International Review of Business Research Papers
Vol. 8. No.7. November 2012. Pp. 94 – 103

An Empirical Analysis of the Import Demand for Palm Oil in the Five Leading Importing Countries

Amna Awad Abdel Hameed[1] and Fatimah Mohamed Arshad[2]

This paper investigates the behaviour of the palm oil import demand in its top importing countries (India, China, Bangladesh, Pakistan and USA). Five single equation models representing the demand in these countries have been analysed through utilizing the autoregressive distributed lag (ARDL) procedure. The findings of the study show that the palm oil and its substitute prices are significant determinants of palm oil demand across all the models excluding India while the national income has been found to play an important role in shaping the palm oil demand. Other factors such as, health concern induced government rules, trade liberalization policies and exchange rate also proved to be important factors affecting import demand for palm oil in some of these countries.

JEL Code: Q17, Q17

Key Words: Palm oil, Import demand, Bounds Test, cointegration.

1. Introduction

The fats and oils international trade patterns have experienced steady transformations over the last few decades. The ever-increasing role of developing countries in the oils and fat complex and the rising issues about the fat contents of different oils associated to health concern have elevated most of the changes within the industry. The international market has also been influenced by the establishment of various international trade agreements and the changing trade policies of governments all-around the world.

Various oils including soybean, palm, coconut, rapeseed, sunflower, and cottonseed oils are traded internationally. However, the trade patterns in the global vegetable oil industry, for the most part, are dominated by soybean and palm oils due to their major share in the world consumption of oils and fats. Until 2004, soybean occupied the top position of the global consumption of fats and oils. Since 2005, palm oil has become the highest widely consumed vegetable oil. Expanding world consumption of palm oil, mainly attributed to its price competitiveness among various competing oils, is met through increasing imports. Consequently, its contribution to the world fats and oils imports in 2010 stood at the vicinity of 60%, followed by soybean oil (15%), sunflower oil (7%) and Rapeseed oil (5%) while the rest of the 17 major commercial fats and oils , jointly, contributed only (13%) . Based on the average for 2008-2010, the biggest slice (18%) of the palm oil imports goes to India where, despite being a major producer of

[1] Research fellow and [2], Director, *Agriculture and Food Policy Studies Institute,*
Universiti Putra Malaysia,43400 Serdang Selangor, Malaysia
Tel: (+603)-8947 1076,Fax: (+603)-8947 1077
Email: amna.awad@gmail.com, fatimah@econ.upm.edu.my

oilseeds in the world, self –reliance in edible oils is not within reach and the country imports almost half of its edible oil requirements. Similarly, in China, the demand for vegetable oils cannot be met by domestic production and accordingly, it has become a major importer of vegetable oils, mainly palm oil, for the last two decades. Over the years 2006-2010, it accounted for 16% -19% shares in the world imports, occupying the first or second position among the top importers, alternately, with India, each of them, individually, surpasses the European countries, collectively, in terms of their palm oil imports. Pakistan has consistently been part of the top four world importers of palm oil. Beside those three countries, Bangladesh with lower shares is growing into a major import market for vegetable oils. A recent development is that U.S. government required that, by 2006, food labels list a product's content of trans-fat, coming from partially hydrogenated oil (a reportedly, major cause of heart disease). Many food processors are trying to reduce trans-fat by changing to other oils including palm oil. In 2004, U.S. imported about 50 percent more palm oil than in 2003 (Brown and Jacobson, 2005). The increase in imports went on to reach 990 thousand tonnes in 2010, despite the organized campaigns against the oil.

The increasing importance and complexity of the domestic and international vegetable oils markets and the growing significance of the palm oil among those oils, impels policy makers and other market participants to find tools that can give clear and timely answers for questions *vis-à-vis* the major factors affecting the demand for palm oil in the major fats and oils in the importing countries so as to formulate long-term targets and strategies to adjust their supply plans. Therefore, the objective of this study is to examine the palm oil import demand in the top five palm oil importing countries: India, China, Bangladesh, Pakistan and USA.

