Market Potential and Challenges for the Malaysian Palm Oil Industry in Facing Competition from Other Vegetable Oils

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ABSTRACT

The market potential for oils and fats remains good into the future considering the increases in population, income as well as per capita consumption especially in countries with currently low income and low consumption. However, the challenges are that most of the oils are inter-substitutable and therefore in competition with each other. Thus, countries impose support measures to gain markets for their products. This paper examines the market potential and challenges of the Malaysian palm oil industry in facing competition from other vegetable oils. There exists a relationship between vegetable oil prices in the long-term and short-term because they are co-integrated. The vector error correction model (VECM) was used to distinguish the long- and short-term relationships between the vegetable oil price variables. This test determined the oils in close competition with one another as well as established the bi-directional causality between the oils. The former means that two or more oils can influence each other. In general, it was concluded that palm olein is a price leader to certain vegetable oils and the challenge lies in making it the main price leader in the vegetable oils and fats sector. This can be achieved by palm oil producing and exporting countries having their own market intelligence to confer an advantage in preparing better competing strategies.

INTRODUCTION

There are more than 17 major oils and fats produced and traded in the world. In 2003, 44.69 million tonnes of oils and fats entered into world trade. Palm oil with exports of 21.68 million tonnes accounted for 48.9% or the largest share, ahead of soyabean oil with 9.64 million tonnes (21.6%). Trade in the other oils and fats totalled 9.5 million tonnes and accounted for 29.5%. Palm oil production contributed to 22% of the world's oils and fats production. It was the second largest contributor to the world supply of oils and fats.

Malaysia is the world's largest producer and exporter of palm oil, where in 1980 production started with 2.5 million tonnes, or 53.6%

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of total palm oil produced, and increased to 13.35 million tonnes (47.8%) in 2003. The export volume of palm oil by Malaysia then was 2.27 million tonnes and increased to 12.26 million tonnes in 2003, accounting for 91.8% of the total palm oil produced by the country. In the same period, production of palm oil from Indonesia increased from 0.691 million tonnes to 10.3 million tonnes.

In view of the above situation, this paper examines the market potential and challenges to the Malaysian palm oil industry in facing competition from other vegetable oils. In doing so, a price leader among the vegetable oils and fats would be determined based on VECM. The long- and short-term relationships between the prices of RBD palm olein and those of other vegetable oils as well as the causality direction between RBD palm olein and its close substitutes are also investigated using multiple methods analyses. Monthly data from January 1990 to June 2004 are utilized.

MARKET POTENTIAL

The trade in oils and fats is influenced by the complex inter-relationships of the demand-supply balance of the major oils and fats and their co-products, the oil cakes or oil meals. Demand for oil meals has an impact on the demand for the oils and consequently the prices of the oils. Demand for the latter also depends on the degree of substitutability between vegetable oils traded in the international market.

Basically, the demand for oils and fats is determined by three factors, population growth, economic growth and per capita consumption. It is estimated that by 2015, the population of the world would exceed 6.8 billion people from the current 6.4 billion. The world average population growth is estimated at 1.5% a year. The majority of growth would occur in Asia implying that the population of the world and Asia in particular is becoming potential market users, while observation indicates less proportion of the world are involved in producing food and agriculture products. Thus, in the case of oils and fats, it too evidently means that there would be an increase in their demand.

However, population is just one of the factors that affect demand. Another important factor is income. In the case of low income countries, any additional income would be spent on food while for high income countries, the additional income would be spent on higher quality products or to have a higher quality life.

World caput use of oils and fats has been increasing over the years and averaged 19.91 kg in 2003. Countries with low caput use are in Africa (10.09), Asia (15.41) and the ex-USSR (17.6). These countries have an estimated population of 4.88 billion, or 77% of the world population. To reach the world average of 19.91 kg caput use, the current population would require an additional 25.86 million tonnes of oils and fats. Thus, low income countries would increase their consumption of oils and fats, since their per capita consumption is still low. With expected increases in income in the still developing countries, it implies that the potential market demand for oils and fats is high in the future.

