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The Implications of Palm Cooking Oil Price Increases in Malaysia

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ABSTRACT

Domestic palm oil consumption in Malaysia increased to about 3.37 million metric tons in 2022. This number is expected to increase further due to population growth and consumer preferences for palm oil cooking oil. However, in 2016, the government withdrew its subsidy on palm cooking oil, increasing its price by 48.9%. Recently, the government proposed to use a floating price for palm cooking oil. These changes have left direct and indirect impacts on food producers and consumers. Therefore, this paper examines the impact of an increase in the price of palm cooking oil on food producers (directly) and consumers (indirectly). This study applied the Leontief price modelling technique and simulated a scenario for the price changes in the production cost. The simulation results indicated that costs and prices changed. The results found that the most significant cost change came from restaurants, 52.0%, while other price changes were from oil palm (29.6%) and restaurants (17.4%). This study also used the profit index to calculate the profit food producers and services gained. Based on this scenario, food producers should revise their prices of goods and services since they still gain profit. It was recommended that the government revise the price of palm cooking oil by providing subsidies or incentives to the food producer or consumer. The fluctuation in palm oil prices impacts the price of palm cooking oil in the market. If the government does not revise cooking oil prices, it will affect food consumers and producers.

Keywords: Cooking oil, key sector, Leontief price model, palm cooking oil, simulation

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INTRODUCTION

Malaysia was an agricultural nation before transforming into an industrialised nation over the last few decades. Despite an emphasis on technological modernisation since the early 2000s, the agricultural sector has emphasised the mantra, 'Agriculture is business'. This slogan refers to transforming agricultural activity into a business activity that concentrates on self-sufficiency and is profitable for farmers. This activity aims to transform Malaysia into an industrial and modern agricultural nation after decades of industrialisation to improve national food security and bolster exports. Most basic crops and foods like rice, vegetables, coffee, and cocoa are suitable for cultivation in Malaysia. Thus, this country can reduce food imports if domestic food needs are sufficient. However, palm oil is the country's focus over other crops like rice and vegetables.

According to the Department of Statistics Malaysia (2020), palm oil has been the focal point of growth, followed by paddy, pineapple, sugar cane, cocoa and other minor crops. From agriculture activities, the palm oil industry is the major contributor to the gross domestic product (GDP) from the agriculture sector at 35.2% in 2021, followed by other agriculture (29.3%), livestock (16.7%), fishing (11.3%), rubber (2.3%) and forestry and logging (5.2%). The agriculture sector of Malaysia's GDP was led by palm oil in 2022, with 4.9% of the GDP. Other agriculture activities contributed 1.6 per cent to the country's GDP. The agriculture industry made up 8.9% of the GDP in 2022.

The palm oil industry in Malaysia is profitable, and many oil palm companies are listed on the Kuala Lumpur Stock Exchange (Basiron, 2008). Figure 1 shows that the price of crude palm oil increased by 26.3% to USD 715 per ton in 2020 compared to USD 566 in 2019. Figure 1 shows the trend of crude palm oil with an average growth rate of 151%. It shows that as the price of crude palm oil increases, the price of crude palm oil will also increase because cooking oil is derived from palm oil.

One of the leading products produced by the palm oil industry is oils and fats, including cooking oil, which fulfil the basic needs of consumers and food products and services in Malaysia, contributing to the changes in food production costs and prices. Most consumers in Malaysia use palm cooking oils in their daily meals compared to other seed oils and fats such as canola oils, olive oil, sunflower oil and grape seed oil. According to Izzah et al. (2015), 90% of consumers prefer to consume palm cooking oil due to its affordable price. The quality of palm cooking oil is equivalent to other oils and fats in the market, regardless of the price. Based on a study by Mayada and Juwita (2023), the increase in the price of cooking oil influences the change in food consumption patterns, which is a decrease in the consumption of some food needs other than cooking oil.

Undoubtedly, cooking oil is the most important input in the production process and consumers' daily cooking. In the past, cooking oil was subsidised, and the price was still reasonable for most household

