Impact Assessment of Liberalizing Trade on Malaysian Crude Palm Oil

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ABSTRACT

This study analyses the impact of lifting the export tax on Malaysian crude palm oil. In the first section, the structural equation is developed incorporating Malaysian palm oil products, especially focusing on crude palm oil (CPO) and processed palm oil (PPO). The study deals with the conceptual model and dynamic specification of the Malaysian palm oil market model as regards the oil palm area, palm oil supply, domestic consumption, imports and exports of palm oil products, stocks and domestic price relationships. The model also included the Indonesian palm oil market model as well as world palm oil price relationships due to the significant impact of both factors on Malaysian palm oil in international trade.

INTRODUCTION

Most of the palm oil produced in this country is exported refined as the export of CPO is discouraged by an export tax. The aim of the policy is to add value to the product locally in order to maximize the benefits to the country. As a result of the policy, the refining capacity has expanded to about 12.8 million tonnes a year for Peninsular Malaysia and a combined 7.8 million tonnes a year for Sabah and Sarawak, giving a national capacity of 20.6 million tonnes in 2004. Considering that the country only produced 13.13 million tonnes palm oil in 2004, there is an excess capacity of 7.47 million tonnes a year. The excess capacity has, in fact, been chronic over the years despite there being no official barrier on importing CPO for additional refining.

Despite the persistent excess refining capacity, some export of CPO has recently been allowed - in both 2001 and 2002, about 1 million tonnes of CPO each year were exported. Despite this, the volume of local refining has not changed much nor CPO imports grown. Hence, it can be concluded that there has been no change in the demand for CPO by the refineries and that their absorption capacity for palm oil may be more limited than expected - certainly less than the increase in local CPO production – despite its excess capacity.

Nevertheless, the volume of CPO exports is still dwarfed by the exports of PPO, which have increased annually in the past five years. But with yet increasing local palm oil production, there is increasing demand to be able to export CPO. The interest in exporting CPO can be seen in the large volume sold with the recent temporary lifting of the export tax.

It is therefore important to analyse the likely impact that lifting the CPO export tax can have

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on the local refining industry. More palm oil would likely be exported crude, but would then the exacerbated excess refining capacity push up the price of local CPO? An escalating CPO price as the refiners scour the market for raw material to maintain their operation can pose challenges in maintaining their market competitiveness, especially when the incentive to import the raw material is limited. Hence, liberalizing the export of CPO can potentially hinder local downstream value addition to palm oil.

However, the scenario speculated above would need evidential support. The impact on local refining can, of course, be ameliorated if imports can be increased to replace the local CPO exported. It is important for the downstream PPO industry to be freed of its current dependence on local PO, and, for this, the import option needs be better developed. Hence, any policy that can alter the flow of CPO and/or affect the price of local CPO should be exhaustively analysed before implementation to fully assess its likely impacts on the industry.

This study attempts to analyse the economic impact of lifting the export tax on CPO. Removing the tax may make the market for Malaysian palm oil more versatile. But, whatever the measure taken, whither then the Malaysian palm oil refining and the downstream processing industry?

MODEL SPECIFICATION AND ESTIMATION METHODS

Figure 1 gives the product flow in the palm oil industry with the major variables of concern in the study. The econometric model developed is based on basic production of the palm oil, and disappearance identities and technical relations. The model describes the determination of estates and smallholders planted area equations, production of CPO by estates and smallholders, exports of CPO and PPO, imports of CPO, stocks of CPO and PPO, domestic price of CPO and world price of CPO.

The model also highlights three equations for the Indonesian palm market – for its production, exports and stocks of CPO - due to the importance of Indonesia as the second major producer of palm oil as well as a major exporter of CPO to the world. Finally, the model defines the Malaysian market equilibriums for CPO and PPO, export price of Malaysian CPO, domestic consumption of CPO and PPO, Indonesian market equilibrium for CPO, world production, consumption and stocks of CPO and the world market equilibrium for CPO. This national model was developed with inclusion of rational price expectations and partial adjustment models as well as monetary factors such as inflation and exchange rates.