This study makes three noteworthy contributions to the existing literature on vegetable oils trade. First, the econometric methodology employed in this study uses the Bounds Test procedure (BT); a rather new cointegration technique developed by Pesaran *et al.* (2001), which has not been applied in the previous studies on palm oil import demand in the countries under study . Secondly, to our knowledge, this study uses different variables such as the impact of the recently introduced food content labeling requirement in USA and the changes in importing countries policy in India and Pakistan that have not been used in the previous studies. Thirdly, the study is conducted with more recent data than those used in the previous studies on this topic.

The remainder of the paper is organized as follows: the following section briefly summarises the Literature on the topic. Section 3 outlines the empirical methodology while Section 4 reports and discusses the results. A summary and some conclusions are presented in the last section.

2. Literature Review

The behaviour of palm oil trade either by itself or within the context of investigating its industry in the producing countries has been investigated in many studies. Most of them deal with its aggregate import demand. Those include the works of Talib *et al.* (2007) on the Malaysian and Indonesian palm oils and Abdullah on the Indonesian palm oils (2011)The studies that investigated the demand by individual countries include Suryana's work (1986) on US, EEC as a group and Japan; Lubis (1994) examined the export demand to India, Japan, US, UK and Netherlands within a market model for the

Malaysian palm oil; Yulismi and Siregar (2007) investigated the palm oil export from Indonesia and Malaysia to India, EU and China using data for the period 1990-2004. Rifin (2010) used annual data for the years 1964 until 2006 to analyze the import demand model for Indonesian and Malaysian palm oil export. Shariff *et al*. (2006) estimated the price and income elasticities of Malaysian palm oil export to China, India, Pakistan, Egypt and South Korea using annual data from year 1980 until 2003. Ernawati *et al.* (2006) examined the impact of trade liberalization on the export demand of Indonesian palm oil to India, China, EU and the rest of world through estimating export demand model for Indonesian palm oil with annual data for 1969-2004. Othman *et al*. (1995) investigated the impact of the American Soy Bean Association campaign against tropical oils on the US import patterns for palm oil and Awad *et al* (2007) examined the import demand for palm oil in the Middle East and North Africa region. Since all the aforementioned studies have been conducted from the exporting countries' perspectives, they concentrate on the trade policies adopted by those countries. Furthermore, those studies use simulation analysis i.e. they build their assessment of the impact of the trade policies based on assumed future scenarios. None of them tracked the impact of the actual changes in the importing countries' policies. This paper, therefore, is attempting to fill this void in the palm oil trade models in the major importing countries.

3. Methodology

3.1 Model Specification

To specify the appropriate model for answering the questions raised by this study some points must be considered. First, the study is conducted under the criterion of the imperfect substitution model. Second, since the studied countries do not individually, affect the vegetable oils and trade, each of them is considered as a small country. Therefore, the supply prices of different fats and oils faced by these countries are assumed to be exogenous. As price takers, individual countries meet highly elastic supply. Thus, using a single equation model can be appropriate and the determinants of palm oil import demand in country "I" (Q_i) was modelled with a common set of variables. The main explanatory variables suggested by economic theory are the income (GDP), palm oil price (POP), and the price of a substitute oil (STP). An exchange rate variable was found to be very important in trade models (Chambers and Just, 1979). Thus, an exchange rate variable (EX) was included in the initial model.

Trade policies are important tools of importer countries to realize a number of objectives that differ from one country to another according to the priorities of the governments. Hence, these policies are of crucial importance when trying to study the import demand. With limited land for oilseed cultivation, Bangladesh relies on import to fill the gap in the growing demand by its growing population and sustaining the local processing industry. Therefore, Bangladeshi Government imposes zero customs duty on imported oils. (PORAM, 2009 a). Other countries, *albeit* practicing liberalization to some extent do not afford high log-linear specification degree of liberalization, as they need to apply import duties to raise government revenue and protect domestic oilseed producers and processors. In the late 1980s and early 1990s, India practised self-sufficiency to reduce import of vegetable oils. However, trade policy reforms in the mid-1990s besides declining domestic oilseed production, stimulated the recovery of imports (Dohlman, *et al*. 2003). In 2003, Pakistan exempted all oilseeds from custom duty, mainly at the