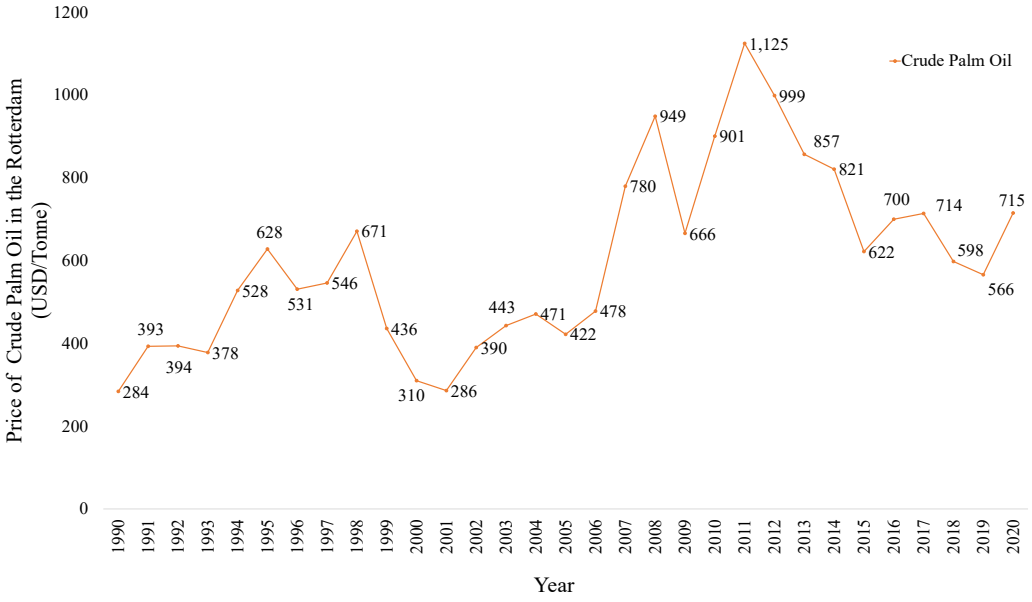

Figure 1: Price of crude palm oil in the Rotterdam (USD/Tonne)

consumers. However, if the subsidy is removed, the price of palm oil will follow the current trend of crude palm oil and become less affordable to the average household. Increasing cooking oil prices can impact the cost of living and inflation, affecting people's purchasing power. In recent years, the Malaysian government has taken steps towards reforming subsidies, including those for cooking oil. One of its goals is to relieve pressure on the government budget and ensure aid is better targeted.

On November 1, 2016, the government withdrew the subsidy on cooking oil. Therefore, the new price of cooking oil increased by almost 50%. However, the government continues to subsidise packet cooking oil by 1 kg at a selling price of RM2.50 (Saari et al., 2016). The price of cooking palm oil has directly decreased consumer purchasing power by 2% of the whole consumer food expenditure; thus, consumers' available income will likely become smaller (Saari et al., 2016). It was the first time in ten years that the price of palm cooking oil had increased in Malaysia. The price change's indirect impact refers to household expenditure on ready-to-eat food that uses cooking oil as its raw material, such as fried foods common among streetside stalls and fast-food restaurants. Due to this, low-income consumers were remarkably hurt by the rising cooking oil prices.

According to the Department of Statistics Malaysia, the Consumer Price Index (CPI) for January 2023 decreased to 3.7% from 3.8% in December 2022. Malaysia's increase in inflation in January 2023 was driven by restaurants and hotels (6.8%), food and non-alcoholic beverages (6.7%) and transportation (4%), household appliances and a collection of household

routine maintenance (3.5%); recreational and cultural services (2.7%); various goods and services (2.3%) and health (1.6%), while housing, water, electricity, gas and other fuels and education recorded increases of 1.5% and 1.3%, respectively. Meanwhile, alcoholic beverages, tobacco, clothing, and shoes trended down 0.8% and 0.5%, respectively, compared to January 2022.

In the production sector, the impact of the increase in cooking oil prices on the food producer is transmitted through the input cost. Cooking oil is a direct input cost to food industries and services sectors such as restaurants and hotels, food stalls, preserved seafood, and Small and Medium Enterprises (SMEs) food products. Consequently, food manufacturers and services also took this opportunity to increase the price of goods and services due to the increase in their cost of production since cooking oil is a significant input to their production goods and services, particularly in food manufacturing, food stalls, restaurants, and hotels. Notwithstanding, producers aim to maximise profits by minimising production costs (Mankiw, 2007). Due to increasing cooking oil prices, producers are willing to use recycled cooking oil rather than new processed cooking oil to maintain their quantity of goods and services but ignoring the health issue of consumers' well-being. In Malaysia, there is rising worry about food safety due to the increasing tendency to combine fresh and old cooking oil. Blending high-quality edible cooking oil with recycled oil has become more common in recent decades, driven by strong market demand and profit margins. Mixing cooking oil by replacing or combining cheaper or waste oils is an irresponsible behaviour motivated by greed. The more severe behaviour of dissolving inedible plastic in non-hot oil while frying to boost crispness and lengthen the shelf life of fried treats has been a growing concern.

According to Datuk Nadzim Johan, Activist Chief of the Malaysian Muslim Consumer Association, over 90% of restaurants and food stalls in Malaysia use recycled cooking oil (Ismail, 2013). Ethical producers or sellers should be concerned about consumers' health as it can trigger health-related problems like cancer and other diseases. This recycled cooking oil from around the country benefits third parties, earning millions of dollars. In the end, it was the consumers that had to pay a high price. The importance of perceived consumer efficacy in consumers' environmental and ethical awareness and utilisation of associated food product information must be considered (Lieke et al., 2023). Consumers may choose differently depending on criteria, including price, fat content, brand, flavour, oil source, advertising, and peer pressure. The unsaturated fats in cooking oil oxidise when heated, which is the most significant issue in health awareness (Kumaran, 2023).

