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Economic Analysis of Palm Oil Demand in Selected Major Importing Countries

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ABSTRACT

This study attempts to examine factors influencing the demand for palm oil in selected major markets (India, EU, China, Pakistan and Nigeria). The study employed the Autoregressive Distributed Lag (ARDL) method on data collected for the period 1980 to 2017. The bound test indicates that there are long-run relationships between the studied variables. The empirical results show that Gross Domestic Product (GDP), palm oil price, and soyabean oil price, production and crushing capacity are significant determinants of palm oil demand.

Keywords: palm oil importers, ARDL, error correction models.

INTRODUCTION

Demand for vegetable oils increases year by year in line with the growing world population. In 1980, the demand for oils and fats was 38.22 million tonnes, which then increased to 59.81 million tonnes in 1990, then up by 52% to 91.05 million tonnes in 2000, and in 2017, the demand for oils and fats amounted to 218.61 million tonnes. According to USDA (2018), the global consumption of vegetable oils as food is forecast to grow further, reflecting growth in population and improved purchasing power in emerging economies. Vegetable oils are used as food and also for industries. Growing food uses will be fulfilled mainly by palm oil and soyabean oil, followed by sunflower and rapeseed oils. Global consumption of oils for industrial use is also forecast to increase in line with increasing biodiesel production in major markets. Global trade in vegetable oils is expected to see a healthy increase, with strong growth in palm, soyabean and sunflower oils, despite reductions in cottonseed, olive and coconut oils. In terms of production, globally, vegetable oils are also expected to experience growth, with all major oils forecast to rise, except for olive oil. Production of palm, soyabean and palm kernel oils is expected to register higher crop estimates. Strong demand in soyabean meal will spur higher

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crushing volumes, resulting in higher soyabean oil production. Both rapeseed and sunflower oils are projected to experience modest growth. This shows that the demand for vegetable oils, including the demand for palm oil, is forecast to grow during 2018/2019. Likewise, global palm oil production in 2018/2019 is also forecast to continue increase.

Of the oils and fats, palm oil is the major oil consumed, followed by soyabean, rapeseed, sunflower and cottonseed oils (Oil World, 2018). Thus, palm oil is one of the important vegetable oils consumed, whether used directly or indirectly as food. Nevertheless, about 20% of palm oil is used for non-food applications, such as biodiesel (Kushairi *et al.*, 2018). In 2017, the largest palm oil import markets were India, the European Union (EU), China, Pakistan and Nigeria (*Figure 1*).

In India, the most consumed vegetable oil is palm oil, followed by soyabean, rapeseed, sunflower, cottonseed and groundnut oils (*Figure 2*). The situation is different in EU, where the main vegetable oil consumed is rapeseed oil, followed by sunflower, palm, soyabean, cottonseed and groundnut oils. The most consumed vegetable oil in China is soyabean oil, followed by rapeseed, palm, groundnut, cottonseed and sunflower oils. Like India, in Pakistan and Nigeria, palm oil is the most consumed vegetable oil.

Each country has a different view regarding vegetable oils. In India, vegetable oil consumption is forecast to increase by 5.3% to 24.8 million tonnes. This shows a strong demand from bulk buyers, food business operators and households, as well as the fast moving consumer generation with more disposable income that is pushing consumption growth. Total consumption demand for food and industrial uses is almost 70%, which is met through imports of palm oil (60%) and soft oils (40%). Taking into consideration that total domestic consumption includes imported as well as locally produced oils, the market share of palm, soyabean and sunflower oils is 44%, 23% and 11%, respectively. India is the third largest consumer of edible oils after China and the European Union. The per capita consumption of edible oils is estimated at 25 kg. Since 28 March 2018 the Cabinet Committee on Economic Affairs in India has approved the proposal by the Ministry of Commerce and Industry to lift the prohibition imposed on export of all varieties of edible oils, except mustard oil. The Indian Government also introduced a 10% social welfare surcharge on all imported goods, including edible oils. Import duty on both crude soyabean oil and crude palm oil is 33%, and 44% for refined palm oil. Implementation of the policy was to encourage domestic refining and also to encourage fair prices of fall-harvested and winter-planted oilseeds for Indian farmers. However, India still needs to import vegetable oils to meet the domestic demand. Currently, there is strong demand for vegetable oils, forecast