CHALLENGES FOR THE MALAYSIAN PALM OIL INDUSTRY

As indicated earlier, there are more than 17 oils and fats traded in the global market. World production had been increasing yearly - in 1985, it was 69 million tonnes and in 2003 124.4 million tonnes, an annual increase of 4% (about 3 million tonnes). In 2003, soyabean oil accounted for the largest production at 25% of total oils and fats. Palm oil, 27 million tonnes, contributed about 22% of the world production and with its co-product, palm kernel oil, at 3.2 million tonnes together contributed 24.6% of the total oils and fats production. Palm oil was the second largest contributor to the world supply of oils and fats. Rapeseed oil, tallow and grease, and sunflower oil accounted for 10%, 7.6% and 6.4%, respectively. The above five oils (excluding palm kernel oil) contributed 71% to the world production of oils and fats. The balance of 29% was accounted for by the other 12 oils and fats.

Even though, the potential market demand for oils and fats is good in the future, the challenge is to ensure that the demand continues to increase, especially for palm oil. A world competitive index for four major vegetable oils - palm, soya, canola and sunflower has been developed by MPOB. The index is based on 10 attributes - price, image, supply assurance, quality functionality, customer support services, cost of production yield, R&D and subsidy. Based on the index, palm oil is the most competitive at 79.44%, followed by canola oil (58.69%), soya oil (56.74%) and sunflower oil (54.14%). However, it is difficult for palm oil to maintain its competitive stand due to agriculture being one of the most protected and heavily subsidized industries. Trade distorting measures in the form of agriculture production subsidies, export assistance programmes, import quotas, *etc*, continue to challenge the competitiveness of palm oil.

Import tariffs continue to be imposed on agricultural products and averaged about 60% worldwide. Tariff-rate quotas

(TRQs), sanitary or phythosanitary (SPS) restrictions and other non-tariff barriers are imposed on some food imports. Domestic production support programmes are also practiced by some countries, resulting in distorted production levels and trade flows. Export subsidies are also provided by some countries to dump surpluses and this affects output from the more efficient producers.

On 1 August 2004, the General Council on the Doha programme adopted the principle that the long-term objective of the Agreement on Agriculture is to establish a fair market-oriented trading system through a programme of fundamental reforms. Agriculture is of critical importance to the economic development of each member country and they must be able to pursue agriculture policies supportive of their development goals, poverty reduction strategies, food security and livelihood concerns.

The Doha Ministerial Declaration also calls for substantial reductions in trade-distorting domestic support, with the view of phasing out all forms of export subsidies to substantially improve market access. It also incorporates full access to special and differential treatment provisions. In addition, it excludes the reduction commitments to the least-developed countries.

The Agreement on Agriculture is amended to enhance monitoring so as to ensure full transparency through timely and complete notifications with respect to commitments in market access, domestic support and export competition.

Currently, with all the trade distortions - market access and non-tariff barriers - faced by the Malaysian palm oil industry, it has been able to survive and face the challenges. Indeed, all the other palm oil producing countries have done so as indicated by the continuous production increases depicted in *Table 1*.

TABLE 1. WORLD PRODUCTION OF PALM OIL BY MAJOR COUNTRIES (1000 t)

Country	1980	1990	2000	2001	2002	2003
Ivory Coast	182	270	266	205	240	240
Nigeria	433	580	740	770	775	785
Colombia	74	226	524	548	528	527
Ecuador	37	120	250	228	241	247
Indonesia	691	2 413	6 950	8 080	9 370	10 300
Malaysia	2 576	6 095	10 840	11 804	11 908	13 354
Thailand	13	232	560	625	600	640
PNG	35	145	296	329	316	325
Others	768	934	1371	1 410	1 446	1 502
Total	4 804	11 014	21 797	23 999	25 424	27 920

Source: Oil World (various years).

World production of palm oil in 1980 was 4.8 million tonnes and increased to 27.92 million tonnes in 2003. The largest and second largest world producers were Malaysia and Indonesia. Production by Malaysia increased from 2.57 million tonnes in 1980 to 13.35 millions tonnes in 2003. In the same period, Indonesian production increased from 0.691 million tonnes to 10.3 million tonnes. In this period, the share of Malaysian to global palm oil production declined from about 54% to 48% while that of Indonesia increased from 14.4% to 37%. Other countries that showed an upward trend were Thailand, Nigeria, Colombia and Ecuador. This would mean that palm oil producing and exporting countries are competing for market share with one another, especially Malaysia and Indonesia, considering that both countries are the largest producers and exporters of palm oil products to the world. Hence, with the new Doha agreement, it is hoped that this industry will perform better.

