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Factor Affecting the Malaysian Palm Oil Export to India

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Abstract: The huge size of its population and increasing living standards from its growing economy do not give any other choice for India to satisfy the huge demand for edible oil unless they are imported from different countries. Currently, India stands as the largest vegetable oils importer in the world, and palm oil from Malaysia is one of its preferences. However, there is a mixed scenery of demand trend shown by India, and surprisingly, it seems to change significantly every five to seven years. Hence, this study aimed to identify the factors that triggered the volatility in India's demand for Malaysian palm oil. This is important since India is the largest importer of Malaysian palm oil and the switch in India's demand for Malaysian palm oil will affect the Malaysian economy. Thus, the outcome from the ARDL analysis of the study presents its findings by summarizing that the Indian market is highly susceptible to price changes in the long and short run, while it is more responsive towards income in the long run. Consequently, this study proposed for policymakers to come up with an effective pricing strategy that applies to the current Indian economic situation and, at the same time, introduce an efficient monetary policy to minimize the risk of currency instability on the export demand.

Keywords: India; Malaysia; palm oil; export factors

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1. Introduction

India is the largest vegetable oils importer in the world with a strong import growth at 3.7% per annum, reaching 22 metric tonnes in 2028 or about a quarter of world vegetable oil imports (FAO, 2019). The high demand for edible oil in this country is driven by its 1.36 billion population and a growing economic performance at an annual growth rate of around 6.80% (World Bank, 2020). In the past, there were various sources of edible oil in the country with the major preferred oils being groundnuts, mustard seed, and rapeseed oil. However, the current production of these oils is insufficient to meet the demand and it drove India to start importing palm oil sourced from overseas to secure the consumers' needs. Since then, palm oil, which was previously unfamiliar in India, was introduced to the market due to its superiority in its price and availability. The presence of palm oil in the market has eliminated such typical preferences and it rose in popularity due to its physical and chemical properties which are appropriate to be further processed into other varieties of industrial products. Plus, the good nutritional quality of palm oil was preferred as a main fat dietary source in food products.

India’s food processing industry is highly dependent on palm oil where 94.1% of the imported palm oil is used in food products (USDA FAS, 2017). Additionally, the low linoleic acid content in palm oil allows it to be marketed as a blending ingredient with other edible oils for conventional usage. Its special traits got a recommendation from The Indian Nutrition Advisory Committee to promote the usage of palm oil in food products manufacturing especially *vanaspati* and margarine which were the major industrial users of palm oil in India. This is because palm oil has a unique attribute that can produce a natural-coloured margarine, which is highly preferable in India since artificial colouring is prohibited. It can also substitute cocoa butter that is traditionally used in confectionery products, which can then reduce the usage of imported cocoa butter.

To fill the gap in the supply-demand of edible oil, India imported vegetable oils including palm oil supply from the largest palm oil exporter, which is Malaysia and Indonesia; soybean oil is mainly imported from Argentina and Brazil; and sunflower oil is imported from Ukraine. In 2019, India imported around 9.9 million tonnes of palm oil, accounting for nearly two-thirds of India's total edible oil imports. From that, 48% of the total import or 4.41 million tonnes of it was from Malaysia, with an average monthly import of 0.36 million tonnes (MPOB, 2020). However, India's demand trend for Malaysian palm oil is not consistent from 1980 to 2018. During this period, a few major changes created a demand for scenery.

As shown in Figure 1, India’s palm oil demand seems to significantly change every five to seven years. There was a rapid increase between 1994 and 1999 when it increased by 90.8%, from 0.21 million tonnes to 2.37 million tonnes. This dominant demand expansion was due to the establishment of the ASEAN Free Trade Area (AFTA) in 1993. In the following seven years, the demand then significantly plunged by 78% to 0.51 million tonnes in 2007. In 2008, the demand began to rise again to reach 3.68 million tonnes in 2015 from 0.97 million tonnes in 2008. The three-fold increasing trend was a result of the lower import duties imposed effective in 2008 and the Malaysia-India Comprehensive Economic Cooperation Agreement (MICECA) as the completion of the ASEAN-India Trade in Goods agreement which became effective in 2011. After that, the demand fell to 2.02 million tonnes in 2017 due to higher imports of palm oil from Indonesia before surging back to 2.51 million tonnes in 2018 as an effect of the tax exemption imposed by Malaysia in that year. In 2020 the demand from India is expected to further increase following the tax exemption on all palm oil products under the National Economic Recovery Plan (PENJANA) initiative introduced by the Malaysian government effective from July to December 2020.

