

IMPACTS OF CPO-EXPORT TAX ON SEVERAL ASPECTS OF INDONESIAN CPO INDUSTRY

Wayan R. Susila¹⁾

¹⁾ A Senior Researcher in The Indonesian Research Institute for Estate Crops, Bogor, Indonesia

ABSTRACT

To control domestic supply and price of crude palm oil (CPO) and cooking oil, the government of Indonesia has imposed CPO-export tax since August 1994. As the CPO industry plays an important role in Indonesian economy, the imposition of the tax has perceived to have substantial impacts on various aspects of the industry, such as on investment, production, trade, farm income, and welfare distribution. In line of this issue, the main objective of this study is to assess these impacts using an econometric model of the industry. The results of the study reveal that this export tax policy has inhibited the growth rate of investment, production, export, and farm income. On the other hand, this policy has been an effective instrument to control domestic CPO and cooking oil price. Moreover, this policy has caused a substantial welfare transfer from producers to consumers and the government. To compromise these conflicting impacts, an alternative CPO tax formula is also proposed within this paper.

Key words : CPO, export tax, policy impacts, Indonesia

INTRODUCTION

Like rice, crude palm oil (CPO) is considered as a strategic commodity in the Indonesian economy. Firstly, as a raw material of the main cooking oil consumed in Indonesia, its price plays an important role in determining inflation rate of Indonesia economy (Amang 1995). Secondly, palm oil industries provide employment for more than 2 million people. Thirdly, it is source of foreign exchange earning as its export has attained to more than US\$ 1 million since 1997. While the area of palm oil in 1988 was 862.9 thousand hectares, it sharply increased to around 4 million hectares in 2002, implying an 11% per annum growth rate. As a result, the production of CPO had increased by around 10% per annum, from 342.7 thousand tons in 1988 to 7.97 million tons in 2002 (Direktorat Jenderal Perkebunan 2003). Similarly, the use of CPO as a raw material for cooking oil has sharply increased by around by 10% per annum.

The CPO industries has been perceived to play a greater role in the future as CPO has been predicted to play a greater role in international market of oils

and fats. Pasquali (1993) projected that the growth rate of CPO production would be the fastest among edible oils. CPO has been predicted to take over the role of soybean oil as the biggest oils traded in the world oil and fat market. The market development of CPO will even be faster as the success of the Uruguay Round (Barton 1993).

Considering the importance of the industry, the government of Indonesia has launched policies to optimize the development of the industry or to achieve non-efficiency goals, such as supply stabilization. The most important policies has been export tax policy, launched since August 1994, aiming at stabilizing and securing domestic supply and price. The export tax rate when this policy firstly introduced, was linearly related to CPO prices, ranging from 40-60 percent of the differences between CPO prices and minimum export price to be taxed. In the period of July 4, 1997 to February 1998, the export tax rate was changed to be 5 percent of CPO price. Due to sharp increase of CPO price and substantial depreciation of Rupiah, the government decided to banned export in the beginning

1998. Then, this policy was replaced by an export tax rate of 60%, and has gradually reduced to be 30% since July 1999.

This policy has perceived to have substantial impacts on various aspects of the industry, such as on investment (area), production, consumption, trade, domestic price, added value, farm income, and welfare distribution. On the other hand, the magnitude and distribution of the impacts will color the future of the industry. Therefore, estimation of these magnitude and distribution of these impacts are important as an effort to formulate an appropriate export tax rate which is relatively fair, either from producers, consumer, or government point of view.

In line with this issue, there are two main objectives of this study as follows:

- 1) To assess the impacts of CPO export tax on Indonesian CPO industry, covering impact on domestic price, investment (area), production, consumption, export, employment, added value, cooking oil price, government revenue, producer surplus, and consumer surplus;
- 2) To propose an alternative CPO export tax formula which is relatively fair, either from producer or consumer point of view.

RESEARCH METHOD

Theoretical Model and Model Specification

Simulation approaches on the econometric model of the industry were used to assess the impacts of CPO export tax on various aspects of the industry. The econometric model developed in this paper is basically a modification of a model previously developed by Susila *et al.* (1995). The main model modifications are re-specification of model, level of aggregation, and the use of a simultaneous equation system approach for all equations (the previous model used single equation for each country and simultaneous equation system for the world market).

Theoretical model of CPO market was specified to consist of ten blocks/subsystems, that are, four blocks of main producing/exporting countries (Malaysia,

Indonesia, Nigeria, and Latin America), four blocks of main consuming/importing countries (West Europe, China, Pakistan, and Egypt), one block of the rest of the world, and one block of the world CPO market. The production share of the four producing countries has been around 86 percent of world production, while the consumption share of the four consuming countries has been around 72 percent. This implies that the level of aggregation is considered to be relatively justified.

A simplified theoretical model by assuming the model consisting of one block exporting country (Indonesia) one block importing country (West Europe), and the world market block, is illustrated in Figure 1. This figure shows the hypothetical relationships between variables in the model.