Apart from competing with one another for markets, palm oil is also facing challenges from other vegetable oils, such as the soyabean oil, rapeseed oil, sunflowerseed oil and other vegetable oils that are substitutable. The supply and demand for vegetable oils in the world market play a significant role in determining the prices of vegetable oils including that of Malaysian palm oil. The substitutability between oils and fats, has increased through advancements, in technology that allow the oil characteristics to be modified so that they have become more versatile. Thus, the price of a vegetable oil is determined by its versatility in applications. Based on economic perspectives, an increase in supply and with constant demand will fall. Therefore, it is important that new uses and new markets be established to confer the oil an edge over other oils and fats.

As indicated in *Table 2*, palm oil, soyabean oil, sunflower oil and rapeseed oil jointly accounted for 72% of the total vegetable oils produced in 2003. However, in trade only 44.69 million tonnes of oils and fats entered the international market. Palm oil, with exports of 21.86 million tonnes, accounted for 48.91%, or the largest share, ahead of soyabean oil at 9.64 million tonnes (21.6%).

TABLE 2. WORLD PRODUCTION AND TRADE IN MAJOR OILS (1000 t)

Oil	Production		Trade	
	2003	%	2003	%
Palm oil	27 920	24.95	21 857	48.91
Soyabean	31 284	27.96	9 636	21.56
Sunflower	8 915	7.97	2 629	5.88
Rapeseed	12 548	11.21	1 064	2.38
Cotton	3 964	3.54	163	0.36
Groundnut	4 526	4.05	230	0.51
Coconut	3 295	2.95	2 060	4.61
Palm kernel	3 314	2.96	1 718	3.84
Others	16 133	14.42	5 334	11.94
Total	111 899	100	44 691	100

Source: Oil World (various years).

Export of sunflower seed oil was 2.63 million tonnes accounting for 5.9% of the world trade while that of rapeseed oil was 1.06 million tonnes or 2.4%. These four oils contributed 79% to the total trade in oils and fats.

Considering the large share contributed to production and exports by these four oils, they are more likely to influence the overall price of vegetable oils in the world market. With the fact that palm oil accounts for nearly 50% of the trade in oils and fats, there is a strong possibility that palm oil can be the leader in the oils and fats sector. These notations are examined and the result revealed in the following sections.

The four major oils have similar end-uses in the food industry. For example, they are used for cooking, frying, to produce margarine, shortening, blended oils, *etc.* Substitution can be made between these four oils in their end-products and thus they are mutual competitors. In terms of price, they tend to closely in tandem with premiums and discounts common among them. It is important to note here that more than 17 palm oil products are traded from crude to fractionated semi-processed to fully processed products. However, among the palm products, the most demand is for RBD palm olein which share of trade has increased over the years reach about 57% in 2003 from 49% in 1990. Thus, in this paper, the price of RBD palm olein is used to represent palm oil prices. The other oils are traded in the crude form. Therefore, given their substitutability, the prices of vegetable oils are expected to have co-movements in the long-term.

The prices of the selected vegetables oils (RBD palm olein, soyabean, rapeseed and sunflower) are graphically shown in *Figure 1*. They display similar but not identical patterns. They exhibited an upward trend in late 1990 and peaked in May 1998. The price of sunflower oil (USD 855/t) was the highest, followed by RBD palm olein, a fully processed palm oil product (USD 750/t), rapeseed oil (USD 673/t) and soyabean oil (USD 671/t). The prices then declined to their lowest in February 2001 when, the price of sunflower oil was USD 390/t, rapeseed USD 338, soyabean USD 302 and RBD palm olein USD 267. Not withstanding thus, sunflower oil was always the highest and the RBD palm olein price almost always the lowest.