expense of imported palm oil. This interpretation is consistent with the remark of the industry observers that the import tariff affects the whole import demand (PORAM, 2009b). A recent important objective of government policies is to improve the health characteristics of food through imposing rules like the aforementioned food labelling directive in USA. To capture the impacts of these policy adjustments, dummy variables denoted D_I, D_P and D_{US} were incorporated is incorporated in the models representing import demand in India, Pakistan USA, respectively.

Thus, the general log-linear specification of the demand for palm oil is explained as follows:

$$lnQ_{i_t} = \alpha_0 + \alpha_1 lnPOP_t + \alpha_2 lnSTP_t + \alpha_3 lnGDP_{i_t} + \alpha_4 lnEX_{i_t} + \alpha_5 D_i + \varepsilon_i \quad (1)$$

α_0 is constant and ε is an error term bounded by the classical statistical properties.

The a priori expected signs of the regression coefficients are as follows $\alpha_1<0$, $\alpha_2>0$, $\alpha_3>0$, $\alpha_4<0$. The dummy variables for India and Pakistan are expected to carry negative sign whereas that of USA is expected to be positive.

Several different specifications of the general model were tried, and the results from each model were tested for statistical significance of the estimated coefficients as well as for consistency with economic theory. After discarding the model specifications that do not meet all these preconditions, the following model specifications have been selected as the final models for individual countries:

$$\text{Bangladesh: } lnQ_B = C - \beta_1 lnPOP + \beta_2 lnRSP + \beta_3 lnGDP_B + U \quad (2)$$

$$\text{China: } lnQc = C - \beta_5 lnPOP + \beta_6 lnSOP + \beta_7 lnGDPc + \beta_8 lnNEER_C + U \quad (3)$$

$$\text{India: } lnQ_I = C - \beta_9 lnPOP + \beta_{10} lnRP + \beta_{11} lnGDP_I + \beta_{12} lnEX_I + \beta_{13} D_I + U \quad (4)$$

$$\text{Pakistan: } lnQ_P = C - \beta_{14} lnPOP + \beta_{15} lnSOP + \beta_{16} lnGDPP + \beta_{17} D_P + U \quad (5)$$

$$\text{USA : } lnQUS = C - \beta_{18} lnPOP + \beta_{19} lnSOP + \beta_{20} lnGDPP + \beta_{21} D_{US} + U \quad (6)$$

Where:
Qs and GDPs with subscripts B, C, I, P and US refer to the import demanded quantities and GDPs in the countries with their respective initials. POP, SOP and RSP are the nominal prices of palm, soybean and rapeseed oils respectively, in USD/ tonne; RP is relative (palm to soy oils) price. EX_I and $NEER_C$ are the nominal and nominal effective exchange rates for India and China, respectively against the US Dollar.
D_I=1 for observations 1988-1994, 0 elsewhere.
D_P and D_{US}= 1 from 2004 onwards ,0 elsewhere.
C is intercept.
U is error term.

3.2 Model Estimation Method

Empirical studies show that most of the time series are not stationary. Since regressions between non-stationary variables may be subject to the problem of spurious regression, Co-integration and general-to-specific approaches are utilized to model the above mentioned relationships. A number of cointegration estimation methods have been

recommended. They include the Engle and Granger (1987), Johansen's (1996) full information maximum likelihood, Philips and Hansen's(1990) and fully modified OLS procedures. A relatively recent procedure known as the bounds testing (BT) procedure developed by Pesaran et al. (2001), have been proposed for investigating the long-run equilibrium relationships among time-series variables. The Engle- Granger method has been criticized in the literature for several weaknesses, which include small sample bias due to the exclusion of the short-run dynamics, the problem of normalization in systems with more than two variables and the incapability to test hypotheses concerning the estimated coefficients in the long-run relationships. Although the procedures developed by Johansen and Philips and Hansen avert some of these problems, their procedures (along with the Engle-Granger method) entail that the variables included in the model are integrated of order one i.e. the variables are I(1). In this study, the(BT) is employed for cointegration analysis since it can be applied whether the regressors are purely I(0), purelyI(1), or mutually cointegrated (Pesaran et al., 2001). Besides, it is robust for small sample as the case in this study. Furthermore, the BT approach is possible even when the explanatory variables are endogenous (Alam and Quazi, 2003).