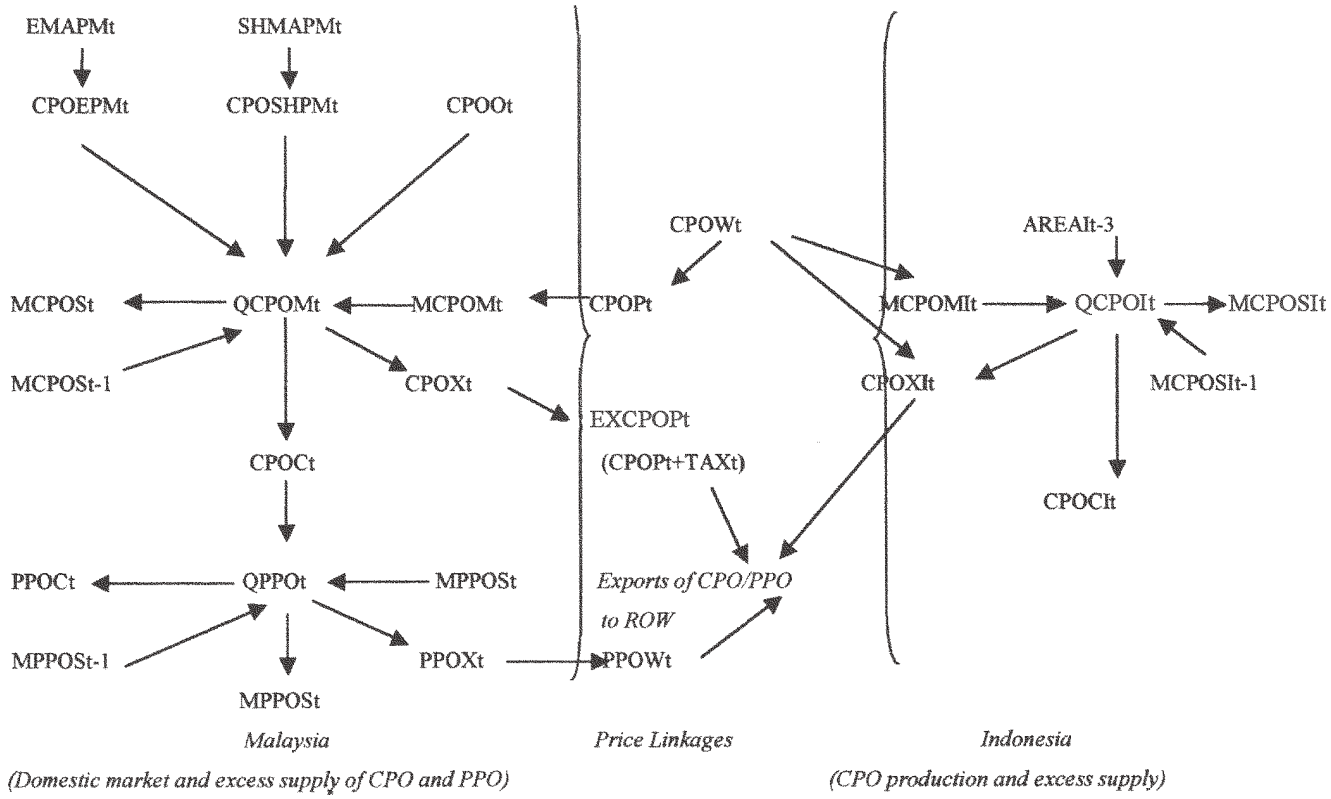

Figure 1. Structure of the Malaysian palm oil model.

ESTIMATION METHODS AND DATA SOURCES

The research methodology relies to some extent on the econometric studies by Adams and Behrman (1976; 1978), Bateman (1969), Labys (1973; 1975), Hallam (1990), and Basri and Zaimah (2002). This study extends the analysis to the PPO market. The econometric estimation uses the Two Stage Least Squares method (2SLS). The impact of liberalizing CPO export by eliminating its export tax would not only depend on the price elasticity of CPO export demand but also on the growth of CPO supply from both local production and imports.

Annual data used in this study were obtained from the Ministry of Primary Industries, Malaysia (1995), PORLA (1988), PORIM (1995), Malaysian Palm Oil Board (MPOB) (2001; 2004), Oil World (1994) and International Monetary Fund (IMF) (1994 – 1996; 2000; 2004). Basically, the data were analysed from 1975 to 2003, although some data outside the period were used for the lag variables. The real prices of Malaysian palm oil were calculated by deflating the nominal prices by the consumer price index, or CPI (1990=100). The world CPI was used as the deflator for the world prices of palm oil and soyabean oil.