As seen in Figure 1, Indonesia block consist of seven equation as follows:

$$\text{INPOA}_t = a_0 + a_1 \text{RPORBP} + a_2 \text{INE45} + a_3 \text{INI45} + a_4 D + a_5 \text{INPOA}_{t-1} + U_1 \dots \dots \dots (1)$$

$$\text{INPOQ}_t = b_0 + b_1 \text{INPOP}_t + b_2 \text{INPOA}_t + b_3 T + U_2 \dots \dots \dots (2)$$

$$\text{INPOC}_t = c_0 + c_1 \text{INPOP}_t + c_2 \text{INY}_t + c_3 D_2 + c_4 D_3 + U_3 \dots \dots \dots (3)$$

$$\text{INPOX}_t = d_0 + d_1 (1 - \text{INTAX}_t) \text{WDPOP}_t * \text{INE}_t + d_2 \text{INPOQ}_t + d_3 \text{INPOX}_{t-1} + U_4 \dots \dots \dots (4)$$

$$\text{INPOS}_t = e_0 + e_1 (\text{WDPOP}_t - \text{WDPOP}_{t-1}) + e_2 \text{INPOQ}_t + e_3 \text{INPOC}_t + e_4 \text{INPOS}_{t-1} + U_5 \dots \dots \dots (5)$$

$$\text{INPOM}_t = \text{INPOC}_t + \text{INPOX}_t + \text{INPOS}_t - \text{INPOQ}_{t-1} - \text{INPOS}_{t-1} \dots \dots \dots (6)$$

$$\text{INPOP}_t = f_0 + f_1 (1 - \text{INTAX}_t) \text{WDPOP}_t * \text{INE}_t + f_2 \text{INPOQ}_t + f_3 \text{INPORP}_{t-1} + U_7 \dots \dots \dots (7)$$

INPOA = Oil palm mature area of Indonesia (1000 ha)

INPOQ = Oil palm production of Indonesia (1000 ton)

INPOC = Oil palm consumption of Indonesia (1000 ton)

INPOX = Oil palm export of Indonesia (1000 ton)

INPOM = Oil palm import of Indonesia (1000 ton)	ING = Indonesia gross domestic product (US\$ million)
INPOS = Oil palm stock of Indonesia (1000 ton)	INI = Indonesian interest rate (% per annum)
INPOP = domestic price of oil palm (Rp/kg)	INN = Indonesian population (million)
$RPORBP = \frac{((1-INTAX_{t-4})WDPOP_{t-4} + (1-INTAX_{t-5})WDPOP_{t-5})}{(INRBP_{t-4} + INRBP_{t-5})}$	INE = Indonesian exchange rate (rupiah/US\$)
= price ratio of palm oil and rubber with time lag 4 and 5 years	INY = Indonesian income per capita (US\$/capita)
WDPOP = world oil palm price (US\$/ton)	WDRBP = world rubber price (US\$/ton)
INTAX = CPO export tax (%)	INRBP = domestic rubber price (Rp/kg)