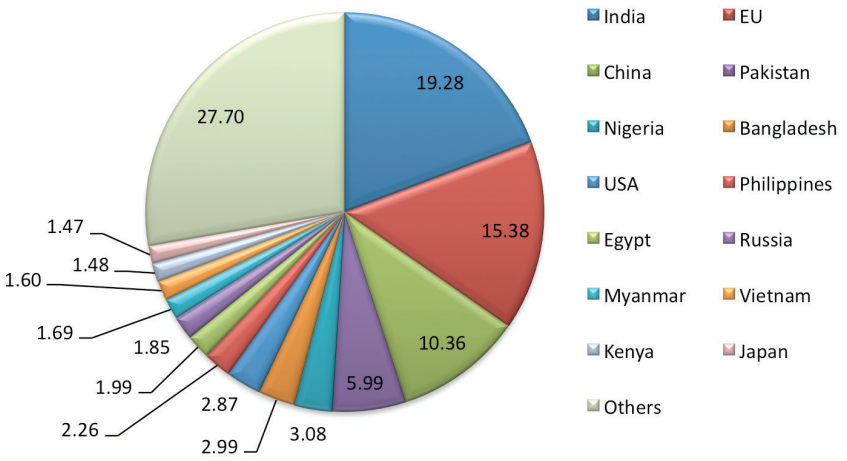

Figure 1. Palm oil importing countries.

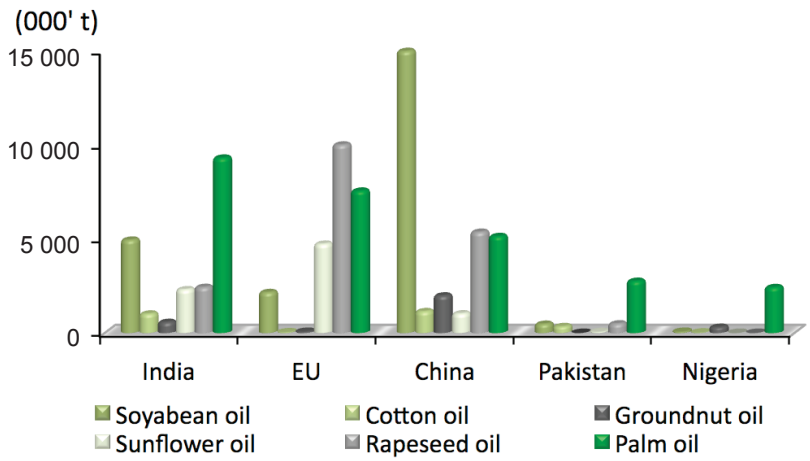

Figure 2. Oils and fats consumption.

in 2018/2019 at 24.8 million tonnes. While the production of local edible oils is seen to be rising to 7.5 million tonnes, there is a widening gap which will be filled through imports, projected to rise from 16.3 to 17.4 million tonnes.

The situation is similar in the European Union in that there is a gap between production and consumption. Global vegetable oil production decreased marginally, in line with the somewhat lower crushing capacity. The use of vegetable oils for biofuels is stagnating, and even appears to be on a declining trend due to increasing competition from animal fats and recycled oils. There is declining use of rapeseed oil, a flattening trend in the use of sunflower oil, but increased use of soyabean and palm oils, which in totality is expected to lead in an almost flat trend in biofuel usage of vegetable oils in 2018/2019. Increased rapeseed, sunflower and olive oils in food usage covers the anticipated increase in total food consumption of vegetable oils, triggered by the growing population.