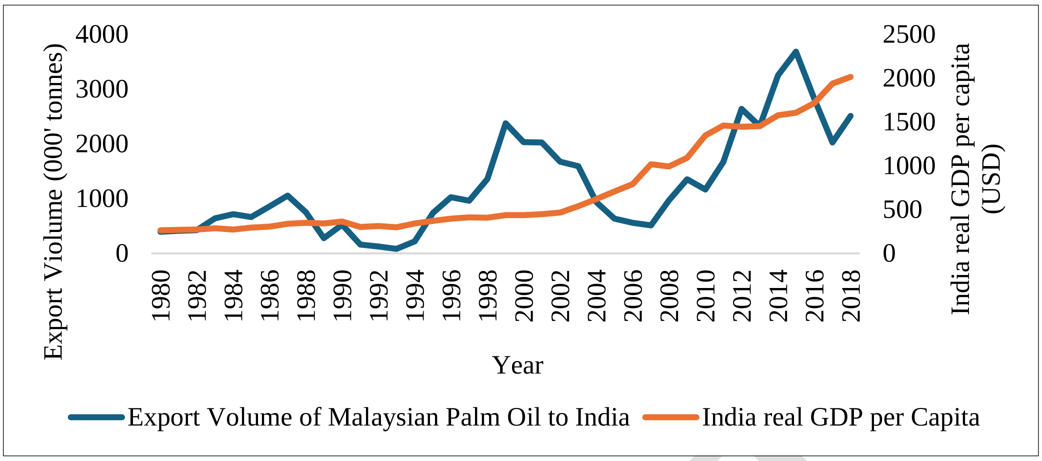

Figure 1. Export Volume of Malaysian Palm Oil to India (tonnes) and Real GDP per Capita (USD/person). Source: Malaysian Palm Oil Board (2020); World Bank (2020)

Furthermore, compared with the other major importer countries, including China and the EU, India is currently standing as the largest top importer country for Malaysian palm oil after surpassing the import demand volume from China in 2014. Since then, it has maintained its position for five years until 2018 (Table 1) even though its demand decreased after 2016. This scenario somehow impacted the revenue gained by Malaysia in terms of palm oil export revenue and affected Malaysia’s GDP. Even worse, it causes the producer, especially the smallholders, to be abandoned with the conflict of low income.

Table 1. Export Volume of Malaysian Palm Oil to Major Destinations, 2013-2018

Year	India (000’ tonnes)	China (000’ tonnes)	European Union (000’ tonnes)
2013	2325	3699	2336
2014	3251	2839	2411
2015	3686	2380	2432
2016	2825	1882	2059
2017	2028	1917	1991
2018	2510	1860	1990

Source: Malaysian Palm Oil Board (2020)

To further understand this situation, the demand and income data were compared. The scenario has shown that India's demand for Malaysian palm oil seems to not change in parallel with the income, where the sustained increase of income (GDP) does not lead the demand to increase. This is against the theory of demand, where demand is expected to increase when income is increased. Therefore, an important question that arises now is, what are the factors that influence India’s demand pattern to change every five to seven-year time?

Thus, this paper aims to reveal the influential factors determining India's demand behaviour towards Malaysian palm oil. This information regarding will help the policymakers and exporters to be more comprehensive about the Indian palm oil trade behaviour and come up with better policies and strategies.