RESULTS OF ESTIMATION

The econometric model for the Malaysian palm oil industry used in this study had 14 behavioural equations and 10 identities. The models, as well as the results from the 2SLS estimation by it, are presented in *Table 1*. The definitions of the variables are given in *Table 2*. The values from the F-statistic, adjusted coefficient of determination ($AdjR^2$) and Lagrange Multiplier (LM) tests show that the estimates are statistically acceptable. Generally, the results are good, with most of the explanatory variables having the expected signs and being significant according to the t-statistic.

Taking the Malaysian oil palm area results first (Equation 4.1), the coefficients for the specified variables had the expected signs. For 23 degrees of freedom (df), the t critical points at the 1% and 5% levels were 2.50 and 1.714, respectively. The Lagrange Multiplier (LM) test (estimated by the 2SLS) showed the value of $LM\chi^2(1)$ to be 2.579, smaller than 6.635 which is the critical value for χ^2 distribution at the 1% level. Thus, the null hypothesis of no auto-correlation was accepted, indicating no first-order auto-correlation. The total oil palm planted area lagged one year was statistically significant in determining the total oil palm area at the 1% level. However, the ratio between the domestic prices of palm oil and natural rubber lagged three years was not statistically significant even at the 10% level.

Meanwhile, for Peninsular Malaysia (Equation 4.2), the independent variables as a whole explained 98% of the variation in the mature oil palm area under smallholders. The coefficient of the one year lagged dependent variable, *i.e.* the mature oil palm area under smallholders, was positive and significant. The total coefficient estimated for the lagged area was almost one with the short run elasticity of the data means at 0.913. However, government expenditure on rural and agricultural development lagged three years was not significant even though it was expectedly positive.

The estimation of total CPO production by estates and smallholders in Peninsular Malaysia (Equations 4.3 and 4.4) was satisfactory by the F-statistic and adjusted R^2 with the expected signs from theory. There was therefore no evidence of auto-correlation. The results suggest that the lagged dependent variables are important in determining CPO production by both estates and smallholders with elasticities of 0.488 and 0.849, respectively. The lagged one year real domestic price of CPO was not significant in determining the production of CPO by estates and smallholders. The time trend variable (TIME) as a proxy for technological improvement in CPO production was only significant in determining CPO production by estates but not by smallholders.

The empirical estimates of Malaysian CPO exports (Equation 4.5) indicated that 72% of the variation was explained by the specified variables. There was also a strong suggestion that the primary forces affecting changes in CPO exports by Malaysia are domestic CPO exports lagged one year and the government policy on CPO exports. The government policy was significant at the 10% level and had the expected positive sign. The export price of Malaysian CPO was not significant in determining the total CPO exports.

The results for Malaysian CPO imports (Equation 4.6) were statistically satisfactory by the F-statistic with the LM test showing no first-order auto-correlation. The coefficient for Malaysian Gross Domestic Product (MGDP) was positive and statistically significant at the 10% level. As expected, Malaysian imports of CPO was negatively related to the real price of world palm oil (in RM) but positively related to CPO imports lagged one year. However, the coefficient for world price of palm oil was statistically not significant. Finally, the coefficient for world economic crisis had the expected negative sign, but was not statistically significant. The world stock of CPO was significant in

TABLE 1. RESULTS FROM THE STRUCTURAL EQUATIONS (2SLS estimates)

Malaysian Domestic Market and Excess Supply of CPO and PPO

$EMAPM_t = 55\,738.54 + 0.943EMAPM_{t-1} + 4\,646.90(CPOP_{t-3}/NRP_{t-3})$ (4.1)
(2.73)[a] (42.69)[a] (0.16)
$AdjR^2 = 0.987$ F-stat. = 928.27 $LM\chi^2(1) = 2.579$

$SHMAPM_t = 18\,443.72 + 0.97SHMAPM_{t-1} + 0.000036(GOVRDE_{t-3}/CPI_{t-3})$ (4.2)
(0.41) (37.04)[a] (1.16)
$AdjR^2 = 0.984$ F-stat. = 776.83 $LM\chi^2(1) = 0.409$

$CPOEPM_t = 486\,659.45 + 0.508CPOEPM_{t-1} + 62.74(CPOP_{t-1}/CPI_{t-1}) + 38\,001.23TIME_t$ (4.3)
(1.08) (1.89)[b] (0.32) (1.84)[b]
$AdjR^2 = 0.909$ F-stat. = 88.85 $LM\chi^2(1) = 6.551$