Meanwhile, consumers become stressed by the high price of goods and services. Therefore, this study uses the Leontief price modelling technique to examine the impact of the increasing price of palm cooking oils in Malaysia and identify which sector gains the highest profit due to increased palm cooking oil prices.

Main Features of the Palm Oil Industry

Malaysia became the world's second leading exporter of palm oil after Indonesia in 2017. As the world's second-largest palm oil producer after Indonesia, Malaysia needs to capture the full potential of existing downstream opportunities and diversification to sustain its growth in the palm oil sector. Therefore, based on Jaafar et al. (2015), the Malaysian palm oil industry is more interconnected to the rest of the production sector than Indonesia (Figure 2).

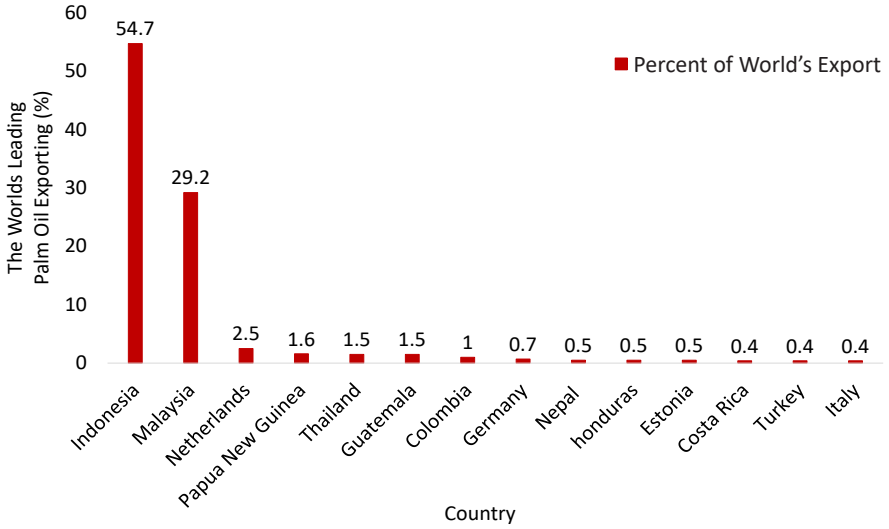

Figure 2. The world's leading palm oil exporting countries, 2021

Note. Adapted from Daniel (2023)

The development of palm oil downstream can be accelerated through the palm oil industry cluster as a catalyst in establishing value chains for the palm oil industry and developing related support industries (Abdul Manan et al., 2014). The production of palm oil downstream, including palm milk, should be domestically and internationally commercialised. Palm milk has many advantages, including low cholesterol, low fat, durability, viability and safety. The Ministry of Primary Industries targeted domestic consumption of palm products and commodity-based downstream products to increase by 10% through the 'Love My Palm Oil' promotion campaign.

Malaysia's principal agency that highly supports and promotes activities downstream is the Malaysia Palm Oil Board (MPOB). The primary role of these agencies is to carry out the task of strengthening the private sector as a critical role in promoting the palm oil industry (Yasin et al., 2017). Ali et al. (2015) proposed solid biomass

residues and liquid effluent as a new green downstream industry that could be created through an integrated biorefinery concept.

In terms of demand, the export volume of Malaysia's palm oil increased in 2018 compared to 2017. Palm oil exports increased significantly by 6.6% to 24.82 million tonnes compared to 23.29 million tonnes recorded in 2017. It contributed to 2.83 million tonnes or 17.6% of total Malaysian palm oil in 2017, followed by the European Union and China, accounting for 2.06 and 1.88 million tonnes, respectively (Figure 3).