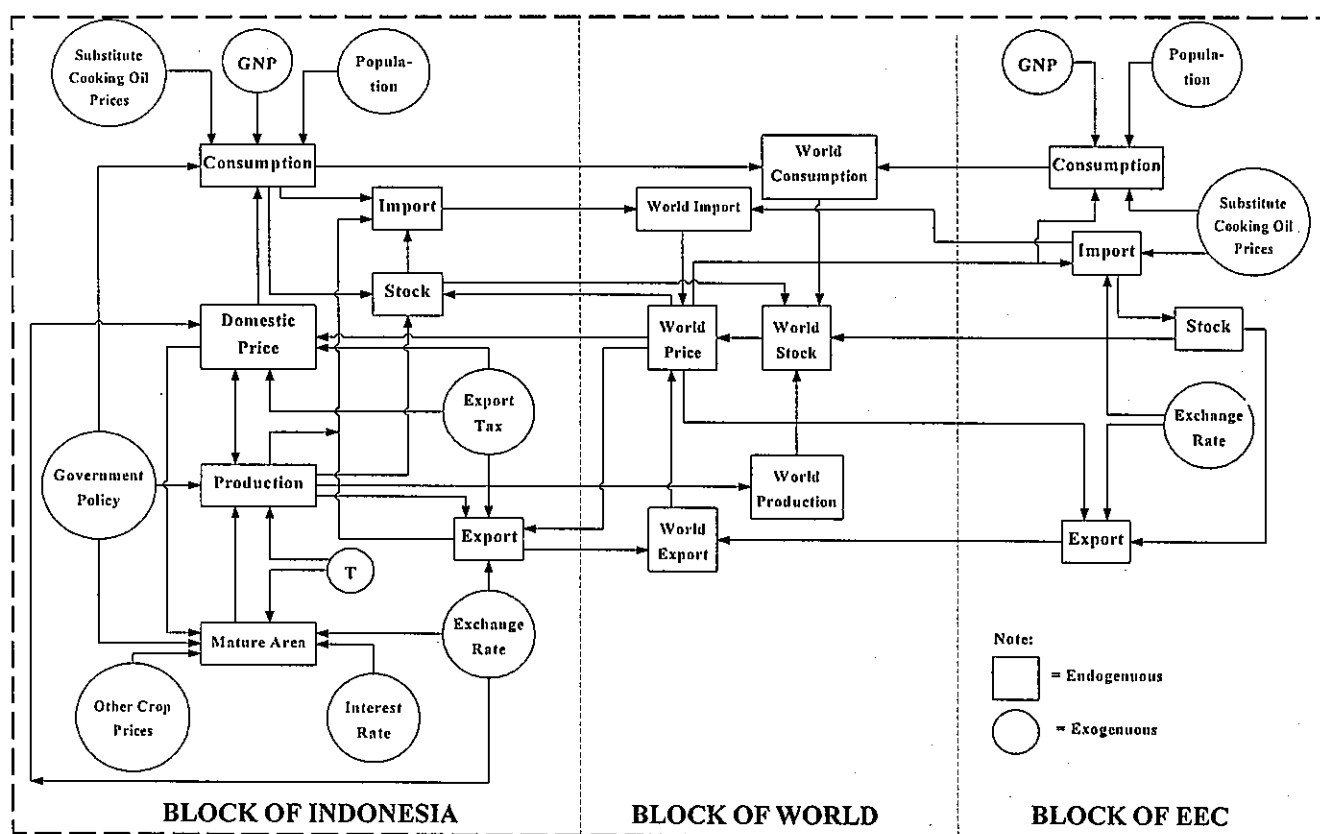


Figure 1. General theoretical model of crude palm oil (CPO)

T = Vintage of crops which have optimal production

D_0 = dummy variable $D = 0$ before 1979
 $D = 1$ after 1979 to 2005

D_2 = dummy variable $D_2 = 0$ before 1980
 $D_2 = 1$ after 1980 to 2005

D_3 = dummy variable $D_3 = 0$ before 1991
 $D_3 = 1$ after 1991 to 2005

Note : Index 45 means sum of variabel at time lag 4 and 5

example: $INPOP_{45} = INPOP_{t-4} + INPOP_{t-5}$

Equation (1) shows that mature area of oil palm plantation is affected by the price ratio of palm oil and rubber, exchange rate, interest rate, government policy related to palm oil development (D_0), government policy on liberalization of edible oil domestic market, and previous mature area. Moreover, since time lag between investment (planting activities) and mature area is around 4-5 years, then this time lag is used in Equation (1). The role of the CPO export tax will be captured in the model as the producer price defined as the world price minus tax. The relationship between exchange rate and mature area is expected to be positive, while that of mature area and interest rate to be negative. The government policies is expected to positively related to the oil palm mature area.

Equation (2) indicates that production is determined by the current mature area, CPO price, government policies, and export tax rate. The CPO price, mature area, and government policies is expected to be positively related to production. On the hand, the tax rate is expected to be negatively related to production, since tax depresses the CPO domestic prices.

Like most consumption equation, consumption of CPO is explained by domestic price, price of its substitute products (coconut oil), gross domestic product (GDP), and population (Equation 3). The higher the GDP, number of population, and

substituting product prices, the higher of the CPO domestic consumption. On the other hand, the higher of CPO domestic prices, the lower of CPO domestic consumption.

Export is expected to be positively related to the CPO world price, production, pervious export, exchange rate, and negatively related to export tax rate (Equation 4). Assuming that stock management is as part of speculative activity, the volume of stock is expected to positively related to price difference between current price and previous price and production. Moreover, stock is theoretically related to consumption and previous stock (Equation 5).

In Indonesian block, import is assumed to be residual variable as the function of Indonesian import is just to fulfill the deficit in domestic market. In can be seen from its volume, which is relatively fluctuated following the deficit. To accommodate this phenomenon, then the stock equation is represented by residual-identity equation (Equation 6).

Domestic price is basically a market-integrated approach implying that the domestic price is strongly influenced by the world price (Equation 7). In seen in the equation, the domestic price will negatively related to the tax rate and production and positively related to exchange rate and previous price.

With various adjustments to accommodate specific characteristics of each country/ block, all seven equations can be applied each countries. For example, area and production equation will be eliminated in West Europe block since it is not a producing country. Moreover, West Europe has not imposed export tax, but persistently imposed import tax to protect its sunflower oil industries. Thus, all seven equations could be used as prototype equation in each block, except the world market block. Model specifications and the results of estimation for each block can be seen completely in Susila *et al.* (2000).

Except for price equation, all equation in the world market block is a summation of its relevant variables (equation 8-equation 13). For example, equation (8) shows that world or total mature area is summation of mature area of all producing countries.

$$WDPOA_t = INPOA_t + MLPOA_t + NIPOA_t + LAPOA_t + CHPOA_t + RWPOA_t \dots\dots\dots (8)$$

$$WDPOQ_t = INPOQ_t + MLPOQ_t + NIPOQ_t + LAPOQ_t + CHPOQ_t + RWPOQ_t \dots\dots\dots (9)$$

$$WDPOC_t = INPOC_t + MLPOC_t + NIPOC_t + LAPOC_t + ECPOC_t + CHPOC_t + PKPOC_t + EGPOC_t + RWPOC_t \dots\dots\dots (10)$$

$$WDPOX_t = INPOX_t + MLPOX_t + LAPOX_t + ECPOX_t + RWPOX_t \dots\dots\dots (11)$$

$$WDPOM_t = INPOM_t + MLPOM_t + NIPOM_t + LAPOM_t + ECPOM_t + CHPOM_t + PKPOM_t + EGPOM_t + RWPOM_t \dots\dots\dots (12)$$

$$WDPOS_t = INPOS_t + MLPOS_t + NIPOS_t + LAPOS_t + ECPOS_t + CHPOS_t + PKPOS_t + EGPOS_t + RWPOS_t \dots\dots\dots (13)$$

$$WDPOP_t = ae_0 + ae_1 WDPOS_{t-1} + ae_2 WDPOM_t + ae_3 WDPOX_t + ae_4 WDPOP_{t-1} \dots\dots\dots (14)$$

