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Indonesia's Palm Oil Subsector

Donald F. Larson

A recommendation: Indonesia should repeal its export tax on crude palm oil and discontinue buffer stock operations and directed sales from public estates. It is time for Indonesia to complete the evolution from public interventions in the palm oil market to private sector initiative in response to international price signals.



Summary findings

Debate on Indonesia's palm oil policy was stimulated by a sharp increase in cooking oil prices in 1994–95 and a resulting increase in the export tax rate on crude palm oil. Palm oil has been one of the fastest growing subsectors in Indonesia. In two decades, annual output grew from less than 400,000 tons to more than 4 million. Using a quantitative model, Larson analyzes the effect of government policies, including the export tax, buffer stock operations by the BULOG (the national logistics agency), and directed sales from public estates.

Larson acknowledges the export tax's effectiveness in lowering domestic prices, but observes that its impact on inflation and consumer welfare is minimal. Cooking oil accounts for only 1.4 percent of the consumer price index and welfare gains to consumers are small (less than \$1 per capita annually) because the importance of cooking oil has declined in the household budget of even the poorest households. (It is 4 percent of the household budget of the poorest 20 percent of the rural population.)

The tax has also had the unintended effect of transferring income (up to US\$99 million a year) from oil palm growers — 22 percent of them smallholders — located primarily off Java.

The structure of the tax discourages local processing by squeezing margins for processing. And determining tax rates on palm oil products independent from the underlying crude palm oil price creates uncertainty about marketing margins for processors, inhibiting effective risk management.

Larson recommends repealing the tax. He also recommends discontinuing buffer stock operations and directed sales from public estates because they are ineffective at lowering domestic prices and affect investment by creating needless uncertainty.

Larson concludes with recommendations on investment policy. Direct incentives (in the form of subsidized loans) to private investors have been an indirect instrument for overcoming investment risks and uncertainties, but investors should no longer need those incentives.

Instead, Indonesia's government should focus more on alleviating obstacles to private investment, such as lack of rural infrastructure, land titles, and sovereign risk. The Bank might be of assistance in this area.

The review for this paper — a product of the Commodity Policy and Analysis Unit, International Economics Department, and the Agriculture Operations Division, East Asia and Pacific, Country Department III — was conducted to help the debate on Indonesia's palm oil policy. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Pauline Kokila, room N5-030, telephone 202-473-3716, fax 202-522-3564, Internet address pkokila@worldbank.org. September 1996. (47 pages)

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Indonesia's Palm Oil Subsector

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CONTENTS

I.	Summary	1
II.	The Structure of Production	4
	Production History and Investment Policies	4
	Cost of Crude Palm Oil Production.....	7
	Market Concentration in the Refining Industry.....	8
III.	Market Interventions	9
	Background.....	9
	Current Policy Issues	10
	A. Export Tax	11
	B. Directed Domestic Sales	15
	C. Bulog Operations.....	17
IV.	Long-term Development Issues	19
	Land procurement and titles.....	19
	Direct Investment and a Potential Role for the World Bank	20
	Conclusions.....	21
	Bibliography	23
	Annexes	24
	Tables	32
	Figures	41

A Review of the Palm Oil Subsector in Indonesia

Summary

During the last twenty years, the history of the palm oil industry in Indonesia is one of evolution from government sponsorship and market interventions to private sector initiative in response to international price signals. The evolution of the market from public to private sector, while substantial, is incomplete. Investments in new oil palm estates receive preferential financing terms. Further, marketing interventions aimed at reducing inflation and assisting consumers remain but with unintended consequences.

Production of palm oil in Indonesia has increased dramatically, from less than 400,000 tons in 1975 to more than 4.4 million tons in 1995. Until 1992, most palm oil was produced on publicly-owned estates, although the mix will change rapidly during the next decade as existing plants mature.