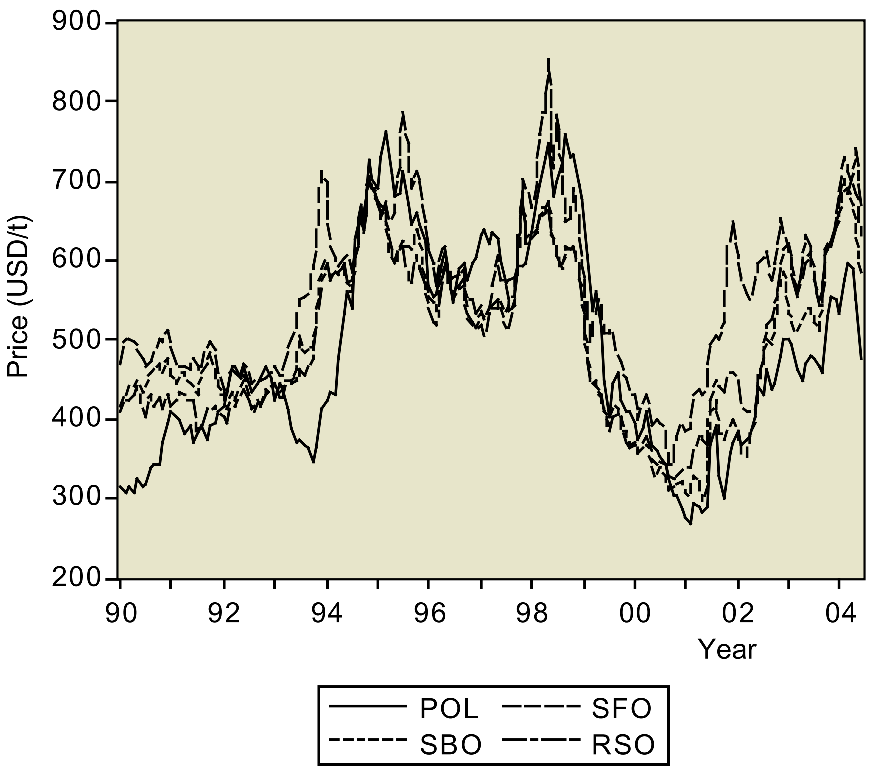


Figure 1. Prices of palm olien (POL), soyabean oil (SBO), sunflowerseed oil (SFO) and rapeseed oil (RSO) (USD/t) (January 1990 to June 2004).

PALM OIL IN THE WORLD OF OILS AND FATS SCENARIO: AN EMPIRICAL ANALYSIS

When two variables fluctuate in tandem, they are said to be co-integrated. Co-integration is taken as the statistical expression of the notion of equilibrium in economics. In this analysis, the variables were the prices of the selected oils. Granger (1986) pointed out that a necessary condition for co-integration is that each of the variables should be integrated to the same order (more than zero) or that all the series should have a deterministic trend. For this purpose, the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests were utilized. The results indicated that all variables were non-stationary at the absolute value. However, when the ADF and PP tests were carried out on the first difference in the data, the results depicted all the variables stationary at the 1% significance level (*Table 3*).

The Johansen-Juselius co-integration test was carried out to determine the long-term relationship between the vegetable oil prices. Only one vector co-integration existed from lag 1 until lag 4 (*Table 4*). The results confirmed the long-term relationships between the vegetable oil prices indicating that they have co-integrating characteristics. Hence, the vegetable oil prices move in tandem in the long-term.

The VECM approach was also utilized to distinguish between the short-term and long-term causality of prices. Causality or causation is the relationship between causes and effects. The causality of two variables describes the extent of one variable is caused by the other. When there is causality, there is a measure of predictability between the two variables. *Table 5* summarizes the causality test results from lag 1 until lag 6. To make it easier for interpretation, the results are separated into four parts. The first part focuses on the short-term relationship between vegetable oil prices. The second part examines the long-run relationships between the vegetable oil prices. The causality pattern is discussed in part three while which vegetable oil is the price leader is covered in part four.

TABLE 3. UNIT ROOT TEST

Variable	ADF		Phillips-Perron (PP) test	
	No. trend	Trend	No. trend	Trend
	Level			
POL	-1.7999(2)	-1.7480(2)	-1.9399(1)	-1.8761(1)
SBO	-1.6667(2)	-1.1957(2)	-1.5315(1)	-1.4987(1)
RPO	-1.5961(1)	-1.6206(1)	-1.4196(1)	-1.4425(1)
SFO	-1.7852(2)	-1.8125(2)	-2.0662(1)	-2.0851(1)
	First difference			
POL	-4.5796(3)*	-4.6103(3)*	-10.6671(1)*	-10.6829(1)*
SBO	-10.2106(1)*	-10.1969(1)*	-10.3300(1)*	-10.3078(1)*
RPO	-9.0717(1)*	-9.0543(1)*	-10.2756(1)*	-10.2543(1)*
SFO	-10.1657(1)*	-10.1373(1)*	-11.0768(1)*	-11.0459(1)*

Notes: The final lag length optimum is indicated in parenthesis with criteria Akaike (AIC).
* indicates significant at 1%.