Total vegetable oil consumption as food in China is forecast at 34.5 million tonnes for 2018/2019, compared to the increase of 0.8 million tonnes (or 2.3%) to 33.7 million tonnes in 2017/2018. According to USDA (2018), China's food use of oils will maintain stable growth, driven by an increase in the practice of dining out and more food processing in the coming years. Total vegetable oil imports is forecast to rise to 8.6 million tonnes in 2018/2019 from the estimated 7.6 million tonnes in the previous year, mainly to offset the reduction in soyabean oil production due to lower soyabean imports. To compensate for the decrease in soyabean oil production, palm oil import is forecast to rebound to 5.6 million tonnes in 2018/2019 from the estimated 5.2 million tonnes in 2017/2018. China is expected to increase her imports to meet domestic vegetable oil demand in 2018/2019.

In Pakistan, imports of oilseeds are expected to exceed edible oil imports in 2017/18, reflecting the growing importance of oilseed meals to the domestic poultry and livestock sectors, and rising domestic oil production from the imported oilseeds. Oilseed imports during 2018/2019 are projected at a record 3.7 million tonnes, up 12% from the preceding year. Palm oil continues to be the major imported oil with marketing year 2018/2019 imports forecast at 3.4 million tonnes. Pakistan is the fourth largest importer of edible oils in the world. The edible oils industry includes refineries, vegetable ghee processors, cooking oil plants and oil extraction units. Pakistan produces about 30% of her vegetable oil needs domestically (12% from local oilseeds and 18% from imported oilseeds), and production in 2018/2019 is forecast to increase, based on forecasts on oilseed production and imports. In terms of consumption, in 2018/2019, total consumption is forecast at a record 5.0 million tonnes, up 5% from the current marketing year. Palm oil dominates the imported vegetable oil market, and is commonly blended with other oils to be sold as cooking oil.

Production of oilseeds and oilseed products is trending upwards in Nigeria, but domestic supply still lags behind the growing demand. Demand is growing from both the poultry and food processing industries. Palm oil/palm kernel oil and soyabean oil are the dominant supply sources, contributing approximately 70% and 25%, respectively, of the country's national consumption requirement (NCR). Nigeria consumed 2.44 million tonnes of palm oil in 2017. According to USDA (2014), 80% of total domestic consumption in Nigeria is for food, while 20% is for non-food purposes. Palm oil is also consumed by the food industry, for the manufacture of such products as noodles, biscuits, chips, margarine and shortenings.

In 2006, Rabobank concluded that the world demand for vegetable oils will be influenced by four factors, which are rising income, high population, increasing environmental concerns, and high petroleum price. There are several studies on the demand for vegetable oils. Ali *et al.* (2013) discussed the factors affecting edible oil consumption in Pakistan. Edible oil is a main component of the food in Pakistan, and is a key ingredient in household food consumption. From this study, the researchers found that the factors affecting consumption demand for edible oil in Pakistan included price, income and family size. Price is considered to be the most important factor that affects consumption by households: 1.00% increase in price would result in 0.30% decrease in consumption. After price, family size is a major factor affecting household consumption. This study showed that 1.00% increase in family size would increase consumption of edible oil by 0.42%. Income also influences consumption of edible oil, with 1.00% increase in income leading to 0.29% more edible oil consumption.

Hameed *et al.* (2016) used ARDL to investigate the determinants of palm oil import demand in six Asian countries, and the results show that the prices of palm oil and substitute oil as well as national income of the importing countries are significant determinants of palm oil demand. Other factors such as the biofuel mandate, trade policies and exchange rate are also important. The situation in Nigeria is similar. A study

by Egwuma *et al*. (2016) found palm oil price, income level and technology improvement influence the demand for palm oil. Zakaria *et al*. (2016) analysed the demand for palm oil in India, using ARDL. The outcome of this study showed that in the long run, there are three factors influencing the demand for palm oil in India. First is GDP, second is the price discount of palm oil against soyabean oil, and third is population. Chalil and Barus (2018) studied the factors that influence Pakistan palm oil demand from Indonesia, using ARDL. They found that the country's palm oil import volume is significantly influenced by the price of Pakistan's palm oil import, trade balance and soyabean oil price. Most of the studies showed GDP, palm oil price, price of palm oil substitute and population influence the demand for palm oil. However, a study by Priyati (2018) using the gravity model found location to be one of the important determinants of palm oil imports.