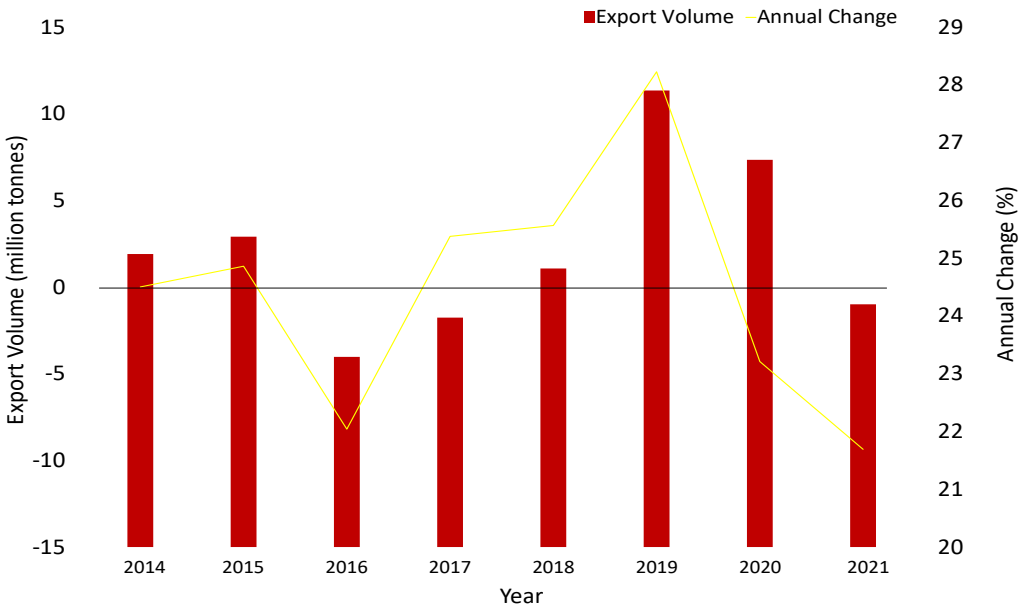

Figure 3. Export of palm oil products (million tonnes) and its growth in 2021

Note. Adapted from MPOB (2021)

The export of palm oil during the period was due to the increase in palm oil demand by major importing countries such as India, Pakistan, China and the European Union. Nonetheless, export to India remains the largest market.

Literature Review

Malaysia's history in the palm oil industry started in 1917 when the dura palm oil of Dura (thick shell) from Rantau Panjang, Selangor, was planted in the Tenmaran Estate, Kuala Selangor. Commercial cultivation began with several kinds of research to understand the inheritance of oil palm fruit. The government introduced oil palm cultivation in Malaysia to eradicate poverty among the rural population. In the 1960s, the Federal Land Development Authority (FELDA) opened new lands to explore and become oil palm estates. The positive growth of industries related

to downstream activities can create job opportunities for poverty eradication (Abdullah et al., 2009).

The palm oil industry employs over 600,000 people, including highly skilled and low-skilled labour. Research and innovation activities have also added new jobs for Malaysians every year. The country created over 66,000 new job opportunities and improved the sector's contribution to the gross national income (GNI) of RM 30 billion (USD 9.5 billion) under the 1Malaysia Biomass Alternative Strategy (1MBAS). It shows that Malaysians have benefitted from the growth and profitability of the palm oil industry. Compared to Indonesia, the main goal of the New Order regime is to revitalise the plantation sector to increase export earnings, utilise land and create job opportunities on the outer islands (Badrun, 2011; Zen et al., 2016).

Among the products produced is palm cooking oil, which has advantages over other oils such as soy, olive, sunflower and coconut (Peng et al., 2017). Cooking oil is essential for many Asians, especially Malaysia and Indonesia (Dauda et al., 2021; Noor & Hua, 2016). Malaysia is also the world's second-largest producer of palm cooking oil, trailing only Indonesia (Sarjadi et al., 2019). The Malaysian habit is not separated from the use of cooking oil in preparing many types of cuisine due to its low cost and high oxidative stability when used for frying (Ling et al., 2022; Yaakob et al., 2013). Bakeri et al. (2020) claim that internal and external perceptions, nationality traits, and local variables like social factors, products, and governmental regulations may affect consumer behaviour regarding food oils. Regardless of these factors, the demand for vegetable oil has increased due to population growth. This increase, exacerbated by the advent of its usage in biofuels, has led to land use change from tropical forest to oil palm production (Jones et al., 2018).

Various instances showed the increase in the price of goods and associated price changes in other goods and services. Extensions of a standard Leontief model included the input-output (I/O) price models by Sharify and Sancho (2011) and Sharify (2013), which studied the price shock effect from taxation and subsidies on general prices. Liew and Liew (1988) applied the I/O variable model to measure the impact of primary input prices on prices and outputs. Dietzenbacher (1997) proposed an alternative interpretation by suggesting the Ghosh model be viewed not as a quantity model but as a price model, which was in other discussions on alternative interpretations of the Ghosh model (De Mesnard, 2007; Miller & Blair, 2009; Oosterhaven, 1996). Ghosh's price model and Leontief's price model showed the same results (Miller & Blair, 2009).

There is minimal study on the impact of oil and fat prices, but there are many studies on the impact of petrol products and electricity prices and energy consumption in Malaysia (Bekhet & Abdullah, 2010; Chik et al., 2017; Saari et al., 2016). Lim

and Yoo (2013) showed that an increase in electricity price by 10% in the Korean economy is estimated to be 0.4367% using the input-output price model. Logar and van den Bergh (2013) focused on the tourism sector and found that rising oil prices led to declining demand for tourism services in Spain, such as the air, water, land, and rail transport sectors. However, Filipski et al. (2017) observed the impact of saffron price volatility on the Morocco economy using unique micro-household data and local economy-wide modelling methods extended from Taylor and Filipski (2014).

METHODOLOGY

Price theory is used as the underpinning theory in this study. Price theory focuses on how supply and demand interact to form market prices. The price theory aims to explain how prices are formed. It is explained in microeconomics by the law of demand, the law of supply, and their equilibrium in individual markets and across markets. In setting policies such as fiscal and monetary policy, the government must consider market forces, as in macroeconomics like wages and interest rates, to determine the price of certain goods, including the price of cooking palm oil. Regarding consumer demand, firm supply, and market factors, price theory aims to understand, explain, and predict prices and pricing decisions.