$CPOSHPM_t = 43\,482.70 + 0.90CPOSHPM_{t-1} + 120.56(CPOP_{t-1}/CPI_{t-1}) + 12\,222.89TIME_t$ (4.4)
(0.11) (4.11)[a] (0.46) (0.42)
$AdjR^2 = 0.951$ F-stat. = 169.36 $LM\chi^2(1) = 2.630$

$CPOX_t = 128\,026.61 + 0.83CPOX_{t-1} - 123.38EXCPOP_t + 176\,338.847XPOLICY_t$ (4.5)
(1.07) (6.31)[a] (-1.26) (1.63)[c]
$AdjR^2 = 0.728$ F-stat. = 24.40 $LM\chi^2(1) = 1.772$

$MCPOM_t = 60\,996.37 + 0.35MCPOM_{t-1} - 52.87(CPOWP_t*R_t/CPI_t) + 0.0006MGDP_t - 5587.40CRISIS_t$ (4.6)
(0.74) (1.31) (-1.07) (2.07)[c] (-0.10)
$AdjR^2 = 0.419$ F-stat. = 5.50 $LM\chi^2(1) = 0.143$

$MCPOS_t = 173\,057.93 + 0.10MCPOS_{t-1} - 42.90\,(CPOP_t/CPI_t) + 0.40CPOSW_t - 0.07REF_t$ (4.7)
(0.80) (0.51) (-0.37) (3.82)[a] (-3.00)[a]
$AdjR^2 = 0.544$ F-stat. = 7.38 $LM\chi^2(1) = 1.850$

$PPOX_t = 179\,226.87 + 1.09PPOX_{t-1} - 412.97(CPOWP_t*R_t/CPI_t) + 244.77(SOYABP_t/WCPI_t)$ (4.8)
(0.40) (17.96)[a] (-1.20) (1.33)[c]
$+ 96\,058.65CRISIS_t$
(0.96)
$AdjR^2 = 0.977$ F-stat. = 286.22 $LM\chi^2(1) = 3.28$

$MPPOS_t = 36\,388.44 + 0.58MPPOS_{t-1} - 11.90\,(CPOP_{t-1}/CPI_{t-1}) + 1045.73MIPI_t)$ (4.9)
(0.70) (3.29)[a] (-0.33) (2.31)[b]
$AdjR^2 = 0.911$ F-stat. = 90.13 $LM\chi^2(1) = 2.193$

Price Linkages

$CPOWP_t = -114.31 + 0.21CPOWP_{t-1} + 0.98SOYABP_t - 7.03E\text{-}06CPOSW_t$ (4.10)
(-1.76)[b] (2.29)[b] (9.26)[a]
$AdjR^2 = 0.863$ F-stat. = 56.32 $LM\chi^2(1) = 0.305$

$CPOP_t = 344.90 + 0.25CPOP_{t-1} + 2.34CPOWP_t + 0.0003CPOX_t - 967.72CU_t + 228.60CRISIS_t$ (4.11)
(1.21) (1.38)[c] (5.32)[a] (1.95)[b] (-2.64)[a] (1.44)[c]
$AdjR^2 = 0.593$ F-stat. = 8.95 $LM\chi^2(1) = 3.29$

Indonesian CPO Production and Excess Supply

$QCPOI_t = -13\,535.73 + 0.76QCPOI_{t-1} + 0.92AREAI_{t-3} + 317\,014.4PRODIDM_t$ (4.12)
(-0.15) (6.60)[a] (2.96)[a] (2.06)[b]
$+ 12.54(CPOWP_t/WCPI_t)$
(0.33)
$AdjR^2 = 0.996$ F-stat. = 1726.52 $LM\chi^2(1) = 0.345$

$CPOXI_t = -677\,289.9 + 0.34CPOXI_{t-1} - 2\,481.49(CPOWP_t/WCPI_t) + 2\,629.24(SOYABP_t/WCPI_t)$ (4.13)
(-3.01)[a] (1.73)[b] (-2.40)[b] (2.54)[a]
$+ 0.511QCPOI_t$
(4.26)[a]
$AdjR^2 = 0.959$ F-stat. = 155.21 $LM\chi^2(1) = 0.024$

TABLE 1. RESULTS FROM THE STRUCTURAL EQUATIONS (2SLS estimates) (continued)

$$MCPOSI_t = \underset{(2.90)^a}{93\,512.31} + \underset{(1.16)}{0.23}MCPOSI_{t-1} \underset{(-2.64)^a}{- 0.14}(CPOWP_t * RI_t/CPI_t) + \underset{(2.77)^a}{0.14}QCPOI_t \underset{(-1.91)^b}{- 0.11}CPOXI_t \quad (4.14)$$