2. Literature Review

In order to understand India's demand behavior towards Malaysian palm oil, a review of past literary works was carried out. Rifin (2010) clarified that the price of palm oil, which is cheaper than other vegetable oils such as soybean and sunflower oils, had encouraged consumers to prefer palm oil. As stated by Dohlman *et al.* (2003), the lower price of palm oil makes its market share in India to expand well, and it reflects the sensitivity of Indian consumers towards the price changes. Then, it leads to competition between edible oils and palm oil producers. Based on Subramani (2005), the major reason for the increasing market share of Indonesian palm oil in palm oil trading is due to the price of Indonesian palm oil which is cheaper than Malaysian palm oil in the market. This is supported by Yatawara (2017), who stated that the market share of Indonesian palm oil in India is growing fast while the Malaysian palm oil market share is stagnant due to the price competitiveness of Malaysian palm oil, which always tends to be higher than the Indonesian palm oil and it is supported by Ramadhani and Santoso (2019).

On the other hand, Fatimah (2012) added that India's edible oil demand is expected to rise as the economy improves since the higher income will improve the living standard. This is supported by Patel (2016), who stated that there is an influential relationship between edible oil consumption per capita and GDP: when the GDP increases, the consumption of edible oilwill also increase . Kumar *et al.* (2011) and Zakaria *et al.* (2017) found that price and income have a vital impact on the demand for food commodities in India and it is elastic. In the case of Nigeria, Egwuma *et al.* (2016) found that the Nigerian palm oil industry is driven by the factor of palm oil price and income.

In addition, there are other studies which included other issues in the discussion like the one by Hameed and Arsyad (2007) who included the price of palm oil, national income, and substitute products' prices in the estimation of (Middle East North Africa (MENA) countries' palm oil demand elasticity. The result reveals that besides the price of palm oil and national income, its substitute products' prices also have a significant influence on the demand. Similar to the findings by Talib and Darawi (2002), who found that the -price of palm oil and substitute product are both important in determining the export demand for Malaysian palm oil. This is supported by Subramaniam *et al.* (2007), who found that palm oil export demand was influenced by world palm oil price, world soya bean price, and time trend. Yanita *et al.* (2019) added that Indonesian palm oil export is influenced by the soybean oil price and the exchange rate of the exporter country. Hameed and Arshad (2012) discovered that the Malaysian palm oil top importer countries' demand behavior, including India's, is determined by several key factors, which are the price of palm oil, the price of substitute products, national income, and exchange rate. Mosikari (2016) agreed that the importer's GDP has a positive impact on the agricultural product trade and added that there is a negative relationship between the exchange rate and the demand.

Simeh and Kamarudin (2003) stated that palm oil trading in India is not only influenced by the price and production, but also has a relationship with the trade policy of the Indian Government. Through the ECM analysis, Ernawati *et al.* (2006) studied the reduction of export tax and import tariff: the export quantity of palm oil will increase through the trade liberalization policy between Malaysia and India. The study by Nurchayani *et al.* (2018) showed that one of the reasons that caused India's demand for Indonesian CPO to fluctuate is the free trade agreement policy. The major export product from Malaysia to India, that is palm oil, shows rising changes because of the lower export price due to the Malaysia-India Comprehensive Economic Cooperation Agreement (MICECA) (Chandran & Nathan, 2017).

3. Materials and Methods

In this study, the thirty-one year (1988-2018) time-series data of export volume of Malaysian palm oil to India (EXPDI), the soybean oil world price per export price of Malaysian palm oil to India (SBRPO) were collected from the oil palm statistic book published by the Malaysian Palm Oil Board (MPOB); the real GDP per capita of India (RGDPI) was obtained from the World Bank Indicator (www.worldbank.org); the exchange rate Ringgit Malaysia per Indian Rupee (RM/INR) (EXMYR) was adopted from Bank Negara Malaysia Monthly Bulletin (www.bnm.gov.my); and the export price of Indonesian palm oil (EXPRI) was gathered from the UN COMTRADE website (https://comtrade.un.org). Then, these data were analyzed through several empirical analyses.