The bounds test is basically computed based on an estimate of unrestricted error-correction models unrestricted error correction model (UECM) or error correction version of autoregressive distributed lag (ARDL) model, by Ordinary Least Squares (OLS) estimator (Pesaran et al., 2001). Since the inclusion of a linear time trend was not supported by the data, the specifications we use here are with an unrestricted intercept and without (Case III in Pesaran et al., 2001and Narayan, 2005) The UECM based on the import demand Equation (1) can be written as below:

$$\Delta \ln Q_{i_t} = \theta_0 + \theta_1 D + \pi_{QQ} \ln Q_{t-1} + \pi_{QX.X} \ln X + \sum_{i}^{p-1} \phi_i \Delta \ln Z_{t-i} + \omega' \Delta \ln X_t + U_t \quad (7)$$

where x represents the regressors ($InPOP_t$, $InSOP_t$… etc), z represent all the variables used in the specified model and π_{QQ} and $\pi_{QX.X}$ are long-run multipliers. The BT is the Wald test (F-statistic version of the bounds testing approaches) for the lagged level variables in the UECM i.e. it investigates the absence of a level relationship between Q_t and X_t, through excluding the lagged level variables of InQ and InX in UECM given by Equation (7). Thus, the absence of a level relationship between y, and x, is a test of the joint null hypothesis $\pi_{QQ}=\pi_{QX.X}=0$ in Equation (7). If the F-statistic surpasses upper critical bound, then the null hypothesis of no cointegrating relation can be rejected. If it falls below the lower critical bound, we cannot reject the null hypothesis. Alternatively, if it falls between the two bounds, an irrefutable inference cannot be achieved. Here, the order of integration, I(d) for the explanatory variables must be known before any conclusion can be reached (Pesaran *et al*.2001).

3.3 Data Sources and Description

Time range of the data for Bangladesh and Pakistan are over the periods 1979-2010 and 1978-2010 respectively whereas those for the rest of the countries extend over the period 1977-2010. Annual data vegetable oils prices were available from Oil World Annual. The Data on GDP and exchange rates were available from International Financial Statistics of the International Monetary Fund.

4. Results and Discussion

The first step in applying the bounds testing is to specify an optimal lag length for the UECM. The Schwartz Bayesian (SBC) and Akaike Information (AIC) criteria are used in this study to choose an appropriate lag order of the model specification with the maximum lag length set equal to 3. According to the results the lag length of one is selected for all the models[i].

Table 1 summarises the results of the bounds test. Given the relatively small sample size in the present study, we extract the appropriate critical values from Narayan (2005) which were generated for small sample sizes of between 30 and 80 observations. The conclusion drawn from those results is that the presence of a cointegrating relationship among the variables included in all models was established.

Table 1. F-Statistics for Testing the Existence of Long-run Relationships

Country	F-Statistics
Bangladesh	13.3547***
China	5.7366**
India	9.0216***
Pakistan	9.2737***
USA	4.1675*

Asterisks *, **and *** denote10%, 5% and 1% significance levels respectively.

Having found a long-run relationship, the specified model for each country was estimated using the SBC for model selection because it chooses the most parsimonious one (Morimune & Mantani, 1995). It selected ARDL(1,1,0,1) for Bangladesh, ARDL(1,0,0,1,0) for China, ARDL(1,0,0,0) for India and (1,0,0,0,0) for Pakistan and USA. In order to confirm the robustness of the model specification suggested in this study, several diagnostic tests are conducted. The diagnostic test statistics of the specified ARDL models are displayed along with the empirical results for the short-run in Table 3. The results of those tests suggest that the import demand functions used in this study are properly specified, verified their stability throughout the sample period and, accordingly, the estimations of the long and short-run dynamics based on those models are reliable.