This study used the Malaysia input-output (I/O) table (2010) from the Department of Statistics Malaysia. In Malaysia, the Economic Census is conducted every five years; therefore, the I/O table is constructed and published by the Department of Statistics every five years. The I/O tables for 1978, 1983 and 1987 consist of 60 sectors, but the latest table for 2010 was extended into 124 sectors. This change indicates that the more recent IO tables provide a more detailed sectoral breakdown due to the diversification of economic activities and expansion of the economy. In the input-output table, palm oil (refined palm oil) is placed under refined palm oil to manufacture vegetable and animal oils and fats, a part of the manufacturing sector. By referring to the MSIC 2008 Ver.1 standard, refined palm oil is classified under item 15143.

Input Output Price Model

This study focused on the impact of an increase in the price of palm cooking oil on consumers. Producers and consumers are likely to be affected if the effects of higher oil and fat costs are simultaneously considered. This study simulates the impact of an increase in the price of palm cooking oils by 48.9% as the main scenario. This percentage is derived from the price ratio of subsidy withdrawal in cooking oil palm. This study applied the input-output price model in a 124 x 124 matrix form (Department of Statistics Malaysia, 2010). Similar to the quantity model, the price model distinguishes between endogenous and exogenous components (Chik et al., 2017; Miller & Blair, 2009; Saari et al., 2016). The endogenous component was the

Leontief inverse matrix, while exogenous components were the costs of primary inputs. The exogenous expenditure coefficients (vector **a = m + l + v + t**) were split into coefficients for imported products (m), Labour (l), Value added (v) and taxes (t). Leontief inverse matrix was transposed, and the exogenous cost vector was expressed in column vectors instead of row vectors. Therefore, the solution for the price model was represented by the following equations:

$$P = (I\text{-}A)^{-1\prime} (mp_m + lp_l + vp_v + tp_t) \quad \text{Equation (1)}$$

$$P = L' (mp_m + lp_l + vp_v + tp_t) \quad \text{Equation (1a)}$$

$$P = L' (m + l + v + t) \quad \text{Equation (1b)}$$

Where P is the price vector for a particular sector, A' is a transposition of the input-output coefficient matrix, while pm, pl, pv, and pt are the price vectors of import coefficient, labour, value-added and indirect tax, respectively. m, l, v, and t are denoted as import coefficient (import per unit of output), labour coefficient (the composition of employees per unit of output), value-added coefficient (value-added per unit of output), and indirect tax coefficient (tax per unit of output), respectively. From Equation 1 to Equation 1b, the base year's primary input (costs) coefficient was calculated.

Equation 2 was represented in matrix form as follows:

$$\begin{bmatrix} P_1 \\ \vdots \\ P_6 \\ \vdots \\ P_{124} \end{bmatrix} = \begin{pmatrix} (1-a_{11}) & \cdot & -a_{16} & \cdot & -a_{1124} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ -a_{61} & \cdot & (1-a_{66}) & \cdot & -a_{6124} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ -a_{1241} & \cdot & -a_{1246} & \cdot & (1-a_{124124}) \end{pmatrix}^{-1} \begin{bmatrix} m_1 + l_1 + c_1 + t_1 + a_{16}P_6 \\ \cdot \\ \cdot \\ m_6 + l_6 + c_6 + t_6 + a_{66}P_6 \\ \cdot \\ \cdot \\ m_{124} + l_{124} + c_{124} + t_{124} + a_{1246}P_6 \end{bmatrix}$$

In both equations, the variable on the left side was considered endogenous. Exogenous cost components determined the price of sectors (P1 to P124). For simulation purposes, there is a 48.9% increase in palm cooking oil products (P6 as an exogenous variable) in the country (on November 1, 2016, the government withdrew the cooking oils subsidy by 48.9% for all cooking oil brands). The increase in this price has also affected other sectors. The following equation was used to run this simulation.

$$\Delta p = L' (mp_m + lp_l + vp_v + \Delta tp_t) \quad \text{Equation (2)}$$

Then, the above matrix was rearranged as follows:

$$\begin{bmatrix} P_1 \\ \vdots \\ t_6 \\ \vdots \\ P_{124} \end{bmatrix} = \begin{pmatrix} (1-a_{11}) & \cdots & 0 & \cdots & -a_{1124} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ -a_{61} & \cdots & 1 & \cdots & -a_{6124} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ -a_{12124} & \cdots & 0 & \cdots & (1-a_{124124}) \end{pmatrix}^{-1} \begin{bmatrix} m_1 + l_1 + c_1 + t_1 + a_{16}P_6 \\ \vdots \\ m_6 + l_6 + c_6 - (1-a_{66})P_6 \\ \vdots \\ m_{124} + l_{124} + c_{124} + t_{124} + a_{1246}P_6 \end{bmatrix}$$

Now consider the palm cooking price (P6) increased by 48.9% (therefore P6=1.489). The new price level (exogenous price) was calculated from the simulation. The exogenous costs and the exogenous price were grouped into four quadrants (Figure 4).