Note :

1. The first two letters of notations represent country or world (IN: Indonesia, ML: Malaysia, NI: Nigeria, LA: Latin America, CH: China, EC: European Economic Community, PK: Pakistan, EG: Egypt, RW = rest of the world country, WD: world)
2. The next two letters of notation represent the commodity (PO = oil palm)
3. The last letter of notation represent variable (A : mature Area, Q : production, C: consumption, X: export, M: import, S : stock, P : Price)

example: WDPOX: world CPO export

MLPOQ : oil palm production of Malaysia

The CPO world price equation is specified as a behavioral equation, not as a market clearing equation. Following this, the world price is expected to positively influence by world import, price of other oils (soybean oil and sunflower oil), moving average effects ($WDPOP_{15}$). Moreover, world export and previous stock are expected to negatively influenced world price (Equation 14).

Model Identification, Estimation, and Simulation

Model identification used in this study was order condition. With 52 endogenous variables (equations), 73 predetermined variables, and around 3-10 explanatory variables in each equation and using order condition, we know that the model is definitely over-identified. On the basis of extensive experiences from previous studies, the use of rank condition will end up with the same conclusion as that of order condition. Therefore, rank condition was not applied in this study.

Given that the model was over-identified, 2SLS method of estimation was applied. Koutsoyiannis (1977) stated that under the circumstance of the existence of model misspecification, missing of relevant variables, multicollinearity and autocorrelation error, 2SLS tends to yield more robust estimates. Moreover, 2SLS method is relatively the simplest method among methods suited to over-identified model.

Based on previous export tax rates, four scenarios associated with the tax rates were analyzed in this study as follows:

- 1) Scenario I is a basis scenario, that is a scenario in which the government would not have imposed the CPO export.
- 2) Scenario II is conducted to **evaluate** the impacts of export tax on various aspects of Indonesian

CPO industry since its implementation (1994-1999). This scenario, therefore, is based on imposition of actual tax rate as the government had decided in the 1994-1999 periods. The differences between the results of Scenario I and Scenario II are the impacts of the export tax imposition on the industry in the 1994-1999 periods.

- 3) **S c e n a r i o** predict the impacts of export tax on various aspects of Indonesian CPO industry using time horizon of the year 1999-2010. Scenario III is based on an assumption that the export tax rate in that time horizon would be 40%. Using the similar approach, Scenario III and IV represent 40 and 60 percent tax rate, respectively. The differences between the results of these scenarios and Scenario I are the impacts of the export tax imposition on the industry in the year 1999-2010 periods, respectively.

On the basis of the magnitude and distribution of the impacts, the effectiveness of the export tax policy was evaluated. Based on this evaluation and various factors related to the consumer and producer, such as the number of farmer, consumer, consumption/income share, and theory of secondary right, an alternative export tax rate was formulated.

RESULTS AND DISCUSSIONS

Results of Model Estimates

The results of estimates are generally in accordance with theories/hypotheses, although some are not. This can be seen from the sign and magnitude of estimates, which are generally as expected. Moreover, the model estimates are also fairly robust, indicated by 25 equations out of 39 estimated equations (13 identity equations are no need to be estimated) have coefficient of determination which larger than 90%. Only 9 equations have coefficient of determination lower than 75%. Moreover, with a criterion of root mean square percentage error to validate the model, it is perceived that the model is fairly sufficient to use a simulation model. A more comprehensive discussion on model validation can be seen in Susila *et al* (2000).

Considering the focus of this paper, discussions on all estimates for each block/ country are not presented within this paper. Again, these discussions can be seen in Susila *et al.* (2000). Discussions on the results of estimates are only focused on the Indonesia Block (Equation 15 - 21 and the world price equation (Equation 22)).

Equation (15) shows that there are four explanatory variables significantly influenced investment (mature area), that are, price ratio of CPO and rubber, D2, D3, T. These four variables can explain around 92.65 percent of mature area variation. The government intervention on the industry (D2) had a negative impact on area development while liberalization of CPO trade in Indonesia (D3) had supported the development of oil palm plantation. Moreover, Variable T which may represents the government policy to support the development of oil palm in Indonesia has a significant positive impact on palm oil plantation in Indonesia.

$$\begin{aligned} \text{INPOA}_t = & -761.05 + 345.33 \text{ RPORBP} - 226.77 \text{ D2} \\ & 0.044 \quad 0.286 \quad 0.070 \\ & + 321.73 \text{ D3} + 62.85 \text{ T} \dots\dots\dots (15) \\ & 0.068 \quad 0.001 \end{aligned}$$

$$R^2 = 92.65 \%$$

The price ratio of CPO to rubber which is significant in Equation (15) indicates that there has been a competition in resource (land) use between oil palm and rubber. The competition has occurred mainly in Sumatra and Kalimantan, which are traditionally known as rubber and oil palm plantation centers. The positive sign of the price ratio coefficient indicates that the increase of CPO price or a decrease in rubber price will increase oil palm plantation with 4-5 year time lag.

Production behavior can simply be explained by mature area and time trend (T). These two variables can explain around 98 percent production variation. CPO price has non a significant effect on production, a common characteristic of production response of estate crops. In other words, price changes had not been responded by production changes, but by investment decision (area expansion). T in equation (16) has mostly represented an increase in yield due

to plantation composition based on plantation age (vintage). The expansion of oil palm since 1970 has caused a continuous increase of vintages which are in maximum yield (Susila 1997).