TABLE 4. JOHANSEN-JUSELIUS CO-INTEGRATION TESTING

Lag 1		λ-trace	
		Co-integrating vector	Critical values
H_o	H_1		99%
r = 0	r • 1	67.3221**	61.24
r - 1	r • 2	33.7347	40.49
r - 2	r • 3	15.3201	23.46
r - 3	r = 4	4.0390	6.40
Lag 2			
r = 0	r • 1	61.5171**	61.24
r - 1	r • 2	32.5631	40.49
r - 2	r • 3	15.5727	23.46
r - 3	r = 4	3.5017	6.40
Lag 3			
r = 0	r • 1	68.2292**	61.24
r - 1	r • 2	39.9906	40.49
r - 2	r • 3	16.7356	23.46
r - 3	r = 4	4.1241	6.40
Lag 4			
r = 0	r • 1	64.4231**	61.24
r - 1	r • 2	32.3228	40.49
r - 2	r • 3	14.5529	23.46
r - 3	r = 4	3.9157	6.40

Notes: r - indicates the number of co-integrating vector.
* indicates 1% significance level.

Part 1: Short-Term Relationships between Vegetable Oil Prices

Generally, it is accepted that the price of a vegetable oil is dependent on the prices of other vegetable oils in the previous month. This is in

TABLE 5. TESTING FOR VECTOR ERROR CORRECTION MODEL (VECM)

	ΔPOL	ΔSBO	ΔSFO	ΔRSO	ECT
			First year		
ΔPOL(1)	-	0.0052***	0.6451	0.0181**	0.0013***
ΔPOL(2)	-	0.0104**	0.7283	0.0661*	0.0000***
ΔPOL(3)	-	0.0118**	0.3371	0.0422**	0.0004***
ΔPOL(4)	-	0.0440**	0.7433	0.1633	0.1397
ΔPOL(5)	-	0.0923*	0.8820	0.5308	0.6510
ΔPOL(6)	-	0.1124	0.8909	0.6123	0.1816
ΔSBO(1)	0.3444	-	0.8202	0.0300**	0.2830
ΔSBO(2)	0.2429	-	0.5048	0.1460	0.0220**
ΔSBO(3)	0.1226	-	-0.9248	0.3467	0.2393
ΔSBO(4)	0.1899	-	0.9840	0.4062	0.6207
ΔSBO(5)	0.3915	-	0.9090	0.2801	0.1611
ΔSBO(6)	0.0866*	-	0.8306	0.4082	0.4859
ΔSFO(1)	0.0149**	0.0569*	-	0.6370	0.5183
ΔSFO(2)	0.0134**	0.2812	-	0.7343	0.2317
ΔSFO(3)	0.0050***	0.2689	-	0.4420	0.4898
ΔSFO(4)	0.0201**	0.1233	-	0.1806	0.0117**
ΔSFO(5)	0.1269	0.0388**	-	0.0145**	0.0002***
ΔSFO(6)	0.0230**	0.0309**	-	0.0102**	0.0028***
ΔRSO(1)	0.7773	0.0051***	0.4815	-	0.2430
ΔRSO(2)	0.2741	0.0086***	0.5627	-	0.0471**
ΔRSO(3)	0.1795	0.0356**	0.5082	-	0.1948
ΔRSO(4)	0.3306	0.0341**	0.7644	-	0.9762
ΔRSO(5)	0.6031	0.0217**	0.7709	-	0.2830
ΔRSO(6)	0.1646	0.0186**	0.8667	-	0.4184

Notes: All variables in first difference (denoted by **Δ**) except the lagged error correction term. ***, **, * indicates the levels of significance at 1%, 5% and 10%, respectively.

agreement with economic theory where the price of a product is determined by supply and demand, the price of the product in the previous period as well as the prices of substitutes.

Based on *Table 5*, the VECM illustrates that the price of soyabean oil (SBO) is a significant factor influencing the price of palm olien (POL) in the short-term. This means that soyabean oil is a closer substitute to POL than sunflowerseed oil (SFO) and rapeseed oil (RSO) in the last five months. The same scenario is observed for RSO as it also significantly influenced the price of POL. This strengthens the belief that the price of SBO is independent of and not influenced by the prices of other vegetable oils. This situation is the result of the strategy developed by the SBO producers (*e.g.* the subsidy scheme).