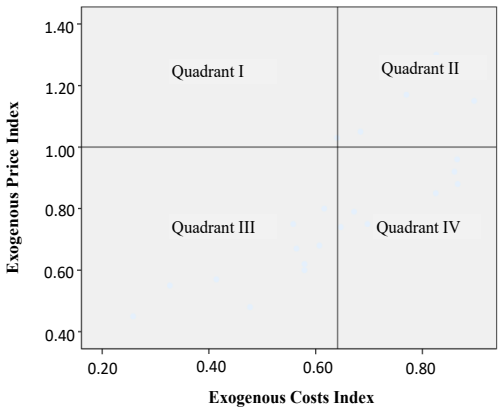

Figure 4. Schematic of the relationship between exogenous costs and exogenous price

The indicators of quadrants are as follows:

a. Quadrant I-Low Exogenous Costs but High Exogeneous Price
b. Quadrant II-High in Exogenous Costs and High in Exogenous Price.
c. Quadrant III-Low in Exogenous Costs and Low in Exogenous Price.
d. Quadrant IV-High in Exogenous Cost but High in Exogenous Price.

From this simulation, the estimated profit coefficient gained by every food industry was calculated based on the basic profit formula below:

$$R = P \times C \quad \text{Equation (3)}$$
$$\pi = R \times C \quad \text{Equation (3a)}$$
$$\pi = (P \times Q) - (C \times Q) \quad \text{Equation (3b)}$$
$$\pi = (A - B) \quad \text{Equation (3c)}$$

Where R is the Revenue, P is the Price, C is the Cost, π is the Profit Coefficient, A is the Exogenous Price, and B is the Exogenous Cost of Input.

Indirectly, this model can be used to analyse the impact on consumers.

Data Source

This study used the Malaysia input-output (I/O) table published by the Department of Statistics Malaysia (2010), Malaysian Palm Oil Berhad (MPOB, 2021) and Consumer Price Index, 2017 published by the Department of Statistics Malaysia and Productivity Report (2016/2017) published by Malaysia Productivity Corporation.

RESULTS AND DISCUSSION

Price Simulation

The price model is calculated using Equations 1(1b) and 2. Baseline costs presented in Column (1) were exogenous costs for four variables, namely imports, labour, value-added and taxes for the base year solution. Then, a new level of exogenous costs was obtained, as presented in Column (2). Column (3) shows the percentage of cost changes by comparing base year and exogenous costs. It was shown that the biggest cost changes came in restaurant and Dairy Production by 52.0% and 36.3%, respectively. It was then followed by the Preservation of Fruits and Vegetables (16.7%), Animal Feeds (15.4%) and Accommodation (11.5%). Meanwhile, the negative signs show a decline in primary input prices (costs), as shown in Table 1.

Table 1
Input-output Leontief price model for food production and services sector

Sector	Total Cost (Primary Input Price)			Total Impact Price		
	Cost of Input	Exogenous Cost of Input	% Change	Baseline price	Exogenous price	% Change
Column	(1)	(2)	(3)	(4)	(5)	(6)
1. Paddy	0.898	0.897	-0.1	1.00	1.15	14.9
2. Food Crops	0.867	0.865	-0.2	1.00	0.96	-4.2
3. Vegetables	0.827	0.825	-0.2	1.00	0.85	-14.8
4. Fruits	0.861	0.860	-0.1	1.00	0.92	-7.5
5. Oil palm	0.828	0.826	-0.2	1.00	1.30	29.6
6. Flower Plants	0.867	0.866	-0.1	1.00	0.88	-12.2
7. Other Agriculture	0.686	0.672	-2.1	1.00	0.79	-20.8
8. Poultry Farming	0.565	0.564	-0.2	1.00	0.67	-32.8
9. Other Livestock	0.610	0.607	-0.4	1.00	0.68	-32.1
10. Fishing	0.526	0.515	-2.2	1.00	0.76	-23.6
11. Meat and Meat Production	0.324	0.327	0.8	1.00	0.55	-45.3
12. Preservation of Seafood	0.254	0.258	1.8	1.00	0.45	-55.1
13. Preservation of Fruits and Vegetables	0.496	0.579	16.7	1.00	0.62	-38.1
14. Dairy Production	0.475	0.647	36.3	1.00	0.74	-25.9
15. Grain Mills	0.411	0.414	0.6	1.00	0.57	-42.7