As expected, consumption of CPO has been positively related to income per capita as most domestic use of palm oil is for cooking oil (Equation 17). Moreover, government policies represented by D2 and D3 also had a significant impact on the increase of CPO domestic consumption. The consumption of CPO has not been significantly affected by its price as cooking oil is considered as a basic need.

As seen in Equation (18), the behavior of Indonesian CPO export has mainly related to CPO export price and production. An 1 percent increase of export price will cause a 0.253 percent increase in export, implying that export is inelastic to price. Since export tax is negatively related to export price, increases in export tax will decrease volume of export. The role of production in export equation indicates that international market has been the main destination of Indonesian CPO production. On the other hand, Indonesian stock has been relatively small, due to high risk and cost of holding stock, compared to its potential profit gain.

The estimates of stock and import on are not as robust as the previous equations. As an example, signs of the estimates of stock equation are consistent with hypotheses, but are not significantly explained the variation of stock. Yet, import equation can only explain by its moving average term.

The world CPO price can well be explained by world current and previous stock, import, export, and moving average effect (Equation 21). All these four variables explain around 90 percent of world price fluctuation. As expected, world stock and export will negatively related to price while import is positively related to price.

The magnitudes of price flexibility which are relatively high are as expected. Price flexibility of import and export are 18.08 and 18.37, respectively. This implies that an one percent import/export increase will cause more than 18 percent increase/decrease in price. This is consistent with the fact that the CPO price has been highly fluctuated with coefficient of variation around 34%. As an example, while the average CPO price in 1998 was US\$ 550/ton, it sharply decreased to US\$ 220/ton in 1999. This sharp price decrease was triggered by an increase in soybean oil production in

$$\begin{array}{l} \text{INPOQ}_t = -521.49 + 1.96 \text{ INPOA} - 77.77 \text{ T} \dots\dots\dots (16) \\ \quad \quad \quad 0.003 \quad \quad \quad 0.000 \quad \quad \quad 0.000 \\ \quad \quad \quad R^2 = 98.41 \% \end{array}$$

$$\begin{array}{l} \text{INPOC}_t = 16.47 - 0.000024 \text{ INXP} + 0.66 \text{ INY} + 359.15 \text{ D2} + 253.25 \text{ D3} \dots\dots\dots (17) \\ \quad \quad \quad 0.828 \quad \quad \quad 0.892 \quad \quad \quad 0.000 \quad \quad \quad 0.001 \quad \quad \quad 0.105 \\ \quad \quad \quad R^2 = 96.62 \% \end{array}$$

$$\begin{array}{l} \text{INPOX}_t = 24.78 + 0.00044 \text{ INPOPXT} + 0.42 \text{ INPOQ} - 0.23 \text{ INPOX}_{t-1} + 191.53 \text{ D3} \dots\dots (18) \\ \quad \quad \quad 0.233 \quad \quad \quad 0.033 \quad \quad \quad 0.011 \quad \quad \quad 0.414 \quad \quad \quad 0.437 \\ \quad \quad \quad R^2 = 96.62 \% \end{array}$$

$$\begin{array}{l} \text{INPOM}_t = 35.52 + 0.63 \text{ INPOME} \dots\dots\dots (19) \\ \quad \quad \quad 0.235 \quad \quad \quad 0.030 \\ \quad \quad \quad R^2 = 96.62 \% \end{array}$$

$$\begin{array}{l} \text{INPOS}_t = 24.78 + 0.00044 \text{ INPOPXT} + 0.42 \text{ INPOQ} - 0.23 \text{ INPOX}_{t-1} + 191.53 \text{ D3} \dots\dots (20) \\ \quad \quad \quad 0.233 \quad \quad \quad 0.033 \quad \quad \quad 0.011 \quad \quad \quad 0.414 \quad \quad \quad 0.437 \\ \quad \quad \quad R^2 = 96.62 \% \end{array}$$

$$\begin{array}{l} \text{WDPOP}_t = -422.82 - 0.11 \text{ SWDPOS} + 0.37 \text{ WDPOM} - 0.30 \text{ WDPOX} + 0.76 \text{ WDPOP}_{t-1} + 0.45 \text{ WDSBSFP} \dots\dots (21) \\ \quad \quad \quad 0.000 \quad \quad \quad 0.002 \quad \quad \quad 0.001 \quad \quad \quad 0.003 \quad \quad \quad 0.000 \quad \quad \quad 0.000 \\ \quad \quad \quad R^2 = 90.52 \% \end{array}$$

main CPO importing country (the USA), causing a decrease in CPO import

Evaluation and Projection of the Impacts of CPO Export Tax

Since the policy implemented in August 1994, this export tax policy has had significant impacts to the industry. Within the time horizon 1994-1999 at which the effective tax rate of around 13.33 percent, the mature area of oil palm plantation had been reduced by 2.56 percent per annum or around 37 000 ha per annum (Table 1). This indicates that this policy had a

On the other hand, this policy had been proven to be an effective mean to control domestic cooking oil price. With this policy, the government had been successful to control or to keep the cooking oil price down when the world CPO price increased or Rupiah was substantially depreciated. Using this policy, the government had pressed the cooking oil price to be 7.77 percent or Rp 184/kg lower than it should be. Moreover, from the government point of view, a significant tax revenue, estimated around Rp 5241 billion, was also considered to be a positive impact of the policy.