3.1Model Specification

The model built to study the export demand of Malaysian palm oil to India was based on the derived demand theory as referred to Hameed *et al.* (2016) and Suherman *et al.* (2015). Generally, the market demand theory is based on the quantity of demand (Q) explained by product price (P), income (Y), and substitute product's price (S) which is written as:

$$Q = f(P, Y, S) \quad (1)$$

Since the study aims to examine the Indian demand for Malaysian palm oil, the derived demand model was modified to become as such:

$$EXPDI_t = f(SBRPO_t, RGDPI_t, EXMYR_t, EXPRI_t) \quad (2)$$

The export volume of Malaysian palm oil to India (EXPDI) is a proxy of the quantity demanded and price ratio of soybean oil's world price per Malaysian palm oil export price to India (SBRPO) represents the price of own products and the substitute product. The exchange rate of Malaysian Ringgit per Indian Rupee (EXMYR) was included as suggested by

Chamber and Just (1979), while the inclusion of Indonesian palm oil export price (EXPRI) is to measure the competitive impact of Indonesian palm oil export price towards the performance of Malaysian palm oil export demand in India. Then, the final model can be specified as the following double-log equation:

$$lnEXPDI_t = c + \beta_1 lnSBRPO_t + \beta_2 lnRGDPI_t + \beta_3 lnEXMYR_t + \beta_4 lnEXPRI_t + \mu_t \quad (3)$$

In the equation, c is interpreted as the intercept, μ is an error term and t is the time trend. The coefficient of β_1 and β_2 are expected to be negative, since the higher ratio between soybean oil's world price per Malaysian palm oil export price to India and the value of Ringgit per Rupee will cause the demand to be lowered. Conversely for the β_3 and β_4 which is expected to be positive since an increase in income and the Indonesian palm oil export price will encourage more demand from Indian consumers.

3.2 Model Estimation

3.2.1 Unit root test

In handling time series data, there is a high possibility of trending behaviour or non-stationarity in the mean of the data especially when it comes to economics and financial variables such as GDP and prices. This is important, since it is the precondition for most analytical tools, statistical tests, and models. Thus, the analysis carried out in this study utilized two types of unit root tests which are Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test. The results obtained through this test will describe the property of the mean and variance of the data whether it is constant or varies over time. If the data has a time-varying variance or/and mean, it indicates that the data has a random walk process (non-stationary).

3.2.2 Cointegration test

Then, the analysis proceeded with the ARDL Bounds testing approach, proposed by Pesaran *et al.* (2001), to verify the cointegration relationship of the variables in the long run. This method was adopted based on its advantages, which can handle a small sample size of data and a series of variables with purely stationary at I(0), purely I(1), or mixed order of stationary (I(0) and I(1)). Moreover, its major strength is that the long-run ARDL estimates are unaffected by the number of lags included and it is also able to integrate the short-run adjustment without missing the long-run information. The estimated ARDL model is as follows:

$$\Delta lnEXPDI_t = c + \beta_1 lnEXPDI_{t-1} + \beta_2 lnSBRPO_{t-1} + \beta_3 lnRGDPI_{t-1} + \beta_3 lnERMYR_{t-1} + \sum_{i=1}^{p} \alpha_{i1}\, \Delta \mathrm{lnEXPRI}_{t-i} + \sum_{i=0}^{p} \alpha_{2i}\, \Delta lnSBRPO_{t-i} + \sum_{i=0}^{p} \alpha_{3i}\, \Delta lnRGDPI_{i-i} + \sum_{i=0}^{p} \alpha_{4i}\, \Delta lnERMYR_{t-i} + \sum_{i=0}^{p} \alpha_{5i}\, \Delta lnEXPRI_{t-i} + \varepsilon_t \quad (4)$$

The Δ represents the difference in the operator and *p* represents the selected optimal lag-length for the ARDL Bounds test. In testing the cointegration relationship, the tested null hypothesis is $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ and the alternative hypothesis is H_1 : at least one of the $\beta_i \neq 0$. The rule to reject the null hypothesis will be based on the F-statistics' value obtained from the F-test, where the cointegration will only be confirmed once the F-statistics value is greater than the upper critical bound value proposed by Narayan (2005). However, if the F-statistics' value is found to be smaller than the lower critical bound, it will lead to a decision that there is no cointegration relationship between variables. In the case of the estimated F-statistic being in between the lower critical bound and upper critical bound, the result will be inconclusive and the analysis should be continued with other cointegration tests such as Johansen and Engle-Granger cointegration test to confirm this matter.