Thus, the current study focused on the demand for palm oil in five major importing countries using ARDL.

METHODOLOGY

The data set used in this study was obtained from various sources, covering the period from 1980 to 2017. Gross domestic product (GDP) data were obtained from World Development Indicator, while data on oils and fats production and crushing capacity came from Oil World (2010; 2015; 2017). Data on palm oil and soyabean oil prices were sourced from the United Nations Conference on Trade and Development (UNCTADstat).

In this empirical investigation, first, we studied the stationarity of the variables, namely, palm oil import, oils and fats production, crushing capacity, GDP, palm oil price, and the difference between soyabean oil price and palm oil price, by employing unit root tests. For this purpose, the study used the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. The reason for choosing the unit root tests is that generally economic and financial time series, such as prices and real GDP, exhibit trending behaviour or non-stationarity in the mean. Moreover, economic and finance theories often suggest the existence of long-run equilibrium relationships among the non-stationary time series variables. If these variables are integrated to the order one (I(1)), co-integration techniques can be used to model these long-run relationships. Hence, pre-testing for unit roots is often a first step in co-integration modelling.

This study employed the Autoregressive Distributed Lag (ARDL) bound testing approach to cointegration, developed by Pesaran *et al.* (2001), to verify any long-run relationship between the variables. The advantages in using this approach are that it can be applied irrespective of whether the variables are I(0) or I(1), and that this technique also has less problems of endogeneity because it is free of residual correlation (*i.e.* all the variables are assumed to be endogenous). Besides that, the ARDL procedure can distinguish between dependent and explanatory variables. The major advantages of this approach lie in its identification of the cointegrating vectors in cases where there are multiple cointegrating vectors. Moreover, the error correction model (ECM) can be derived from the ARDL model through a simple linear transformation, which integrates short-run adjustments with long-run equilibrium without losing long-run information (Nkoro and Uko, 2016). The estimated ARDL model is as follows:

$$\Delta lnPO_{import_{it}} = \alpha_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta lnPO_{import_{t-i}} + \sum_{i=0}^{q} \beta_{2i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{r} \beta_{3i}\, \Delta lnProduction_{t-i} + \sum_{i=0}^{s} \beta_{4i}\, \Delta lnCrushing_{t-i} + \sum_{i=0}^{t} \beta_{5i}\, \Delta lnPSPO_{t-i} + \sum_{i=0}^{u} \beta_{6i}\, \Delta lnPPO_{t-i} + \delta_1 lnPO_{import_{t-1}} + \delta_2 lnGDP_{t-1} + \delta_3 lnProduction_{t-1} + \delta_4 lnCrushing_{t-1} + \delta_3 lnPSPO_{t-1} + \delta_4 lnPPO_{t-1} + \varepsilon_t$$

Equation (1)

where,

α, β and δ	=	parameters to be estimated
$POimport_{t-i}$	=	palm oil import from the country of origin in year t
GDP_{t-1}	=	Gross Domestic Product of the country of origin in year t
$Production_{t-1}$	=	oils and fats production of the country of origin in year t
$Crushing_{t-1}$	=	crushing capacity of the country of origin in year t
$PSPO_{t-1}$	=	difference in price of soyabean oil and palm oil in year t
PPO_{t-1}	=	palm oil price in year t
ε_t	=	error term

Note: The countries of origin refer to India, EU, China, Pakistan and Nigeria.