$Adj R^2 = 0.704$ F-stat. = 16.65 $LM\chi^2(1) = 1.275$

Identities:

$$QCPOM_t = CPOEPM_t + CPOSHPM_t + CPOO_t \quad (4.15)$$

$$QPPO_t = 0.95*CPOC_t + 0.95*CPKO_t \quad (4.16)$$

$$CPOC_t = QCPOM_t + MCPOM_t + MCPOS_{t-1} – CPOX_t – MCPOS_t \quad (4.17)$$

$$PPOC_t = QPPO_t + MPPOM_t + MPPOS_{t-1} – PPOX_t – MPPOS_t \quad (4.18)$$

$$CPOCI_t = QCPOI_t + MCPOMI_t + MCPOSI_{t-1} – CPOXI_t – MCPOSI_t \quad (4.19)$$

$$EXCPOP_t = CPOP_t + TAX_t \quad (4.20)$$

$$QCPOW_t = QCPOM_t + QCPOI_t + QCPOR_t \quad (4.21)$$

$$CPOSW_t = MCPOS_t + MCPOSI_t + MCPOSR_t \quad (4.22)$$

$$CPOCW_t = QCPOW_t + CPOSW_{t-1} ñ CPOSW_t \quad (4.23)$$

$$QCPOW_t + CPOSW_{t-1} = CPOCW_t + CPOSW_t \quad (4.24)$$

Notes: Numbers in parentheses are t-statistics.
a. Significant at 1% level.
b. Significant at 5% level.
c. Significant at 10% level.

determining Malaysian stocks of palm oil at the 1% level (Equation 4.7). The real domestic price of palm oil and refining capacity for palm oil processing industry had negative signs. The refining capacity was significant at the 1% level in determining stocks of Malaysian CPO but the real domestic price of palm oil was not significant.

The specification of Equation 4.8 showed that the two most important determinants of PPO exports were PPO export lagged one year and the real world price of soyabean oil. The estimated coefficients for these two variables had the expected positive signs and high t-ratios. The coefficient for exports of PPO lagged one year was 1.089, significant at the 1% level. It also showed that the equilibrium level of exports was achieved only in the lagged one year period as compared with Malaysian CPO exports. Meanwhile, the real world price of soyabean oil was significant at 10% and its elasticity in the short run was 0.061. The world economic crisis was not significant in determining the total exports of Malaysian PPO even though it had a positive sign. The 2SLS estimation of Malaysian PPO stocks (Equation 4.9) showed that the variation was explainable by the independent variables, *i.e.*, PPO stocks lagged one year, domestic CPO price lagged one year and the Malaysian industrial production index (MIPI). The coefficient for PPO stocks lagged one year, as expected, had a positive sign and was statistically significant at 1%.

From the estimation of world CPO price (Equation 4.10), all the coefficients for the variables had their expected signs. The soyabean oil price was positive and statistically significant at 5%. The elasticity was high, implying that a 1% increase in the price of soyabean oil increased the world CPO price by 1.065% in the short run and 1.357% in the long run. The world CPO stock was negatively significant, affecting the world CPO price at 1%, implying that the world price of CPO varied inversely with the world CPO stocks.

For estimating the domestic price of Malaysian CPO (Equation 4.11), both the coefficients for world price of CPO and industrial processing capacity for CPO were significant at 1%. In the short run, a 10% increase in the world price of CPO, *ceritus paribus*, increased the domestic price of CPO by 9.98%. However, a 10% increase in industrial processing capacity decreased the domestic price by only 6.68%. The total export of CPO was significant in determining the domestic price of Malaysian CPO at the 5% level. The domestic price of CPO lagged one year and economic crisis were significant at the 10% level. Any attempt to adjust the domestic CPO price toward its equilibrium level had a direct effect on the current domestic price of CPO. Furthermore, the world economic crisis also significantly increased the domestic price of CPO.