The findings of the long–run estimation are displayed in Table (2). Almost all the estimated coefficients are statistically significant and their signs are consistent with theory. Those findings suggest that the import demand functions used in this study are appropriately specified. Since the models are specified in the double log form the estimated coefficients of the variables give the constant elasticities. Apart from India, the coefficients of palm oil and its substitute price variables in all the models are statistically highly significant and the long-run elasticities of the demand with respect to its own price across those countries are high, which imply that they play an important role in shaping the palm oil demand and the high substitutability between them there. However, the results show that the coefficient of relative price of palm to soybean oils is insignificant and inelastic suggesting the low substitutability of palm oil which makes it a necessary commodity. The soybean oil proved to be a substitute for palm oil in India, China, USA and Pakistan, while rapeseed oil came out to be an important substitute for it in Bangladesh.

Moreover, the results reveal that the GDP is the most sequential variable across all the studied countries except USA probably as it negligible portion of the USA budget. However, in terms of the demand elasticity, the findings showed different degree of responsiveness to this factor in of the countries under study. The results detected very high sensitivity of demand to changes in GDP, amounting to more than unity, in India and China, supporting the views that the fast growing economies in those countries sparked the demand for oils. On the other extreme, the results indicate low income elasticity for the demand in Bangladesh, Pakistan and USA. Higher nominal and nominal effective exchange rates turned out to have significant negative effect on the import demand for palm oil in both India and China as it increases the import prices in terms of their local currencies. Oil seed and oils trade policy in Pakistan undergoes frequent changes to enable the industry to capture the value-added benefits from local crush. The results show that the coefficient of dummy variable carrying the value of one after 2004 have a significant negative effect on the palm oil import demand there. This is a plausible result as in June 2003, Pakistan exempted all oilseeds from custom duty and it, however, imposed a 20 percent sales tax. This development boosted the demand for oilseeds at the detriment of palm oil (FAO, 2006). Likewise, the demand in India was negatively affected by government policies aimed reducing the reliance on vegetable oils imports by increasing self-sufficiency in these oils. The recent

Table 2: Estimated Long-run Coefficients Using the ARDL Approach (Dependent Variable is lnQ)

Regressors	Bangladesh	China	India	Pakistan	USA
lnPOP	-2.158**	-5.00***	-	-2.6528**	-1.9291**
	(-2.189)	(-3.797)		(-2.4369)	(-2.6723)
lnSOP	**-**	3.714**	-	. 3.0746**	2.0633**
		(2.493)		(2.3187)	(2.4897)
lnRSP	2.76**	-	-	-	-
	(2.458)	-	-.42886	-	-
lnRP			(-.4981)		
lnGDP	.563**	1.5811***	1.03***	.42234***	.1542
	(2.464)	(8.1395)	(3.7449)	(3.7407)	(.88078)
lnEX	-	-	-.9739*	-	-
			(-1.908)		
lnNEER	-	-1.924***	-	-	-
		(-4.200)			
C	(-3.24)	-3.9997	.9812	1.0072	8.5400**
	(-1.141)	(-1.3712)	(.9423)	(.45808)	(2.4411)
D_I	-	-	-1.6256***	-	-
			(-6.1126)		
D_P	-	-	-	-.6089*	
				(-1.897**)**	
D_{US}	**-**	**-**	**-**	.-	1.4601***
					(-4.7218)

Notes: Country notations in the variable symbols are suppressed for writing convenience (Q,and GDP are palm oil imports and GDP, respectively, for the relevant country).
Figures in parentheses are the T-Ratio values. Asterisks *, **, *** denote 10%, 5% and 1% significance levels.

The results of the error correction representations for the selected ARDL models corresponding to palm import demand functions throughout the selected countries are displayed in Table (3). The error correction terms were found to be statistically highly

significant and they carry negative signs, giving additional evidence as to the existence of long term causal relationships between the variables of all the equations.