Table 1 *(continue)*

Sector	Total Cost (Primary Input Price)			Total Impact Price		
	Cost of Input	Exogenous Cost of Input	% Change	Baseline price	Exogenous price	% Change
Column	(1)	(2)	(3)	(4)	(5)	(6)
16. Bakery Products	0.523	0.579	10.6	1.00	0.60	-40.0
17. Confectionery	0.665	0.684	2.9	1.00	1.05	5.0
18. Other Food Processing	0.569	0.616	8.3	1.00	0.80	-20.1
19. Animal Feeds	0.553	0.640	15.7	1.00	1.03	3.0
20. Wine and Spirit	0.711	0.697	-2.0	1.00	0.75	-25.1
21. Soft Drink	0.485	0.477	-1.5	1.00	0.48	-52.0
22. Accommodation	0.501	0.558	11.5	1.00	0.75	-25.4
23. Restaurants	0.507	0.770	52.0	1.00	1.17	17.4

Note. Calculated from Equation (1)- Equation (2)

Column (4) is the Baseline price or new level price = 1. A new level of exogenous price was obtained by assuming a 48.9% increase in palm cooking oil product prices. The highest price came from the oil palm sector and restaurants by 29.6% and 17.4%, respectively. The relationship between price and cost is shown in Figure 5.

High cooking palm oil prices can affect the producer's costs in two ways; the first is the direct effect of an increase in the price paid by producers for the consumption of palm oil product input. Meanwhile, in the second way, an indirect effect of using other sector inputs, the prices increased to offset their cost. This indirect effect can explain the cause of some products that are not related but still experience substantial effects in their cost of production, such as with restaurants. Sector 23 (restaurants) and Sector 19 (Animal Feeds) were laid on Quadrant I. Both sectors were high in price but low in cost. Sector 1 (Paddy), Sector 5 (Oil Palm), and Sector 17 (Confectionery) in Quadrant II were high in price and high in cost. Most sectors laid on Quadrant III were low in price and low in costs, such as Sector 8 (Poultry Farming), 9 (Other Livestock), 10 (Fishing), 11 (Meat and Meat Production), 12 (Preservation of Seafood), 13 (Preservation of Fruits and Vegetables), 14 (Dairy Production), 15 (Grain Mills), 16 (Bakery Products), 18 (Other Food Processing), 21 (Soft Drink), and 22 (Accommodation). However, Sector 2 (Food Crops), 3 (Vegetables), 4 (Fruits), 6 (Flower Plants), 7 (Other Agriculture), and 20 (Wine and Spirit) in Quadrant IV were low in price but high in costs.

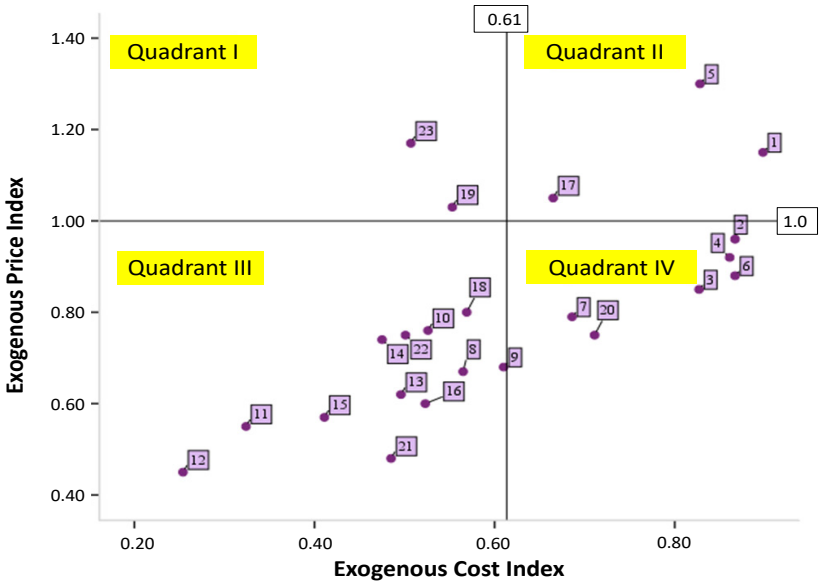

Figure 5. Relationship between exogenous cost and exogenous price (index)

In production theory, the producer aims to maximise profit and minimise the costs of raw materials. Due to the 48.9% increase in palm cooking oil prices, the cost of production would increase, immediately causing food producers to increase the price of food and services to gain maximum profit. Therefore, the food producer seems to pass the increase in production costs to the consumer to retain their profit. A similar finding was found in other studies on the effect of energy price increases on retail food prices (Hamid, 2011; Taghizadeh-Hesary, 2019). The higher the impact of an increase in the oil price, the more significant the increase in retail price. The highest profit gained by oil palm was 0.47, followed by restaurants at 0.40, Animal Feeds at 0.39 and Confectionary at 0.37. Preserved seafood and restaurants use many oil and fat products, mainly cooking oil, in their production activities. Generally, most food industries gain profit due to an increase in the cost of input, as shown in Figure 6.