Indonesia is one of the lowest-cost producers of vegetable oil in the world. Comparative studies on production costs, based on engineering techniques, generally estimate average costs at around \$200/ton. However, a recent study on the field costs at nine Socfindo estates puts the cost of production -- including depreciation of capital investments -- at \$127/ton. With palm oil prices currently above \$600 tons and projected to remain above \$400 for the foreseeable future, prospects for new investments are bright.

Since 1991, the government has intervened infrequently in the marketing of palm oil. However, with the price boom in palm oil, inflation fears and concern for consumers has motivated recent market interventions. Still, growth in incomes over the past decade has resulted in a diversified household budget with less importance given to cooking oil-- even among the poor. Cooking oil comprises 1.4 percent of the CPI and 4 percent of the household budget of the poorest 20 percent of the rural population. As a result, the 21 percent increase in the prices of cooking oil in 1994 only contributed 0.3 points to the inflation rate. Further, the costs to the poorest consumers of the increase in palm oil was

equivalent to a 0.4 percent decrease in their household income. It is unlikely, with average incomes growing at more than 6 percent, that the price increase created a burden for most consumers.

The government currently uses three policy tools to affect domestic prices: 1) an export tax; 2) buffer stock operations; and 3) directed sales from public estates. The export tax is triggered when FOB prices reach \$435/ton and targets only above-average profits. The tax has been effective in lowering domestic prices, but does so by transferring income from the oil palm growers who are primarily off-Java, to the government and to consumers who are primarily on-Java. Analysis suggests that the welfare gains to consumers are small -- less than one dollar per capita per year. Further, twenty-two percent of the growers are smallholders. As a result, the tax runs counter to the government's development priorities. Since the advantages to consumers are limited, the government should repeal the tax.

The way in which the tax is implemented creates a burden for the processing industry. Generally, the tax has discouraged local processing by heavily taxing processing margins. Further, since the tax rates for palm oil products are not directly linked to the tax on crude palm oil, processing margins are unpredictable and the policy inhibits common risk management practices such as forward sales. This is an unintended consequence of the mechanics of the tax. If the tax is not repealed, it should be modified to address this short-coming by basing the tax on palm oil products on their crude oil content.

Since the reforms, restrictions on imports and exports have been lifted and domestic prices of crude palm oil and refined products, including cooking oil, have followed international prices. As a result, crude oil and olein stock pile operations and directed domestic sales cannot have a substantial enduring effect on domestic prices. These interventions transfer income but do not accomplish the intended purpose of the interventions-- improving the welfare of consumers. Further, the interventions create needless uncertainty in the investment community. Regardless of the government's decision regarding its policy of lowering domestic prices during boom periods, these interventions should be abandoned.

Although profitable, investing in plantation crops is a risky business characterized by a number of substantial hurdles. The Government of Indonesia has successfully encouraged new investments by investing directly through public plantations and by offering loans at below-market rates of interest. Because of improved domestic capital markets and interest by foreign investors, the industry may no longer require direct incentives. Rather, the GOI might consider addressing the obstacles to private investment directly. The World Bank could play a role as well, by developing programs jointly with the GOI to address 1) rural infrastructure needs; 2) land titlement; and 3) issues of policy risk.

I. Overview

As incomes have grown and levels of human and physical capital have accumulated in Indonesia, the economy has become increasingly diversified. Agriculture provides an increasingly smaller portion of national income, declining from 56 percent of GDP in 1965 to 19 percent in 1993. This is not to suggest that agriculture has not grown or that future investments in agriculture are not profitable. Exactly the opposite is true. Further, the association of rapid growth in agriculture along with growth in other sectors has been a common characteristic of growth in developing countries. Such growth is usually associated with the rapid development of new crops and new technologies. In Indonesia, the palm oil industry has been one such source of growth in a dynamic agricultural sector. In twenty years, production has grown from less than 400,000 tons of crude palm oil (CPO) to over 4 million tons. In addition, with production costs among the lowest in the world, investment levels are expected to remain high.