Table 1. Evaluation of the impacts of CPO export tax (1994-1999)

Explanations	Unit	Means	Impacts of Export Tax Implementation (%)	Impacts of 1% Increasing of EET (%)
Mature area	Thousand ha	1 444.86	-2.56	-0.19
Production	Thousand ton	4 483.95	-0.81	-0.06
Export	Thousand ton	2 371.03	-6.20	-0.47
CPO price	Rp/kg	1 524.54	-8.58	-0.64
Cooking oil price	Rp/kg	2 366.85	-7.77	-0.58
FFB Price	Rp/kg	342	-8.58	-0.64
Gross margin	Rp/ha/th	3 512 116	-11.35	-0.85

Note:

EET : Effective Export Tax

sub-stantial-negative effect on investment of the industry. As the results of this negative investment effect, the CPO production had also depressed by the policy. It was estimated that the policy had caused a loss of around 0.81 percent of the total production or around 36 000 ton CPO per annum.

The most devastating impacts of the policy had been on the export and farm income. During that time horizon, this policy had caused the export to be 6.02 percent lower than that is without the export tax. This implies that Indonesia had sacrificed her export of about 147 000 ton annually. Similarly, the policy had caused the farm income to be lower around 11.35 percent or around Rp 400 000/ha/year, a substantial loss for farmers.

With time horizon of 1999-2000, impacts of three export tax rate, namely 20 percent (4.78 percent effective), 40 percent (9.55 percent effective), and 60 percent (14.33 percent effective) were forecasted. The impacts of these tax rates are summarized in Table 2. In term of mature area, an increase of 1% effective tax rate will decrease mature area by around 0.15 percent, which is equivalent to a decrease of 3145 ha. For an example, if the tax rate imposed in year 1999-2010 is 4.75 percent effective tax rate, then the mature area will be lower around 0.76 percent or around 16 000 ha per annum. This implies that the imposition of the export tax has significantly depressed the development of oil palm plantation in Indonesia.

Tabel 2. Projection of the impacts of CPO export tax (2000-2010)

Explanations	Unit	Means	Impacts of Tax Policy (%)			Impacts of 1% Increasing of EET (%)
			Tax 20%	Tax 40%	Tax 60%	
			Ef. 4.78%	Ef. 9.55%	Ef. 14.33%	
Mature Area	Thousand ha	2 096.75	-0.76	-1.39	-2.05	-0.15
Production	Thousand ton	6 345.89	-0.49	-0.90	-1.32	-0.09
Export	Thousand ton	3 457.51	-2.28	-3.86	-5.51	-0.41
CPO Price	Rp/kg	2 379.24	-6.61	-10.69	-15.12	-1.13
Cooking oil Price	Rp/kg	3 626.61	-6.05	-9.78	-13.80	-1.03
Consumption	Thousand ton	2 728.54	0.01	-0.03	-0.06	0.00
Import	Thousand ton	94.19	0.00	0.00	0.00	0.00
Stock	Thousand ton	708.08	0.10	0.05	-0.01	0.00

Note:

Ef. = Equivalent with effective export tax

EET = Effective export tax

Following its negative impact on mature area, the export tax has also depressed production, although in lower rate. In general, an 1 percent increased of effective tax rate is projected to decrease production of 0.09% per annum or around 5700 ton per annum. As seen in Table 2, if the government imposed 14.33% effective rate, the production decrease will be around 84000 ton per annum.

The negative impacts of this policy will be more substantial in term of export volume. An 1% increase of the tax rate will decrease Indonesian export by around 0.41% or around 14 000 ton per annum. If for example, the government impose 9.55 percent effective tax rate, then the export loss will be around 133 000 ton per annum. This indicates that this policy could be an effective policy instrument to control supply in domestic market.

On the contrary, this policy has given a substantial benefit to consumers, either cooking oil industries or cooking oil consumers. As seen in the table, the implementation of this policy has caused domestic CPO and cooking oil price are lower than they should be. For example, an increase 1 percent effective tax rate will decreased CPO price by 1.13 percent or

around a decrease of Rp 26.89/kg. If the government imposes export tax of 14.33 percent effective, then the domestic price will be Rp 360/kg lower compared to that of without export tax.

As a consequence of CPO domestic price depressed by the tax, the price of cooking oil has also decreased. An increase of 1 percent effective tax rate will cause a decrease of 1.03 percent or Rp 37.35/kg price of cooking oil. This shows that this policy has been effective to control the price of cooking oil. Thus, if the government intends to protect cooking oil consumers from price fluctuation in the world market, then this policy could be an effective alternative.

Producers, mainly smallholders, have suffered a great loss due to the policy. As the domestic price of CPO depressed by this policy, then the farm gate price of the farmers' product (fresh fruit bunch or FFB), declines substantially. In the government imposes a 4.78 percent effective tax rate, then FFB price will be lower around 6.61 percent (Rp 35.23/kg) than that of without the tax (Table 3). In general an 1 percent increase of the tax will reduced FFB price by 1.13 percent of Rp 6/kg.