The 2SLS analysis indicated that the coefficients for the one year lagged dependent variables and oil palm area lagged three years were positive and significant at 1% in

TABLE 2. DEFINITION OF VARIABLES

Variable		Definition
Endogenous Variable		
EMAPM	=	Oil palm area under estates in Peninsular Malaysia (ha)
SHMAPM	=	Oil palm area under smallholders in Peninsular Malaysia (ha)
CPOEPM	=	Production of CPO by estates in Peninsular Malaysia (t)
CPOSHPM	=	Production of CPO by smallholders in Peninsular Malaysia (t)
CPOX	=	Total export of Malaysian CPO (t)
MCPOM	=	Total import of CPO by Malaysia (t)
MCPOS	=	Total stocks of CPO in Malaysia (t)
PPOX	=	Total export of Malaysian processed palm oil (PPO) (t)
MPPOS	=	Total stocks of Malaysian PPO (t)
CPOWP	=	World price of CPO (USD/t)
CPOP	=	Malaysian price of CPO (RM/t)
QCPOI	=	Indonesian production of CPO (t)
MCPOSI	=	Total stocks of CPO in Indonesia (t)
QCPOM	=	Total production of Malaysian CPO (t)
QPPO	=	Total production of Malaysian PPO (t)
CPOC	=	Domestic consumption of CPO in Malaysia (t)
PPOC	=	Domestic consumption of PPO in Malaysia (t)
CPOCI	=	Domestic consumption of CPO in Indonesia (t)
EXCPOP	=	Export price of Malaysian CPO (RM/t)
QCPOW	=	World production of CPO (t)
CPOSW	=	World stocks of CPO (t)
CPOCW	=	World consumption of CPO (t)
CPOO	=	Total production of CPO in Sabah and Sarawak (t)
CPKO	=	Total consumption of palm kernel oil in Malaysia (t)
MPPOM	=	Malaysian import of PPO (t)
MCPOMI	=	Indonesian import of CPO (t)
QCPOR	=	Total production of CPO from rest of the world (t)
MCPOSR	=	Total stocks of CPO from rest of the world (t)
AREAI	=	Total oil palm area in Indonesia ('000 ha)
Exogenous Variables		
NRP	=	Malaysian price of natural rubber (RM/t)
GOVRDE	=	Government expenditure on rural and agricultural development (RM)
CPI	=	Malaysian consumer price index (1990 = 100)
TIME	=	Time series trend as a proxy for technological improvement
XPOLICY	=	Policy changing in palm oil exports (dummy)
R	=	MR:USD exchange rate
MGDP	=	Malaysian GDP at 1990 prices (RM)
CRISIS	=	World and regional crisis in economics (dummy)
REF	=	Capacity of Malaysian palm oil refineries (t/yr)
SOYABP	=	World price of soyabean oil (USD/t)
MIPI	=	Malaysian industrial production index (1990 = 100)
CU	=	Malaysian refinery utilization rate (%)
WCPI	=	World consumer price index
RI	=	(Indonesian) Rupiah: USD exchange rate
TAX	=	Export duty on Malaysian crude palm oil (RM/t)
PRODIDM	=	Indonesian palm oil production policy (dummy)

explaining the production of CPO in Indonesia (Equation 4.12). The coefficient for the Indonesian palm oil production policy had a positive sign and was significant at 5%. However, the real world price of palm oil was not significant in determining CPO production in Indonesia even though it had the expected sign. The 2SLS estimation of Indonesian export of CPO showed that all the independent variables had the expected signs and to be significant at 1% or 5% (Equation 4.13). The world prices of soyabean oil and total production of Indonesian CPO were the important factors in determining total Indonesian CPO exports. As expected, Indonesian exports of CPO were negatively related to the world price of CPO and positively related to the one year lagged exports of Indonesian CPO. Both variables were significant at 5%. In the short and long runs, a 5% decrease in the world price of CPO would increase Indonesian exports of CPO by 8.443% and 12.78%, respectively, *i.e.*, the exports were very elastic.

The estimation of Indonesian stocks of CPO (Equation 4.14) produced the expected signs for all the independent variables. The real domestic price of Indonesian CPO and Indonesian production of palm oil were statistically significant at the 1% level in determining the stocks of Indonesian CPO. The coefficient for total exports of Indonesian CPO was negative when related to Indonesian CPO stocks and significant at 5%. In the short run, a 10% increase in Indonesian exports of CPO would decrease its CPO stocks by 7.80%. However, one year lagged Indonesian CPO stocks were not significant, implying it not to be important in explaining the level of stocks.