Table 3: Error Correction Representations for the Selected ARDL Models (Dependent Variable = dLNQ)

Regressors	Bangladesh	China	India	Pakistan	USA
ΔlnPOP	-1.7753***	-2.4557***	-	-.59476***	-.83871***
	(-3.1274)	(-4.371)		(-4.0755)	(-2.9382)
ΔlnSOP	-	1.8230**	1.028*	.68935***	.89704**
		(2.6904)	(1.8698)	(3.8115)	(2.5575)
ΔlnRSP	1.567**	-	-	-	-
	(2.586)				
ΔlnRP	-	-	-.34173	-	-
			(-.49980)		
ΔlnGDP	2.71**	1.2413***	.82042***	.094692*	.067043
	(2.073)	(6.0365)	(3.0727)	(-1.73396)	(.92736)
ΔlnEX	-	-	-.77603*	-	-
			(-1.7652)		
ΔlnNEER	-	-.94465***	-	-	-
		(-3.3026)			
ΔD_I	-	-	-1.2954***	-	-
			(-5.9775)		
ΔDp	-	-	-	-.13651*	-
				(-1.7996)	
ΔD_{US}	-	-	-	-	.63482***
					(3.5382)
ΔC	-1.84	7.3426***	.78188	.22581	3.7129*
	(-1.14)	(3.1507)	(.97425	(.43696)	(1.9791)
ect(-1)	-.567***	-.49075***	-.79683***	-.22421***	-.43477***
	(-10.39)	(-5.8398)	(-7.7783)	(-2.8141)	(-4.3930)
$\overline{R}^2$	.86986	.81113	.67470	.52037	.51177
Diagnostic Tests					
Serial Correlation(χ^2_{Auto})	1.813[.178]	.521[.470]	014[.907]	.109[.741]	2.781[.105]
Functional Form(χ^2_{Reset})	.8713[.363]	.147[.701]	.08[.776]	.0276[.868]	.254[.614]
Normality(χ^2_{Nor})	.1499[.143]	2.205[.332]	822[.663]	.3444[.842]	2.771[.250]
Heteroscedasticity(χ^2_{Hetero})	.607[.436]	.390[.532]	.095[.758]	.067[.796]	1.579[.158]

Notes: Refer to the notes in Table 2; Δ denotes the first difference of the variables; ect is the lagged error correction term. Numbers in square brackets are *p* values.

Furthermore, the magnitudes of lagged error correction term coefficients which indicate annual adjustment rate to equilibrium the across the countries under study ranges from very low of 22% in Pakistan to a very high adjustment rate of 80% in India, indicated by their one year lagged error correction terms of -0.22 and -0.80, respectively. Additionally, the magnitude of the lagged error correction term coefficient (-.57) for Bangladesh imply that 57% of the disequilibrium is corrected every year, which is quite fast. However, China and USA attained quite low rates of adjustment of 49% and 43 % respectively.

5. Conclusions

The results of this study provide the following findings or conclusions. First, the palm oil price variable across the five models was found to be significant, and the demand for the oil in all the studied countries except India, turned to be highly sensitive to this factor. Secondly, the prices of soybean and rapeseed oils that turned to be the most important substitute for palm oil in all countries has been found to be an important determinants for palm oil demand. From a policy perspective, these findings emphasize the need for reorientation of palm oil marketing policies, in the exporting countries, in a way that would make it possible for them to capture the ever-increasing market share through adopting suitable price policies. Formulation of highly competitive pricing strategies is imperative, considering the high substitutability of palm and soybean oil in the edible and non-edible usage and, to some extent, the substitutability of palm and rapeseed oils for food and industrial purposes. The study reveals that the level of income is positively related to the palm oil import demand in almost all the countries. Additionally the exchange rate proved to be an important factor affecting the import demand in both India and China. From policy point of view these conclusions highlight the necessity of monitoring the performance of these two macro-variables in the importing countries. The recognized important role played by the import tariff imposed on imported oils in shaping the overall import demand, indicates the necessity of the involvement in the bilateral and multilateral trade agreements that contain removal of tariff barriers to open the way for palm oil among other vegetable oils. The USA government directive that requires food labels list a product's content of trans-fat, coming from partially hydrogenated oil seems to be beneficial to the palm oil industry which implies the need for more extensive continuous effort to exploit this development to capture the growing USA market for the oil there. Besides, this result point at the importance of the informational campaign in shaping the market. Therefore, it is very important to augment activities directed towards enhancing the image of palm oil to counter the campaigns that try to portrait it as a "Cruel Oil" through raising health and sustainability issues.