3.2.3 ARDL long-run estimation

Once the cointegration relationship is established, further analysis will be long-run elasticity estimation. The estimation is based on the following derived ARDL model:

$$lnEXPDI_t = \hat{c} + \sum_{i=1}^{p} \widehat{\beta_{1i}}\, lnEXPDI_{t-i} + \sum_{j=0}^{q} \widehat{\beta_{2j}}\, lnSBRPO_{t-j} + \sum_{k=0}^{r} \widehat{\beta_{3k}}\, lnRGDPI_{t-k} + \sum_{m=0}^{s} \widehat{\beta_{4m}}\, lnEXMYR_{t-m} + \sum_{n=0}^{u} \widehat{\beta_{5n}}\, lnEXPRI_{t-n} + \varepsilon_t \quad (5)$$

The *EXPDI* is the dependent variable, *c* denotes the intercept, *α,* and *β* represent the coefficient of the estimated variables while *p* and *q* symbolize the optimal lag length for each of the variables, which were selected based on the Schwartz-Bayesian Criterion (SBC). As a requirement for robust estimation, Equation 2 is undergoing a few diagnostic checking tests that include the Serial Correlation Test (Breusch-Godfrey LM Test), normality test (Jarque-Bera Test), and Ramsey Regression Equation Specification Error Test (RESET Test). When these diagnostic tests are passed, the model can be declared as a Best Linear Unbiased Estimator (BLUE).

3.2.4 ARDL short-run estimation

Once the long-run elasticities are obtained, the subsequent analysis estimates the short-run dynamics parameters through the error correction model affiliated with the formerly determined long-run estimation. The ARDL error correction model is expressed in an equation as follows:

$$\begin{aligned}\Delta lnEXPDI_t = c - \left(1 - \widehat{\beta_{1J}}\right)ECT_{t-1} + \sum_{i=1}^{p} \widehat{\alpha_{1i}}\, \Delta lnEXPDI_{t-i} \\ + \sum_{j=0}^{q} \widehat{\alpha_{2j}}\, \Delta lnSBRPO_{t-j} + \sum_{k=0}^{r} \widehat{\alpha_{3k}}\, \Delta lnRGDPI_{t-k} \\ + \sum_{m=0}^{s} \widehat{\alpha_{4m}}\, \Delta lnEXMYR_{t-m} + \sum_{n=0}^{u} \widehat{\alpha_{5n}}\, \Delta lnEXPRI_{t-n} \\ + \varepsilon_t\end{aligned} \quad (6)$$

In this equation, the error correction term (ECT) represents the residual from the long run cointegration model. c is the constant, while $\alpha_1, \alpha_2, \alpha_3, \alpha_4, and\ \alpha_5$ are the short-run dynamic elasticity of the model in converging to the equilibrium. (1-$\hat{\beta}_1$) is the speed of adjustment parameter and ECT_{t-1} is the error correction term lagged one year which can be derived as:

$$\begin{aligned}ECT_{t-1} = lnEXPDI_{t-1} - \beta_1 + \beta_2 lnSBRPO_{t-1} - \beta_3 lnRGDPI_{t-1} \\ - \beta_4 lnEXMYR_{t-1} - \beta_5 lnEXPRI_{t-1}\end{aligned} \quad (7)$$

From (Equation 6), the value of (1-$\hat{\beta}_1$) is expected to be negatively significant to ensure the cointegration relationship between estimated variables in the short run. The higher ECT_{t-1} value means the market will adjust at a faster rate in eliminating the disequilibrium towards the equilibrium when there is a shock in the economy.