For SFO, the prices of POL, SBO and RSO are significant factors in influencing its prices in the short-run. However, the situation is different since POL as a major substitute to SFO led the price market for SFO in the last four months with minimal contribution from SBO and RSO. Lastly, the results also depict that SBO is a single significant factor influencing the price of RSO in the short-term. This means that SBO is a close substitute to RSO.

Part 2: Long-Term Relationships between Vegetable Oil Prices

The error correction term (ECT) is an approach to investigate the underlying dynamics of economic variables. In this analysis, the ECT was used to examine the long-term relationships between vegetable oil prices. It clearly identified several shifts in prices. Based on *Table 5*, the prices of selected vegetable oils are interrelated in the long-term. The result is consistent with the findings from the co-integration Johansen-Juselius test. The significance of ECT for POL indicates that SBO, SFO and RSO together influence the price of POL in the long-term. The same scenario exists for other oils. Consistent with the results from part 1, SBO again proved to be independent compared to other oils. This was because the ECT for SBO was only significant in the second previous month.

Part 3: Direction of Causality in Vegetable Oil Prices

The result s from VECM show that the price of SBO has unidirectional causality to the price of POL. This means that SBO is a close substitute to POL. From *Table 6*, the prices of SBO and RSO, have bi-directional causality. This was because both SBO and RSO contributed significantly in determining the short-term relationship. However, the bi-directional causality was only observed in the previous month. The prices of POL and SBO have unidirectional causality to SFO. However, the POL unidirectional causality was stronger compared that of SBO. This means that POL is a closer substitute to SFO than SBO and RSO.

Part 4: Which Oil is the Price Leader?

A criterion to be a price leader among the vegetable oils is that the price of the oil must be independent and not influenced by other vegetable oils. Another criterion is that the oil is able to influence the prices of the other vegetable oils. From the analysis, it is obvious that SBO is the price leader among vegetable oils.

However, the price of POL considerably influences the prices of several vegetable oils. POL is thus the number two leader of vegetable oil prices. POL strongly influenced the price of SFO in the short-term, whereas SBO and RSO were weak in doing so.