POLICY SIMULATION

The export tax on Malaysian CPO has been a considerable concern to the Malaysian palm oil industry and government. The government has introduced incentives for domestic processing of palm oil since 1975 to encourage local value-adding. A negative consequence of this has been that it has forfeited the trade in CPO to Indonesia. This is compounded by the fact that increasingly more countries want to refine their edible oil imports themselves and so have increased their import tax on PPO vis-à-vis CPO. Thus, there are increasingly strident calls for the policy to be reviewed. In essence, this simulation seeks to provide the answers to 'what if' scenarios should the tax be removed - what would be the area still under oil palm, Malaysian CPO and PPO production, trade and price of Malaysian palm oil, as well as Indonesian CPO production, world CPO price and consumption sans export tax.

The results of this simulation has provided some important insights into the dynamic relationships between production, imports and exports of Malaysia palm oil as well as palm oil production in Indonesia by linking them through the world price of palm oil and trade flow identities. *Table 3* summarizes the results from the simulation for some of the endogenous variables. The impact

TABLE 3. IMPACTS OF LIFTING THE EXPORT TAX ON MALAYSIAN CRUDE PALM OIL (CPO)

	Without tax (simulation)	With tax (Baseline)	Change	
	Volume	Volume	Volume	(%)
Malaysian Palm Oil Market				
Oil palm area (ha)				
Estate (Pen. Malaysia)	678 170.23	677 719.24	490.20	0.07
Smallholder (Pen. Malaysia)	746 409.92	746 409.92	0.00	0.00
CPO production (t)				
Total	6 690 628.69	6 525 280.77	30 931.79	0.49
Estate (Pen. Malaysia)	2 324 636.96	2 320 812.08	3 977.88	0.18
Smallholder (Pen. Malaysia)	2 583 404.73	2 557 487.50	26 953.91	1.02
PPO production (t)	6 690 628.57	6 758 043.65	-67 415.08	-1.45
CPO Import (t)	106 571.37	106 573.36	-2.00	0.00
Consumption (t)				
CPO	6 231 153.23	6 302 116.42	-70 963.17	-1.61
PPO	1 883 338.14	1 949 941.98	-66 603.79	-6.12
Export (t)				
CPO	415 565.93	314 873.14	100 692.78	63.56
PPO	4 841 518.00	4 842 298.65	-780.68	-0.01
Stock (t)				
CPO	516 451.91	518 365.53	-1 913.63	-0.50
PPO	302 920.27	303 372.20	-875.63	-0.35
CPO Price (RM/t)				
Domestic	1 156.79	1 123.68	33.11	3.17
Export	1 156.79	1 329.06	-172.27	-11.18
PPO Price F.O.B. (RM/t)	1 171.55	1 142.41	29.14	2.55
Indonesian CPO				
Production (t)	3 392 020.34	3 392 018.29	2.10	0.00
Consumption (t)	1 651 205.84	1 643 377.40	7 828.56	0.40
Export (t)	1 831 071.60	1 839 026.80	-7 955.01	-0.57
Stock (t)	276 035.75	274 964.88	1 070.86	0.32
World CPO				
Production (t)	11 643 318.15	11 613 574.12	29 744.20	0.31
Consumption (t)	11 505 318.88	11 475 713.73	29 605.16	0.32
Stock (t)	2 425 187.45	2 426 030.17	-842.77	-0.09
Price (USD/t)	466.80	466.79	0.01	0.00

of lifting the export tax on the world and Malaysian price of CPO are likely to be very small. The world price would likely not be affected at all, while Malaysian CPO price would increase by only an average of 3.17%, or RM 33.11/t. However, the export price of Malaysian CPO would drop greatly by an average 11.18%, or RM 172.27/t.

The Malaysian estate oil palm area would increase by 0.07%, but the smallholder area would not be affected. However, production of CPO by both estates and smallholders would increase by 0.18% (3977 t) and 1.02% (26 954 t), respectively. As a whole, Malaysian production of CPO would increase by 0.48%, or 30 931.79 t. Meanwhile, the impact on exports of Malaysian CPO would be dramatic – up 63.56%, or 100 292.78 t.

Removing the exports would marginally decrease domestic consumption and stocks of CPO by 1.61% and 0.50%, respectively. But imports would not be affected much. Further, the increased CPO price because of exports would penalize local consumption, exports and stocks of Malaysian PPO. Local consumption of PPO would drop considerably by 6.12%, or 66 603.79 t. The exports and stocks of PPO would only decrease slightly by 0.01% and 0.35%, respectively. Meanwhile, the average F.O.B. price of PPO would increase slightly by 2.55%.