4. Results and Discussions

4.1Unit Root Test

The purpose of checking for the stationarity of the variables in this test is achieved and summarised in Table 2. The result of the ADF and PP test showed that all the variables are insignificant at level I(0), except *LNSBPERPO* and *LNEXRMY*, which are significant at 1% and 5%, respectively. However, when those variables are transformed into the first difference, they are turned to be significant at a 1% significance level, which is then able to reject the null hypothesis of there is non-stationarity in the data. Even though *LNSBPERPO* and *LNEXRMY* are significant at level, the transformation into first different is also significant, so it should be classified into 1(1) rather than I(0). Overall, all the variables had passed the ARDL Bounds test pre-condition, where all of the variables must be stationary at a lower order than I(2).

Table 2. Results for ADF and PP Test

	ADF		**PP**	
	I(0)	I(1)	I(0)	I(1)
LNEXPDI	-1.267	-5.197***	-1.359	-5.231***
	(0)	(0)	(1)	(5)
LNSBPERPO	-4.524***	-5.549***	-4.502***	-18.128***
	(0)	(2)	(2)	(22)
LNRGDPI	0.986	-4.916***	0.875	-4.913***
	(0)	(0)	(2)	(1)
LNEXPRI	-1.087	-8.810***	-1.823	-9.099***
	(1)	(0)	(3)	(1)
LNEXRMY	-3.019**	-4.622***	-3.026**	-4.611***
	(0)	(0)	(2)	(2)

Note: All variables are converted into the log form of a logarithm. *** and ** represent significance at 1% and 5% levels, respectively. The number in the parenthesis (…) represents the optimum lag selected for the test. The Schwarz Info Criterion (SIC) is adopted to select the optimum lag order in the ADF test and Newey-West Bandwidth (NWB) is used to select the best lag order in the PP test.

4.2 Cointegration Test

The analysis proceeds with the ARDL Bounds test to explore the cointegration between the variables in the long run. As presented in Table 3, the F-statistics value (3.177) gained from this analysis is less than the upper critical bound of the critical level proposed by Narayan (2005). However, it became an issue when it was estimated between the 10% lower and upper critical bound. Based on Pesaran *et al. (*2001) this condition will lead to an inconclusive result, which might have the cointegration, but it is not confirmed. Hence, the cointegration test continues with the Johansen cointegration test and Engle-Granger cointegration test to reassure about the existence of a cointegration relationship between variables in this model.

Table 3: Result of ARDL Bounds Test

Model: EXPDI = *f* (EXPDI, SBPERPO, RGDPI, EXPRI, EXRMY) {1,2,0,0,0}		
F-statistics: 3.177		
Significance level	Critical Level	
	Lower Bound I(0)	Upper Bound I(1)
1%	4.768	6.670
5%	3.354	4.774
10%	2.752	3.994

Notes: Critical values are cited from *Narayan (2005)* table case III: Unrestricted intercept and no trend for without trend models.

Based on the Johansen cointegration test, the conclusion achieved was that there is a cointegration relationship between variables both in the unrestricted cointegration rank test (Trace) and unrestricted cointegration rank test (Maximum Eigenvalue) (Table 4). This result is concluded when the null hypothesis of no variables being cointegrated is rejected at 1% and 5% significance levels for the trace and maximum eigenvalue test, respectively. In the Engle-Granger cointegration test, the F-statistic obtained is 5.24, which is greater than the 1% critical value of 3.90 as suggested by MacKinnon (1993) (Table 5). Thus, it shows that there is a cointegration relationship between variables since it can reject the null hypothesis that there is no cointegration relationship between the estimated variables. Thus, by referring to the results of these alternative tests, it is confirmed that the variables are associated in the long run.

Table 4: Result of Johansen Cointegration Test

	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	p-value
Unrestricted Cointegration Rank Test (Trace)	None *	0.705	82.264***	69.818	0.003
	At most 1	0.502	46.832*	47.856	0.062
	At most 2	0.452	26.604	29.797	0.111
	At most 3	0.269	9.112	15.494	0.355
	At most 4	0.000	0.024	3.841	0.876
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	None *	0.705**	35.432	33.876	0.032
	At most 1	0.502	20.227	27.584	0.325
	At most 2	0.452	17.492	21.131	0.150
	At most 3	0.269	9.0885	14.264	0.278
	At most 4	0.000	0.0240	3.841	0.876

Notes: *, **, and *** denote significance at the 10%, 5%, and 1% significance levels, respectively.