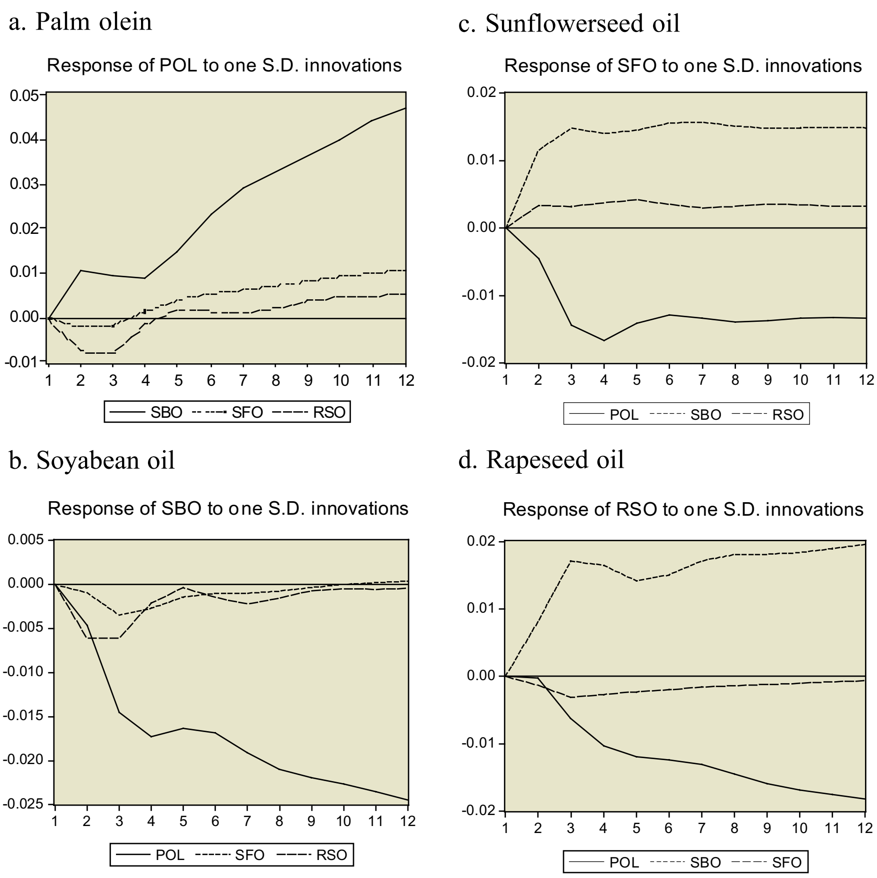
IMPULSE RESPONSE FUNCTIONS

We will now discuss the dynamic effects of shock imposed by one variable on another using the impulse response function. The function measures the effect of a one standard deviation change in a variable on the current and future values of the variable in a system of equations. The impulse response functions are graphed in *Figure 2*.

It is evident that POL responds more to shock from SBO than from SFO and RSO (*Figure 2a*). The effects of SBO price shocks on POL lasted one to five months, after which stability resumed. This observation is consistent with the VECM estimation which had earlier indicated that the price of SBO is significant factor influencing the earlier prices of POL.

The impulse response functions for SBO (*Figure 2b*) shows that the price of RSO is significant in influencing the price of SBO as compared to the prices of POL and SFO. This was because the price of SBO, responded more from the shocks from the price of RSO. The effect lasted one to seven months. This indicates that the price shock of POL was also significant influencing the price of SBO. As illustrated, when shocks from the of price of POL appeared, the effect on SBO lasted one to six months. These results are consistent with the VECM estimation which showed that the prices of RSO and POL were significant in influencing the price of SBO in the short-term.

As for SFO, a one standard deviation shock to one of the innovations on current and future value of endogenous variables in the system (*Figure 2c*) showed that the price of SFO responded more to shock from the price of POL than from the prices of SBO and RSO. The shock from the price of POL lasted six months. However, the shocks from prices of SBO and RSO lasted only one to two months. This result is also consistent with the VECM estimation whereby only POL



Note: For each plot, horizontal axis is number of months and vertical axis is percent change.

Figure 2. Impulse response functions.

significantly influenced the price of SFO in the short term but not the prices of SBO and RSO.

In the response of RSO to a one standard deviation shock to one of the innovations on current and future value of endogenous variables in the system (*Figure 2d*), the price of SBO was a significant in influence the price of RSO. The price of RSO responded more to shock than from the prices of SBO, than from the prices of POL and SFO. This was because when shock appeared in the price of SBO, its effect on the price of RSO lasted one to five months. It is consistent with the VECM estimation, where SBO was significant in influencing the price of RSO in the short-term.

VARIANCE DECOMPOSITION

While the impulse responses provide information on the effect of a standardized output shock, they do not indicate the extent to which a given shock affects the prices of vegetable oils. Thus, to further assess the relative importance of output shock, variance decomposition was used. It provides a better understanding of the bi-directional causality (cause and effects) between the vegetable oil prices. The variance decomposition partitions the variation in the forecast error of a variable into that explained by its own innovation and that explained by innovations in other variables.

The variance decompositions of the vegetable oil prices are summarized in *Table 6*. The price of POL depended largely on its past prices and the current price of SBO. The proportion of the forecast error of POL explainable by the price of SBO increases over time as compared to those from SFO and RSO. However, the proportion variation in the forecast error for POL explained by its own innovation showed a declining trend. This result is consistent within the VECM framework where SBO is significant in influencing the price of POL in the short-term.

As observed in *Table 6*, in period 6 about 90.09% of the variation in the forecast error for POL is explained by its own innovation, and around 8.42% by the price of SBO and the rest by the prices of SFO and RSO at 0.43% and 1.06%, respectively. In period 12, the average variation in the forecast error of POL explained by its own innovation declined to 59.62%. In the case SBO, it indicates a higher (about 37.68%) variation in the forecast error for POL while the forecast errors for RSO and SFO were not much changed from the previous periods.