Endnotes

[i] The Lag Length Selection test results are available upon request from the author.

References

Alam, M.I. & Quazi, R. M. 2003. 'Determinants of Capital Flight: an Econometric Case Study of Bangladesh'. *International Review of Applied Economics*, vol.17, no1, pp.85-103.

Awad, A; Arshad, FM, Shamsudin, MN and Yusof Z. 2007. 'The Palm Oil Import Demand in Middle East and North African MENA Countries', *Journal of International Food and Agribusiness Marketing*, vol. 19, 2/3, pp.143-169.

Brown, E and Jacobson , M.F., 2005, *Cruel Oil: How Palm Oil Harms Health, Rainforest & Wildlife* , Centre for Science in the Public Interest, Washington, DC.

Chambers, R. and Just R. 1979. 'A Critique of Exchange Rate Treatment in Agricultural Trade Models' . *American Journal of Agricultural Economics*, vol. 61, pp.249-57.

Dohlman,E. Persaud,S and Land, R. 2003, *India's Edible Oil Sector: Imports Fill Rising Demand*, United States Department of Agriculture Outlook.

Engle, R. F. & Granger, C.W.J. 1987. 'Co-integration and Error-Correction: Representation, Estimation and Testing'. *Econometrica*, vol.55, 251-276.

Food and Agriculture Organization of the United Nations (FAO) 2006. *Policies for Basic Food Commodities 2003-2004*. Food and Agriculture Organization of the United Nations, Rome.

Granger, C. W. J. 1983. 'Co-integrated Variables and Error-Correcting Models', University of California, San Diego, *Discussion Paper* pp.83-113.

Johansen, S. 1996. *Likelihood-Based Inference in Cointegrated Vector-Autoregressive Models*. 2nd edition, Oxford, Oxford University Press.

Lubis, A., 1994. 'Malaysian Market Model for Palm Oil: Some policy Simulations. Unpublished PhD Dissertation, Faculty of Economics and Management' University Putra, Malaysia.

Narayan, P. K. 2005. 'The Saving and Investment Nexus for China: Evidence from Cointegration tests', *Applied Economics* vol.37, pp.1979–90.

Oil World, *Oil World Annual*, ISTA Mielke GmbH, Hamburg, various issues.

Othman, J., Houston, E.J. and Ames, G.CW. 1995. 'Non-economic Distortions in International Agricultural Trade: The Case of Palm Oil in the U.S'*. Journal of International Food & Agribusiness Marketing*, vol. 72, pp.79-89.

Palm Oil Refiners Association of Malaysia PORAM 2009a. Bangladesh Oils & Fats Profile @ http://www.poram.org.my/, viewed 10th October 2010.

Palm Oil Refiners Association of Malaysia PORAM 2009b. Pakistan Oils & Fats Profile @ http://www.poram.org.my/, viewed 10th October 2010.

Pesaran, M. H., Shin, Y., and Smith, R. J. 2001. 'Bounds Testing Approaches to the Analysis of Level Relationships'. *Journal of Applied Econometrics*, vol.16, pp.289-326.

Phillips, P. C. B. and Hansen, B. E. 1990. 'Statistical Inference in Instrumental Variables Regression with I 1 Processes'. *Review of Economic Studies*, vol. 57, pp.99-125.

Suryana, A. 1986, 'Trade Prospects of Indonesian Palm Oil in the International Markets for Fats and Oils'. Unpublished PhD Dissertation, North Carolina State University.