Tabel 3. Projection of the impacts of CPO export tax on welfare (2000-2010)

Explanation	Unit	Means	Impacts of Tax Policy (%)			Impacts of 1% Increasing of EET (%)
			Tax 20%	Tax 40%	Tax 60%	
			Ef. 4.78%	Ef. 9.55%	Ef. 14.33%	
FFB Price	Rp/kg	533	-6.61	-10.69	-15.12	-1.13
Gross margin	Rp/ha/th	5 888 299	-8.79	-14.38	-20.56	-1.53
Producer Surplus	Billion Rp	4 348.26	-7.14	-11.76	-17.30	-1.26
Consumer Surplus	Billion Rp	25 140.12	5.11	8.14	11.27	0.86
Total Surplus	Billion Rp	29 488.38	3.39	5.45	7.53	0.57
Value Added	Billion Rp	13 150.26	-7.03	-11.56	-16.44	-1.22
Labor	Million	1.90	-0.49	-0.90	-1.32	-0.09
CPO Tax	Thousand US\$	-	85 583	174 506	266 587	175 559
CPO Tax	Billion Rp	-	599 084	1 221 544	1 866 108	1 228 912

Note:

Ef. = Equivalent with effective export tax

EET = Effective export tax

As the FFB price declines due to the tax, farm income, measured in term of gross margin, also significantly decreases. As seen in the Table 3, a 1 percent increase in the tax rate will reduced far income by around 1.53% or around Rp 90 000 /ha/annum. When export tax is 14.33 percent effective rate, such as imposed in 1999, and assuming each farmer has 2 ha of oil palm plantation, then this policy will caused each farmer to suffer from loss of Rp 2.4 million per annum, a substantial loss for a smallholder.

The export tax policy has also an impact on social welfare distribution. As seen in Table 3, this policy has caused welfare distribution from producer to consumer and government. If the government increases the export tax rate of 1 percent, the producer surplus will decrease by 1.26 percent. On the other hand, this tax rate increase will increase consumer surplus by 0.86 percent. Moreover, this policy will also increase the government revenue. For example, the average revenue gained from this policy if the tax rate was 9.55 percent effective is around US\$ 174.5 million or Rp 1 221 544 billion per annum. In addition, total government revenue from this policy in 1994-1999 was estimated to be around Rp 5 241 billion.

The two other negative impacts of this policy are a loss in term of added value of the industry and employment. If the government imposes a 9.55 percent effective tax rate, the loss in term of added value was predicted to be around 11.56 percent of added value of the industry. Moreover, this export tax rate will

also reduce the job opportunity in the industry for around 1730 workers.

An Alternative Formulation of Export Tax Rate

The results of analysis indicate that the implementation of the CPO export tax has advantages and disadvantages to the industry. Moreover, this policy has also a redistribution impact to the agents involved in the industries and government revenue. This policy has caused consumers and the government to be better off. On the contrary, producers have become worst-off, indicated by the decline on area, production, export, farm income, and employment.

Considering the benefits and costs of the policy, the government is likely to maintain this policy in the future. As this policy has substantial impacts on the industry, this policy needs to be reformulated in such that consumers fairly protected from a sharp fluctuation of the international market, while producers still gains a normal profit or incentive to develop their plantations. Following this, the magnitude/rate of CPO tax should consider the following facts:

- 1) Investment in palm oil plantation is a long-term investment and therefore, price fluctuation can not be avoided by the investors/producers. Within a certain period of time, CPO price may well above production cost, and vice versa. For all price is

above the production cost, then we assume that total producers gain profit of Rp X;

- 2) Since there are periods in which producers suffer from a loss, then part of their profit will use to compensate their loss. Using world CPO price in the last two decades, it was found that around 27 percent of CPO price are below the production cost. Thus, the real profit will be around 0.73X, or rounded to be 0.7X;
- 3) Profits/losses strongly depend on the world price and exchange rate. Therefore, these two factors should be explicitly to considered to determine the rate of the tax;
- 4) On the basis of the secondary right theory which states that profit gain of an industry is not merely enjoyed by the people involved in the industry, but also by people, because of some obstacles, can not participate in the industry. This theory is relevant because an increase of profit gain by producers due to either world price increase or depreciation will cause a welfare decrease of consumers. In line with this argument, it assumed that the 75 percent of the profit belong to producers as primary right, while the rest for consumer as secondary right.
- 5) The magnitude of the tax should also consider the number of producers and consumers. In this study, the number of consumer and producers together with family members are assumed 210 million and 10 million, respectively;
- 6) The magnitude of the tax should also consider the income share of oil palm plantation to total farmers' income, and expenditure share of cooking oil to total house household expenditure. Within this study, the former is assume to be 80 percent and the latter to be 4 percent.
- 7) Production cost with an assumption that the exchange rate is Rp 7000/US\$ is around US\$ 362/ton or Rp 2555/kg. The government also indicates that the minimum CPO price to be taxed since July 1999 has been US\$ 365/ton (SK Menkeu No. 181/KMK.017/1999).

Following all these arguments, then an alternative export tax formulation is as follows:

$$PE = (HE \cdot ER - 2555) \cdot 0.7 \cdot 0.25 \cdot (210/10) \cdot (4/80) \dots\dots\dots (22)$$

$$= (HE \cdot ER - 2555) \cdot 0.1838$$

$$= (HE \cdot ER - 2555) \cdot 18.38\% \dots\dots\dots (23)$$

Where:

PE = Export tax rate (Rp/kg)

HE = Export price (US\$/ton)

ER = Exchange rate (Rp/US\$)

Compared to the existing export tax rate which is 30%, this alternative tax rate is far below, indicating the existing tax rate has been too bias to consumers or producers have been over taxed.