Lifting the Malaysian export tax on CPO would not favour Indonesian exports of CPO, which should drop by 0.57%. However, Indonesian consumption and stocks of CPO would slightly increase by 0.40% and 0.32%, respectively, with its CPO production unaffected. Finally, on the world market and trade, world production and consumption of CPO would increase by 0.31% and 0.32%, respectively, but CPO stocks decrease slightly by 0.09%. In conclusion, it is apparent that the major positive and negative impacts of lifting the Malaysian export tax on CPO would be on its own palm oil industry. The impacts will be especially on Malaysian CPO export and domestic consumption, and production of CPO and PPO, with only a very small adverse impact on the world CPO trade and price.

CONCLUSION AND POLICY IMPLICATIONS

This article presents an analysis by a structural model of the Malaysian palm oil, focusing on the oil palm area, palm oil supply, domestic consumption, imports and exports of palm oil products, stocks and domestic price relationships. The model included some characteristics of the Indonesian palm oil market and some world palm oil price relationships. Lifting the CPO export tax will reduce the export price of CPO, and increase its exports. The volume surge will be quite high at 100 692 t/yr, or an increase of 64%. However, this would be a drop in the world palm oil market. Thus, with the small percentage of increased CPO in the world market, the world CPO price should remain stable. The volume of CPO imported by Malaysia should also be largely unaffected. Local production will have only small responses. With the slightly higher domestic CPO price, the estates and smallholders would increase slightly their CPO output.

The surge in CPO export will decrease the volume of CPO available for local downstream activities as the increases in import and local production will be insufficient to offset the immediate sudden loss. Overall, the net reduction in domestic CPO will be 71 000 t, causing the local PPO supply (with a small increase in imports) to fall by 67 400 t and local consumption to decrease by 66 603 t. However, PPO exports and stock should only decline slightly. The surge in Malaysian CPO exports will have a negligible impact on the world CPO price as the volume added would be infinitesimal compared to the global volume traded.

Basically, lifting the export tax on CPO, based on the modelling, would have minimal impact on the Malaysian palm oil industry, world palm oil market and Indonesian palm oil market as the increase in Malaysian exports of CPO will be small, although there will be a small reduction in the CPO export price. However, with the strong linkages to the domestic downstream industry, the CPO domestic flow will largely remain unaffected. The Malaysian domestic CPO price will only rise slightly to encourage a small increase in CPO production. The CPO import component appears to be non-reactive, and will remain unaffected although if imports are not restricted, there may be some additional inflow to make up the shortfall in the domestic downstream palm oil requirement.

Local palm oil producers will face a more competitive market if more palm oil can be imported. However, the palm oil must be imported discriminatingly with quality of the standard adopted by the industry to ensure that local producers can compete. Similarly, with the more competitive market, smallholders would need to improve their productivity when hitherto they had merely planted more and more land with little technological advancement. With limited land now available for expansion, the industry needs to focus on technology to increase productivity. Incentives need be

given to encourage the development, and also for integrated farming with high value livestock (ruminants and non-ruminants) to further improve the returns from the resources used.

REFERENCES

ADAMS, F G and BEHRMAN, J R (1976). *Econometric Models of World Agricultural Commodity Markets*. Ballinger.

ADAMS, F G and BEHRMAN, J R (1978). *Econometric Modelling of World Commodity Policy*. Lexington Books.

BASRI, A T and ZAIMAH, D (2002). An economic analysis of the Malaysian palm oil market. *Oil Palm Industry Economic Journal Vol. 2 No. 1*: 19-28.

BATEMAN, M J (1969). Supply relations for perennial crops in the less-developed areas. *Subsistence Agriculture and Economic Development* (Warton, C R Jr ed.). Frank Cass.

HALLAM, D (1990). *Econometric Modelling of Agricultural Commodity Markets*. Routledge.

INTERNATIONAL MONETARY FUND (IMF) (1994, 1995, 1996 and 2000). *International Financial Statistics Yearbook*.

LABYS, W C (1973). *Dynamic Commodity Models: Specifications, Estimation, and Simulation*. Lexington, Massachusettes.

LABYS, W C (1975). The problems and challenges for international commodity models and model builders. *American Journal of Agricultural Economics Vol. 57*: 874–878.

MPOB (2001). *Malaysian Palm Oil Statistics*. MPOB, Bangi.

MPOB (2004). *Statistics of Malaysian Palm Oil*. MPOB, Bangi.

OIL WORLD (1994). *Oil World 2012*. ISTA Mielke GmbH.

PORIM (1995). *Statistics of Malaysian Palm Oil*.