (WFPI), the Labour Cost (LCOST), and the Real Effective Exchange Rate (REER). The study's findings demonstrate that all the time series data used are non-stationary. This demonstrates that the series is not stationary at the level. As a result, none of the time series data used are $I(0)$ data. As a result, the test proceeds with the first difference. In terms of the unit root test for macroeconomic data, the conclusions given in this study appear to be similar with prior works by Norazman et al. (2018).

Vector Autoregression (VAR)

Table 2 The findings of a Vector Autoregression (VAR) test study on the factors influencing Malaysian food price inflation.

VAR	AIC MALAYSIA
2	-23.96892
3	-23.87282
4	-23.56333
5	-24.63510

6	-24.62688
7	-24.51820
8	-24.50165
9	-24.75734
10	-24.69645
11	-24.62318
12	-24.43712

Note: Note that the numbers in bold are the lowest sequences chosen based on AIC.

Table 2 shows the Akaike Information Criteria (AIC) value is used to present the outcomes of each lag from Lag 2 to Lag 12. Malaysia's optimal AIC value is at lag 9, with an AIC value of -24.75734.

Johansen Juselius Cointegration Analysis

Table 3 The Johansen Juselius Test Results on the Factors Influencing Food Price Inflation in Malaysia

Hypothesis			5%	1%		5%	1%
H0	H1	λ Trace	critical value	critical value	λ Max	critical value	critical value
r=0	r=0	94.77009**	68.52	76.07	40.60230**	33.46	38.77
r≤1	r>1	54.16779*	47.21	54.65	28.29102*	27.07	32.24
r≤2	r>2	25.87678	29.68	35.65	14.64914	20.97	25.52
r≤3	r>3	11.22764	15.41	20.04	9.954298	14.07	18.63
r≤4	r>4	1.273344	3.76	6.65	1.273344	3.76	6.65

Notes: *** Signifies statistical significance at the 1% level, ** signifies statistical significance at the 5% level, and * signifies statistical significance at the 10% level.

Table 3 presents the outcomes of the cointegration test. The test assumes that the cointegration equation consists solely of intercepts. We determined the optimal lag value for this cointegration test using the same Akaike's criteria (AIC) as employed in the unit root test. Furthermore, these findings confirm the existence of at least one cointegration vector between the variables and food price inflation in Malaysia. This demonstrates that the variables are in long-term equilibrium. The presence of this cointegration indicates that the link between the components and the food price index is not 'spurious,' and that a long-term equilibrium exists. Table 3 presents the results of Johansen's cointegration test for the factors influencing Malaysian food price inflation from 1987 to 2022. The trace statistic and Max- Eigen Statistic

are compared to the associated critical values in this investigation. The trace statistic results indicate two cointegrating equations at 1% and 10% significance levels. The Max-eigenvalue test, on the other hand, reveals two cointegrating equations at 5% and 1%. As a result of the findings, it is possible to conclude that there exist two cointegration vectors that display a long-run relationship.

Granger Causality Test

Table 4 Results of the Granger Causality Test on the Factors that Influence the Food Price Inflation in Malaysia

Null Hypothesis	F-Statistic	P value
WFPI does not Granger Cause MFPI	3.73715	0.0037**
MFPI does not Granger Cause WFPI	1.14452	0.3415
LCOST does not Granger Cause MFPI	1.55414	0.1793
MFPI does not Granger Cause LCOST	0.87874	0.4980
REER does not Granger Cause MFPI	3.01544	0.0138*
MFPI does not Granger Cause REER	1.25293	0.2897
OILPRICE does not Granger Cause MFPI	0.81126	0.5441
MFPI does not Granger Cause OILPRICE	0.75301	0.5857

Notes: *** Indicates significance at 1% ** Indicates significance at 5% and * Indicates significance at 10%

To determine the causation between two variables, the Granger causation Test is utilized. This analysis attempts to discover the direction of causation and which factors cause the other variables where Granger is present

The Granger causality between MFPI, WFPI, LCOST, REER, and OILPRICE is shown in Table 4. The result for WFPI demonstrates that the null hypothesis that WFPI does not Granger cause MFPI is rejected at the 5% significance level with a probability value of 0.0037, implying that the Granger causation runs from WFPI to MFPI. This outcome is consistent with the anticipation that a higher global food price index would lead to an increase in Malaysia's food price index. This finding is also compatible with previous research, such as those of Norazman et al. (2018) and Samal et al. (2022). The null hypothesis, on the other hand, MFPI does not Granger Cause WFPI is failed to be rejected at any significance level (1%, 5% and 10%) thus concluding that MFPI does not Granger Cause WFPI.