Once cointegration is established, the conditional ARDL long-run model can be estimated as follows:

$$\Delta lnPO_{import_{it}} = \alpha_0 + \delta_1 lnPO_{import_{t-1}} + \delta_2 lnGDP_{t-1} + \delta_3 lnProduction_{t-1} + \delta_4 lnCrushing_{t-1} + \delta_3 lnPSPO_{t-1} + \delta_4 lnPPO_{t-1} + \varepsilon_t$$

Equation (2)

Finally, the study looked at the short-run dynamic parameters by estimating an error correction model associated with the previously determined long-run estimates. The ARDL error correction model is expressed by the following equation:

$$\Delta lnPO_{import_{it}} = \alpha_0 + \sum_{i=1}^{p} \beta_{1i}\, \Delta lnPO_{import_{t-i}} + \sum_{i=0}^{q} \beta_{2i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{r} \beta_{3i}\, \Delta lnProduction_{t-i} + \sum_{i=0}^{s} \beta_{4i}\, \Delta lnCrushing_{t-i} + \sum_{i=0}^{t} \beta_{5i}\, \Delta lnPSPO_{t-i} + \sum_{i=0}^{u} \beta_{6i}\, \Delta lnPPO_{t-i} + \psi ECM_{t-1}$$

Equation (3)

where β_1, β_2, β_3, β_4, β_5, and β_6 are the short-run dynamic coefficients of the model's convergence to the equilibrium, ψ is the speed of the adjustment parameter, and ECM_{t-1} is the error correction term that is derived from the estimated equilibrium relationship of Equation (1). The coefficient of ECM_{t-1} is supposed to be significant and negative to show the speed of adjustment needed to achieve long-run equilibrium (and *vice versa*), especially when there is a shock in the economy. The diagnostic test examined the serial correlation, functional form, normality and heteroscedasticity associated with the model by employing the Lagrange Multiplier (LM) test. To ensure goodness of fit of the model, diagnostic and stability tests were conducted. The structural stability test was conducted to determine the stability of the model by employing the cumulative sum of recursive residuals (CUSUM) test and the cumulative sum of squares of recursive residuals (CUSUMSQ) test.

RESULTS AND DISCUSSION

Unit Root Test

Results for the unit root test are shown in *Table 1*. All the data were transformed into natural log. Testing for co-integration, a test of order of integration for each variable, was conducted using the Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) procedures. The results for both ADF and PP show that palm oil demand (DD), production,

TABLE 1. UNIT ROOT TESTS

Variable	Level		First difference	
	ADF	PP	ADF	PP
DD_{India}	-1.6028	-1.7981	-5.6100 ***	-5.6089 ***
GDP_{India}	2.4809	4.0703	-4.9674 ***	-4.9615 ***
$Production_{India}$	-2.4540	-2.5368	-6.0769 ***	-8.6013 ***
$Crushing_{India}$	-2.1388	-2.3240	-4.9674 ***	-6.0774 ***
DD_{EU}	-0.9698	-0.9226	-6.7495 ***	-6.7495 ***
GDP_{EU}	-1.4394	-1.4394	-4.1154 ***	-4.1480 ***
$Production_{EU}$	-0.4108	-0.3072	-8.5691 ***	-8.7358 ***
$Crushing_{EU}$	-1.6185	-1.3209	-8.4073 ***	-8.1295 ***
DD_{China}	-1.2083	-1.2589	-3.5057 **	-5.2969 ***
GDP_{China}	-1.3571	-1.2335	-4.0668 ***	-3.3687 **
$Production_{China}$	-1.0175	-1.3702	-8.4292 ***	-16.1132 ***
$Crushing_{China}$	0.2342	-1.0125	-4.7163 ***	-4.0772 ***
$DD_{Pakistan}$	-2.2775	-3.3548 ***	-6.7190	-6.7794 ***
$GDP_{Pakistan}$	-1.1011	-2.1841 ***	-3.6011	-3.5710 ***
$Production_{Pakistan}$	-1.0412	-1.1871 ***	-5.7996	-5.9760 ***
$Crushing_{Pakistan}$	-1.9923	-2.4755 **	-5.5385	-5.6529 **
$DD_{Nigeria}$	0.1664	-5.1758	1.2568 ***	-6.6111 ***
$GDP_{Nigeria}$	1.1958	-4.9098	0.8506 ***	-4.9067 ***
$Production_{Nigeria}$	-2.1009	-4.4259 *	-2.7578 ***	-4.3765 ***
PPO	-2.1080	-7.1530	-2.2349 ***	-2.8256 ***
PSPO	-2.8913 *	-7.4410 *	-6.5232 ***	-13.7256 ***