In socializing the export tax rate, the government should not apply this formula because this tends to be misunderstood. For example, when the government stated that the export tax rate was 30%, then many producers perceive that the magnitude of the tax was 30% of the price, not 30% of the difference between world price and the minimum price taxed. To avoid this misunderstanding, then the formula socialized should be the effective tax rate, that is, the percentage of export tax. Following this, the export tax rate on

the basis of various CPO prices and exchange rates are presented in Table 4.

Tabel 4. Export tax effective value based on export tax formulation 18.38%

Price (US\$/ton)	Exchange Rate (Rp/US\$)	Effective Tax (%)	Value (US\$/ton)	Exchange Rate (Rp/US\$)	Effective Rate (%)
366-400	6000-6500	0.00	550-600	6000-6500	5.31
366-400	6500-7000	0.19	550-600	6500-7000	6.28
366-400	7000-7500	1.45	550-600	7000-7500	7.12
366-400	7500-8000	2.54	550-600	7500-8000	7.84
366-400	8000-8500	3.50	550-600	8000-8500	8.48
366-400	8500-9000	4.35	550-600	8500-9000	9.05
400-450	6000-6500	0.70	600-650	6000-6500	6.36
400-450	6500-7000	2.01	600-650	6500-7000	7.25
400-450	7000-7500	3.14	600-650	7000-7500	8.02
400-450	7500-8000	4.12	600-650	7500-8000	8.68
400-450	8000-8500	4.99	600-650	8000-8500	9.27
400-450	8500-9000	5.75	600-650	8500-9000	9.79
450-500	6000-6500	2.56	650-700	6000-6500	7.25
450-500	6500-7000	3.73	650-700	6500-7000	8.07
450-500	7000-7500	4.74	650-700	7000-7500	8.78
450-500	7500-8000	5.62	650-700	7500-8000	9.40
450-500	8000-8500	6.40	650-700	8000-8500	9.95
450-500	8500-9000	7.08	650-700	8500-9000	10.43
500-550	6000-6500	4.07	700-750	6000-6500	8.02
500-550	6500-7000	5.13	700-750	6500-7000	8.78
500-550	7000-7500	6.04	700-750	7000-7500	9.45
500-550	7500-8000	6.84	700-750	7500-8000	10.02
500-550	8000-8500	7.54	700-750	8000-8500	10.53
500-550	8500-9000	8.16	700-750	8500-9000	10.98

As seen in Table 4, If CPO price is US\$ 480/ton and the exchange rate is Rp 7200/US\$, then the effective export tax rate will be 4.74% of price or around US\$ 22.7/ton. If the price goes up to US\$ 620/ton and the exchange rate is Rp 9000/US\$, then the effective tax rate will be 9.79 percent of export price or around US\$ 60.14/ton.

Since the export tax rate has an effect on the cooking oil contribution to inflation rate, it is considered important to estimate the relationship between the contribution of cooking oil to the inflation rate with world CPO price and exchange rate under the assumption that the effective tax rates are as presented in Table 4 (Equation 24).

$$\text{KONIFL} = 0.00349\text{DWDPOP} + 0.000224\text{DINER} \dots\dots\dots (24)$$

Where:

- KONIFL : contribution of cooking oil to Indonesian inflation rata (percent);
- DWDPOP : change in the world CPO price (US\$/ton)
- DINER : change in exchange rate (Rp/US\$)

In the last 12 months, the contribution of cooking oil to the inflation rate has been around 0.2266 percent. For an example, if the world CPO price increase by US\$ 100/ton, and the effective tax rate is as if presented in Table 5, then contribution of cooking oil to the inflation increase will go up by 0.349 percent. In general, an increase of 1 percent of the price will cause a 0.665 percent increase on the contribution. Similarly, an 1 percent increase in the exchange rate will cause a 0.356 increase in the contribution. For an example, if the existing contribution is 0.22 percent, then a 10 percent increase in CPO price will cause a 0.022 increase in the contribution or the contribution will be 0.242 percent.

CONCLUSION AND POLICY IMPLICATIONS

The implementation of the CPO-export tax has had various substantial effects on both on efficiency/growth and welfare distribution. An increase of an 1 percent export tax rate will cause a 0.19 percent mature area/investment decrease and 0.81 percent production decrease. More over, this policy also leads to a 0.41 percent export decrease. In farm level, an increase of 1 percent export tax rate will lead to a decrease of 1.53 percent of farm income. In addition, this also causes an 1.22% percent decrease in added value in industry and 0.09 percent decrease in employment. However, this policy has been proven as an effective mean to control domestic CPO price and cooking oil price. An 1 percent increase of the export tax rate will reduce the CPO domestic price and cooking oil price by 1.13 percent and 1.03 percent, respectively. Following these, producer surplus will decline by 1.26 percent, while consumer surplus will increase by 0.86 percent for an increase of an 1 percent of the tax rate. Total export revenue gained by the government in 1994-1999 was around Rp 5 241 billion.

Considering several factors related to the industries, the existing export tax rate which is 30 percent, is over-taxed or too biased to consumers. The results of this study show that the export tax rate should be around 18 percent from the difference between the world CPO price and the minimum price taxed (US\$ 365/ton). Under this tax rate formula, the effective tax rates will vary from 0.19-10.98 percent of the world price, depending on the CPO world price and

exchange rate. Moreover, the socialized tax rate should be the effective tax rates, not the nominal tax rates.

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