The results for variance decomposition of SBO indicate that its current price depends largely on its past prices. In the sixth period, 92.48% of the variation in the forecast error of SBO is explained by its own innovation and about 6.86% by the price of POL. The rest of the variation is explained by the prices SFO and RSO (0.15% and 0.52% respectively). This proves that the effects of POL, SFO and RSO are small although in period 12, about 11.29% of the variation in the forecast error of SBO is explained by the fluctuation in the price of POL. This confirms that the price

TABLE 6. VARIANCE DECOMPOSITION

Variance decomposition of POL				
Period	POL	SBO	SFO	RSO
1	100.0000	0.0000	0.0000	0.0000
4	95.4069	3.0962	0.1097	1.3872
6	90.0933	8.4157	0.4300	1.0611
8	80.1537	18.1658	0.8509	0.8296
12	59.6230	37.6800	1.8699	0.8270
Variance decomposition of SBO				
Period	SBO	POL	SFO	RSO
1	100.0000	0.0000	0.0000	0.0000
4	93.9047	5.1330	0.1997	0.7626
6	92.4784	6.8555	0.1511	0.5151
8	90.9409	8.5409	0.1155	0.4028
12	88.3805	11.2943	0.0723	0.2529
Variance decomposition of SFO				
Period	SFO	POL	SBO	RSO
1	100.0000	0.0000	0.0000	0.0000
4	91.0105	4.1863	4.5146	0.2885
6	89.3805	4.7870	5.4805	0.3520
8	88.4584	5.1344	6.0653	0.3419
12	87.7027	5.4411	6.5043	0.3519
Variance decomposition of RSO				
Period	RSO	POL	SBO	SFO
1	100.0000	0.0000	0.0000	0.0000
4	91.4897	1.5505	6.7605	0.1994
6	89.4866	3.0330	7.2899	0.1906
8	87.6208	4.0199	8.2022	0.1571
12	84.7273	5.9616	9.2046	0.1066

of SBO is independent as compared to other vegetable oil prices. Nevertheless, the price of POL influenced the forecast error for SBO. This is consistent with the impulse response, where POL is a factor influencing the price of SBO in the short-term.

The variance decomposition indicates that in period 6 about 89.38% of the variation in the forecast error for SFO is explained by its own innovation. Another 4.78%, 5.48% and 0.35% SFO are explained by POL, SBO and RSO, respectively. However, in period 12, on average 87.70%, 5.44%, 6.50% and 0.35% of the forecast error variance for SFO are explained by its own innovation, and the prices of POL, SBO and RSO, respectively. These results indicate that the prices of POL and SBO are important in influencing the forecast error variance for SFO.

Lastly, the variance decomposition in period 6 indicates that on average, 89.49% of the variation in the forecast error for RSO is explained by its own innovation. Another 3.03% and 7.29% are explained by the prices of POL and SBO, respectively. The remaining 0.19% is explained by the price of SFO. In period 12, on average, 84.72%, 5.96%, 9.21% and 0.11% of the variation in the forecast error for RSO are explained by its own innovation, and the prices of POL, SBO and SFO, respectively. Based on the results of variance decomposition, it is SBO, and not POL or SFO, that is significant in influencing the forecast error for RSO. This observation is consistent with the VECM estimation as explained earlier.

CONCLUSION

The above empirical findings were that there is a high degree of substitutability between vegetable oils in the international market thus their prices are interrelated both in the long- as well as in the short-terms. The major world vegetable oils like soyabean oil and palm oil have become significant in influencing other vegetable oil prices. If production of soyabean and palm oil increases, the increase in world stock of vegetable oils will push down their prices.

Soyabean oil is the price leader among vegetable oils. This could be due to it having good market intelligence within the US Department of Agriculture stationing officers in all its embassies to monitor the supply and demand for indigenous crops, including vegetable oils, in every nation.

Palm oil is the second most produced vegetable oil and the most traded vegetable oil in the world. The findings from this empirical analysis are that palm oil has become a price leader for several vegetable oils. To further improve its price leadership, its own market intelligence, including its stock intelligence, should be further improved. Palm oil producing countries must cooperate and implement a stock intelligent mechanism so as not to allow key market players to make profits in the short- as well as the long-terms. Failure to do so will give a negative impact to the industry because stock will be manipulated by key players.

There is some market intelligence gathering by the palm oil industry but this is not as comprehensive as that by the soyabean industry. Crucial information which includes the latest information on the world vegetable oils supply, situation in importing countries like changes in government policies (changes in the tax structure and non-tariff barriers), weather patterns in the producer countries, vegetable oil stocks and the demand perspective for all competing vegetable oils would be advantageous to have.

Thus, we would suggest that palm oil producing countries get together to start their market intelligence and stock intelligence activities.

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