Table 5: Result of the Engle-Granger Cointegration Test

F-statistic: 5.24***	
Significance level	Critical Level
1%	3.90
5%	3.34
10%	3.04

Notes: *** denotes significance at a 1% significance level. Critical values adopted from Davidson and Mackinnon (1993).

4.3Long Run Coefficient

Since the variables are confirmed to be stationary at I(1) and cointegrated, the causal impact of the variables is examined by estimating the elasticities of the variables. In the long run, all the independent variables including *RGDPI, SBPERPO, EXRMY*, and *EXPRI* follow the expected relationships with the dependent variable (*EXPDI*). The price ratio of soybean oil and palm oil (*SBRPO*) was found to be the most critical factor since it is the only variable that is significant at a 1% significance level. This factor is also elastic since a unit change in the price ratio of soybean per palm oil will cause the demand to change by 8.52%, while other factors are unchanged. The income represented by GDP per capita shows a significant relationship with the demand since it is found to be significant at a 10% significance level yet elastic. In this regard, it shows that when the per capita income of the Indian consumers improves by 1%, it will encourage the demand to increase at the rate of 1.07% considering the other factors are constant. This finding suits the finding from Zakaria *et al.* (2017), where the price difference between soybean and palm oil and income has a significant impact on India’s import demand for Malaysian palm oil, and these factors are elastic. However, there is not enough statistical evidence to claim that EXRMY and EXPRI have a significant causal impact on the demand since both variables are not significant at any level. This finding is similar to the finding by Putra and Sudirman (2014) as well as Ridwanulloh and Sunaryati (2018), who also found that the exchange rate has an insignificant negative relationship with export demand, while Prasetyo (2017) added that the exchange rate has a weak influence on the CPO export, and there is no direct effect between these two factors. Additionally, the negative relationship of the exchange rate with exports has also been highlighted by Hall *et al.* (2010) and Maygirtasari *et al.* (2015). Despite this, *EXRMY* and *EXPRI* still influence the demand where the appreciation of Ringgit against the Indian Rupee is estimated to cause the demand to decrease by 0.81% when the other factors are unchanged. The effect of the 1% rising rate of Indonesian palm oil export price is estimated to cause a 0.508% increase in the demand, with no changes in the other factors.

Table 6. Result of ARDL Long-run Elasticity

Variables	**Coefficient**	**t-statistics**	**p-value**
LNRGDPI	1.070* (0.584)	1.830	0.081
LNSBPERPO	-8.524*** (2.395)	-3.559	0.001
LNEXRMY	-0.189 (1.445)	-0.131	0.896
LNEXPRI	0.508 (0.712)	0.714	0.482
C	-0.179 (2.269)	-0.078	0.937

Note: All variables are converted into the form of a logarithm, ***, **, and * represent significance at 1%, 5%, and 10% significance levels respectively. The number in the parenthesis (…) represents the standard error of the coefficient.

4.4 Short-Run Elasticity

The variables are confirmed to be cointegrated in the short run since the ECT value gain is -0.464 and it is significant at a 1% significance level. It indicates that the market will self-adjust the market imbalance back to the equilibrium at the speed of 46.4% per annum and it will take approximately two years for the progress.