This indirect effect is called cost-push inflation. Cost-push inflation can create a detrimental multiplier effect on many products in the economy. As producers experience a price rise, the burden is passed to the consumers via higher prices. This price rise happens at different stages of production: manufacturing, retailing and distribution creating a continuous increase in the price trend. Increasing production costs at the manufacturing level will increase the wholesaler's and retailer's selling prices. Thus, to secure the margin along the supply chain, the actor will increase their selling price, and in the end, the consumer will probably absorb the production cost increment. When this happens to essential products like palm cooking oil, the impact

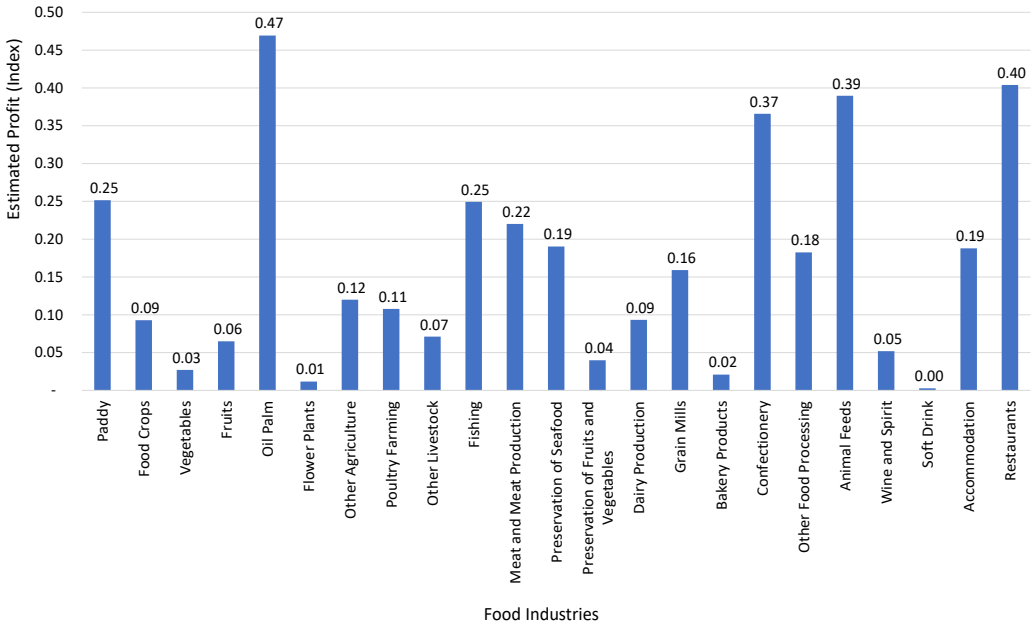

Figure 6. Estimated profit gain by food production

is intensely felt as all household-related economic activities need it, thus pushing inflation higher.

CONCLUSION

Palm cooking oil is a significant input in food manufacturers and food-away-from-home services such as restaurants, hotels, and food stalls. The subsidy withdrawal of palm cooking oil increases the price of cooking oil by 48.9%. Therefore, this study uses the Leontief price modelling technique to examine the impact of increased palm cooking oil market prices on food manufacturers and consumers. The findings show that both price and production costs were changed during the simulation and directly and indirectly impacted food producers and consumers.

From the consumers' perspective, the direct impact happens when they buy and consume cooking oil directly in their home kitchen. Previous study reported that low-income consumers (B40) spent only 2% of their expenditure on food, regardless of the consumer's location, either in urban or rural areas. These B40 consumers are less affected as they can still enjoy the subsidy provided by the government through a 1 kg packet of cooking oil. In addition, B40 consumers were entitled to get *Bantuan Rakyat 1 Malaysia* (BRIM) (now known as *Bantuan Prihatin Nasional* (BPN)) in the previous government, and 64.7% of households in the B40 category only depend on one source of income. The M40 and T20 consumers are not entitled to receive BRIM or *Bantuan Sara Hidup* (BSH) because

their income level is above RM4,000 per month. High living costs from the direct and indirect prices of palm cooking oil and petrol affected M40 consumers. Consumers are remarkably suppressed with an indirect effect when they spend their income on food away from home.

From the producer's perspective, food production costs are increased due to input costs, such as palm cooking oil. However, food producers like restaurants, hotels, food processing, and Confectionary should not significantly increase their prices as it would drive more customers away. In the context of small food producers like *nasi lemak* stalls, fried banana stalls, and noodles stalls, the burden of the higher price of palm cooking oil gives them two options: either gain a breakeven profit or suffer a total loss. Consumers are expected to avoid food away from home and will prepare their food at home. Furthermore, consumers are expected to stock up on their cooking oil during a price promotion. However, with a time constraint, consumers in urban areas will probably prefer to choose a food-away-from-home. Thus, food producers will also take this opportunity to pass the burden of increasing production costs, such as petrol and cooking oil prices, onto consumers by increasing the price of goods and services. This situation is supported by the estimated profit finding that all food producers gained a profit despite a price increase. From a policy implication perspective, the government should revise the price of palm cooking oil. The fluctuation in palm oil prices impacts the market price of palm cooking oil. If the government does not revise cooking oil prices, it will affect consumers and food manufacturers, mainly small-scale food producers.

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