Note: *significant at 10% level, **significant at 5% level, ***significant at 1% level.

crushing capacity, GDP, palm oil price (PO) and price discount of palm oil against soyabean oil (PSPO) were stationary after first differenced or integrated to the order I(1).

The results of cointegration based on the bound test are presented in *Table 2*. This test is based on the Wald test or F-statistic, and is conducted against the null hypothesis of the presence of a long-run relationship between the variables. The F-statistic showed a higher value than the upper bound critical value at 1% (for EU and Pakistan) and 5% (for India, China and Nigeria) significance levels (Pesaran, 2001), indicating the presence of long-run relationships between the variables for all five countries in the study.

Long-Run Estimations

The empirical results of the five major markets for palm oil in the long-run models are presented in *Table 3*. The results indicate that GDP exerts a long-run positive influence on the demand for palm oil in India, EU, China, Pakistan and Nigeria. This means that palm oil is perceived by those countries as a normal product. The model showed that in the long run, for every 1.0% increase in GDP, India, EU, China Pakistan and Nigeria will increase their palm oil imports by 1.6%, 2.3%, 0.7%, 2.6% and 0.7%, respectively. Oils and fats production also influences the demand for palm oil in EU, China, Pakistan and Nigeria. For every 1.0% increase in production in EU, China and Nigeria, the demand for palm oil will increase by 1.0%, 0.6% and 0.6%, respectively, *i.e.* the demand for palm oil will increase in parallel with the production of oils and fats in those countries. The situation is different in Pakistan, where the production of oils and fats has a significant but negative relationship with the demand for palm oil. Every 1.0% increase in production will lead to a decrease in the demand for palm oil by 1.2%.

TABLE 2. COINTEGRATION TEST BASED ON THE BOUND TEST RESULTS

Country	F-statistic	1% lower bound value	1% upper bound value	5% lower bound value	5% upper bound value	10% lower bound value	10% upper bound value
India	4.9934	4.537	6.370	**3.125**	**4.608**	2.578	3.858
EU	7.3629	**4.537**	**6.370**	3.125	4.608	2.578	3.858
China	4.8775	4.537	6.370	**3.125**	**4.608**	2.578	3.858
Pakistan	9.4633	**4.537**	**6.370**	3.125	4.608	2.578	3.858
Nigeria	4.8775	4.768	6.670	**3.354**	**4.774**	2.752	3.994

TABLE 3. ESTIMATED LONG-RUN COEFFICIENTS USING ARDL APPROACH

Variable	India	EU	China	Pakistan	Nigeria
Constant	-14.6111** (3.2986)	-0.6524*** (10.3410)	-12.5092*** (2.5810)	-33.2790*** (7.2808)	-12.5092*** (2.5810)
GDP	1.6946*** (0.1653)	2.2624*** (0.5819)	0.6930*** (0.1663)	2.5575*** (0.6264)	0.6930*** (0.1663)
Production	-1.1900 (0.8194)	1.0242*** (0.3459)	0.5877*** (0.1520)	-1.1962** (0.4959)	0.5877*** (0.1520)
Crushing	0.2185 (0.8961)	-0.2008 (0.2696)	-	0.0556 (0.6409)	-
PPO	-0.6274*** (0.2146)	-0.2668** (0.1249)	0.0068 (0.1613)	-0.4450* (0.2719)	0.0067 (0.1613)
PSOY	0.0045*** (0.0001)	0.0006** (0.0002)	0.0019* (0.0011)	0.0021 (0.0013)	0.0019* (0.0010)