The variables in the short run are still maintained to follow the expected sign except for the $\Delta SBRPO_{t-1}$, which turns out to be positive. Compared to the long-run elasticities, the variables in the short run are entirely inelastic, except for Δ*SBRPO*. In the short run, the price factor is the only factor that is consistently significant in affecting the demand, while the other factors are not. This condition has made the price ratio between soybean and palm oil to be considered a critical factor since when there is a 1% increase in the Δ*SBRPO*, the demand will shift by 1.515% without any changes in the remaining factors. This is consistent with the finding by Wong and Ahmad (2017) which clarifies that there is a strong substitution relationship between palm oil and soybean oil. Besides, the changes by 1% increase in the $\Delta RGDPI$ and $\Delta EXPRI$ will cause the demand to improve by 0.497% and 0.236%, respectively, *ceteris paribus*. In terms of Δ*EXMYR,* every percent of currency appreciation will lead to a demand plunge by 0.08%, constant on other factors. This is comparable with the finding by Dolatti *et al.* (2012) who found the exchange rate has a negative relationship with non-petroleum exports in Iran and it is supported by Mosikari (2016) who found that there is a negative relationship between the real exchange rate towards agriculture, forestry and fishing products of South Africa countries. Even though the variables of Δ*EXMYR* and Δ*EXPRI* are insignificant both in the long run and short run, they still have be treated since omitting those factors may lead to an under-explained model.

Regarding the diagnostic checking test, the R-squared value is 0.859, which reflects that 85% of the *EXPDI* variation was explained by the *RGDPI*, *SBRPO*, *EXMYR*, and *EXPRI* and merely 15% of the variation remains unexplained. The p-value from the Jarque-Bera test is 0.886 which is not significant to reject the null hypothesis that the residual is normally distributed. The Breusch-Godfrey Serial Correlation LM Test, Breusch-Pagan test, and RESET test showed an insignificant result since the p-value is greater than the 10% significance level. Hence, it is confirmed that the model is free from the auto-serial correlation problem, the residual is homoscedastic, and the model is stable. Thus far, by considering these results the model has satisfied all the Classical Linear Regression Model (CLRM) assumptions and it is declared to be the Best Linear Unbiased Estimator (BLUE).

Table 7. Result of ARDL Short-run Elasticity and Diagnostic Checking Test

Variables	Coefficient	t-statistics	p-value
D(LNRGDPI)	0.497 (0.342)	1.451	0.161
D(LNSBPERPO)	-1.515** (0.698)	-2.169	0.041

Variables	Coefficient	t-statistics	p-value
D(LNSBPERPO(-1))	1.367* (0.736)	1.855	0.077
D(LNEXRMY)	-0.088 (0.674)	-0.130	0.897
D(LNEXPRI)	0.236 (0.317)	0.744	0.464
ECT(-1)	-0.464*** (0.140)	-3.313	0.003
	Diagnostic test		
R-squared	: 0.859	Breusch-Godfrey Serial Correlation LM Test	: 1.853 [0.395]
Adj. R-squared	: 0.812	Breusch-Pagan-Godfrey	: 10.250 [0.174]
Jarque-Bera	: 0.287 [0.866]	Ramsey RESET Test	: 2.902 [0.103]

Note: All variables are converted into the form of a logarithm, ***, **, and * represent significance at the 1%, 5%, and 10% significance levels, respectively. The number in the parenthesis (…) represents the standard error of the coefficient while the number in the […] indicates the p-value.

4. Conclusions

India is an important market for Malaysia to export its palm oil. The changes in its demand for Malaysian palm oil will have impacts on Malaysia's economy in terms of export revenue and GDP. Hence, an ample understanding of the behaviour of the Indian demand is very important to come up with the best policy. Firstly, the study discovered that India is a price-sensitive market that is highly responsive to changes in price. It easily switches its demand towards the other closest substitute products when the palm oil price increases. Secondly, the income factor has a significant impact on the demand only for the long term but not in the short term. This means that there is no instantaneous effect between income and palm oil demand. Thirdly, the currency does not have a significant impact on the demand since the impact of currency appreciation was absorbed by the trade policy implemented. Finally, Indonesian palm oil export price is not the main threat to Malaysian palm oil demand in the Indian market either in the long run or short run. In a nutshell, an effective pricing strategy is the most important policy we need to prepare to survive in the Indian market. Implementing the right policy at the right time is compulsory since we must consider the economic condition of India. Finally, a good monetary policy is important to reduce the impact of currency valuation on trading and the industry should be highly flexible to cope with any uncertain changes triggered by the competitor.

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