Furthermore, the LCOST result demonstrates that the null hypothesis that LCOST does not Granger cause MFPI is not rejected because the p-value is greater than any significance level of 1%, 5%, or 10%, implying that LCOST does not Granger cause MFPI. According to Shapiro (2023), labour costs do not directly contribute to inflation. This is based on the observation that rising labour costs do not always result in increased demand for food, which could have an indirect impact on pricing. Changes in labour costs have a slow and long-term impact on food prices. In other ways, the null hypothesis that MFPI does not Granger cause LCOST is not rejected because the p-value is greater than any significance level (1%, 5%, or

10%), implying that MFPI does not Granger cause LCOST. However, these findings are contrary with the studies by Kose and Unal (2022). The findings revealed that labour cost can directly impact food price index.

Additionally, the result for REER shows that the null hypothesis that REER does not Granger Cause MFPI is rejected at 10% significance level with the probability value is 0.0138, concluding that the Granger cause run from REER to MFPI. This finding shows that the REER would lead to enhance the food price index in Malaysia. A depreciation in the exchange rate leads to an increase in the value of the domestic currency, making imported goods more expensive. This higher cost of imports contributes to inflation, particularly in countries that are significant importers of food. This finding is in line with the study conducted by Hasan and Mashi (2018). However, the null hypothesis that MFPI does not Granger Cause REER is failed to be rejected at any significance level at 1%, 5% and 10%. Therefore, it concluded that MFPI does not Granger Cause REER in Malaysia.

The result for OILPRICE indicates that the null hypothesis, suggesting that OILPRICE does not have a Granger-causal relationship with MFPI, is not rejected. This is due to the p-value exceeding the significance levels, implying that OILPRICE does not have a Granger-causal effect on MFPI. This outcome aligns with the findings of Kliesen (2021), which concluded that there exists a moderate correlation between oil prices and food prices, especially in price indexes with a more substantial energy component. Similarly, the result for MFPI not Granger-causing OILPRICE also fails to reject the null hypothesis across significance levels of 1%, 5%, and 10%.

CONCLUSION, POLICY IMPLICATION AND RECOMMENDATION

In summary, this research investigates the factors influencing the food price index in Malaysia from 1987 to 2022. The independent variables include the world food price, labour costs, the real effective exchange rate, and oil prices, while the dependent variable is the food price index in Malaysia. The Johansen Juselius Test revealed a long-term relationship among these variables, with the presence of two cointegration vectors. Additionally, the Granger causality analysis indicated a one-way causal relationship from the world food price index to the Malaysia food price index. This suggests that changes in global food prices can significantly impact the Malaysian index. Furthermore, the Granger causality results for labour costs and oil prices did not show a relationship with the Malaysia food price index in the dataset used for this study. However, in the case of the real effective exchange rate, there was a unidirectional causality from the real effective exchange rate to the Malaysia food index. This finding underscores the influence of the real effective exchange rate on food inflation and highlights the significant role that exchange rates play in determining the costs of imported food items. Based on these research findings, several recommendations related to Malaysian food prices could be proposed and implemented.

The findings of this study could encourage the government to conduct a combination of policies to maintain the food price inflation in Malaysia. For example, by trade policies. The government should regulate imports and exports of food products to stabilize domestic prices, such as restrict exports during shortages and increase imports during surpluses. The government should step its efforts to control the export of food items and reduce import tariffs on food. This

strategy aims to stabilize domestic food prices by ensuring sufficient supply and preventing profiteering by food exporters and wholesalers. Moreover, the government can support the farmers by providing the subsidies to farmers to support the production of essential food crops and reduce production costs.

Some limitations of this study include the method used, the data and the variables employed. Future researchers are encouraged to investigate on different countries with the same framework about this topic, which might be the difference in the context and scope. Furthermore, future researchers also can design another framework using other variables such as demand-side to see more aligned results. Future studies can also use other appropriate research methods to see the differences or similarities of the findings obtained by studying different time periods.

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