Note: * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

TABLE 4. ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL

Variable	India	EU	China	Pakistan	Nigeria
ΔDDPO(-1)	1.2961*** (0.1851)				
ΔDDPO (-2)	0.8553*** (0.1460)				
ΔDDPO (-3)	0.4282*** (0.1420)				
ΔDDPO (-4)	0.7509*** (0.1428)				
ΔDDPO (-5)	0.2903** (0.1118)				
ΔGDP	12.5684*** (1.5829)	0.7935 (0.6959)	-0.3125 (0.1903)		-0.3125 (0.1903)
ΔGDP(-1)	-	-2.2371*** (0.7623)	-0.3905* (0.2239)		-0.3905* (0.2239)
ΔProduction	-0.1119 (0.3576)		0.4404*** (0.1176)		0.4404*** (0.1176)
ΔProduction(-1)	0.7708** (0.2990)		0.1901 (0.1177)		0.1901 (0.1177)
ΔCrushing	-1.6106*** (0.4797)				
ΔPPO	0.0178 (0.1261)		-0.1465*** (0.0467)	-0.0500 0.0410)	-0.1465** (0.0467)
ΔPSPO		0.0006*** (0.0002)			
ΔPSPO(-1)		0.0003 (0.0002)			
ECT(-1)	-1.1576*** (0.1655)	-0.5961*** (0.0746)	-0.3912*** (0.0066)	-0.2731*** (0.0305)	-0.3912*** (0.0655)

Note: * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Another important factor that governed the palm oil imports by the five major markets is crushing capacity. The results show that the demand for palm oil has a significant negative relationship with crushing capacity in EU. Every increase by 1.0% in crushing capacity will lead to 0.2% decrease in the demand for palm oil. Besides that, the palm oil price itself also has a significant influence on the demand for palm oil in India, EU and Pakistan. Every 1.0% increase in palm oil price will result in the demand for palm oil in India, EU and Pakistan decreasing by 0.6%, 0.3% and 0.5%, respectively.

This study also found that in the long run the price of a substitute oil is an important element influencing the demand for palm oil. Price discount of palm oil against soyabean oil (PSPO) has a significant positive influence on the demand for palm oil in India, EU, China and Nigeria. For every 1.00% increase in PSPO, palm oil imports by those four countries will increase by 0.01%.

Short-Run Error Correction Models

The empirical results show that in the short run, lagged GDP has a significant negative relationship with the demand for palm oil in EU, China and Nigeria. The

exception is India where GDP has a significant positive relationship with palm oil imports. Lagged production has a significant positive influence on the demand for palm oil in India, China and Nigeria. Lagged crushing capacity shows a significant positive relationship with the demand for palm oil only in India. Meanwhile, lagged palm oil price has a significant negative influence on the demand for palm oil in China and Nigeria. Lagged price discount of palm oil against soyabean oil (PSPO) has a significant positive relationship with palm oil demand in EU. The error correction terms (ECT(-1)) show how much of the disequilibrium has been corrected, and the extent to which any disequilibrium in the previous period has been adjusted. A positive coefficient indicates a divergence, while a negative coefficient indicates convergence. This study shows the error correction terms (ECT(-1)) to be negative and highly significant. This shows that there is causality in at least one direction. For India, EU, China, Pakistan and Nigeria, the ECT coefficients are -1.16, -0.60, -0.39, -0.27 and -0.39, respectively, which indicate a higher rate of convergence to the equilibrium (*Table 4*).

CONCLUSION

The study found that there are relationships, both long-run and short-run, between various factors and the demand for palm oil in India, EU, China, Pakistan and Nigeria. Based on the results, the most significant influence is attributed to GDP (positive relationship), *i.e.* as GDP increases so also will the demand for palm oil. The price of palm oil has a significant but inverse relationship with the palm oil demand in India, EU and Pakistan. Similar observations were made by Hameed *et al*. (2016), in that palm oil and substitute oil prices as well as the national income of the importing countries are significant determinants of palm oil demand.

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