As noted in *Indonesia: Agricultural Transformation Challenges and Opportunities (1992)*, the tree crops sector occupies a strategic niche in Indonesian agriculture and development, providing a valuable source of foreign exchange earnings and generating incomes for millions of smallholder families. Since tree crop production is concentrated off-Java where poor soils limit food production, growth in the tree crop sector has also contributed greatly to poverty alleviation off-Java.

During the last twenty years, the role of the industry as both a vehicle of development in off-Java and as a supplier of inexpensive cooking oils throughout Indonesia has been explicitly directed through government ownership of estates and varying degrees of market interventions. Increasingly, the production capacity has become more concentrated in private estates and smallholders and government interventions have been reduced. In fact, the history of the palm oil industry in Indonesia is one of evolution from government-sponsorship and marketing interventions to private-sector initiative responsive to international prices signals.

The evolution of the market from public to private sector, while substantial, is incomplete. Interventions which still remain in the subsector are designed primarily to limit the negative effects of rising international prices on domestic consumers. The primary policy instrument is a variable export levy which targets profits and appears to have successfully lowered consumer prices. Still, with growing incomes and the diversification of diets, the effects of cooking oil prices on family welfare has become increasingly small. At the same time, the costs of the policies to off-Java income and to potential foreign direct investment remain real and consequential.

The remainder of this report is composed as follows. Following this overview, Section II describes the structure of palm oil production in Indonesia, including investment policies, production costs, and concentration in the refining sector. Section III discusses the government's past and current market interventions. Section IV briefly discusses three important long-term development issues related to the subsector -- 1) land titlement; 2) infrastructure; and 3) non-commercial risks as a barrier to private investment. Section V concludes.

II The Structure of Production

Production History and Investment Policies

Although considered a new crop in Indonesia palm oil was cultivated and used for soap production in Central Java by the mid-nineteenth century and oil palm plantations

producing edible oil appeared in Sumatra by 1911. In 1938 about 90,000 hectares were planted in oil palm, but during World War II and the following years of early independence, little growth occurred. In 1968, all nationalized former-Dutch estates were reorganized into 28 independent management units: Perseroan Terbatas Perkebunan (PTPs) and Perusahann Negasa Perkebunan (PNPs) and all other nationalized estates were returned to their previous owners.

Since that time, investment policies have been characterized by three distinct periods. From 1968 to 1988 growth in the subsector came through direct government investments via the PTPs. From 1988 to 1994, most expansion occurred via a joint government-private sector development scheme known as *Pir-trans*. More recently, the government has initiated a program of government supported private sector and cooperative investment known as Prime Co-operative Credit for Members (KKPA).

Following the reorganization of the PTPs, expansion and rehabilitation plans were launched and new plantings begun. Oil palm was considered more profitable than alternative estate crops, and area devoted to oil palm expanded rapidly. Area planted in oil palm on government estates grew from 84,000 hectares in 1969 to 176,000 hectares in 1979 to 343,000 hectares in 1987. In the late 1970s, palm oil became a vehicle for rural development as the government sponsored smallholder development in oil palm. Lands were cleared and planted near existing PTPs where smallholder on 2-4 hectares cared for and harvest the trees, delivering the fresh fruit bunches to the PTP plants for crushing. Non-existent in 1978, smallholder production grew to almost 184,000 tons by the end of Replita V in 1989. (See Table 1 for statistics on CPO production in Indonesia.)

During the next five years, greater emphasis was placed on the private sector under the *Pir-trans* program. Under *Pir-trans*, the government assumed responsibility for infrastructure development and facilitated the acquisition of property rights. Land-clearing was handled by contractors, frequently in exchange for logging rights. Private investors were granted access to credit at concessionary rates to be used for estate development, new crop planting and crushing facilities. Around the estate nucleus, the government sponsored smallholder development. The standard plan called for a 20

percent/80 percent mix between estate area and smallholder area. The government provided financing for smallholder plantings, initial living expenses and housing; the nucleus estate was responsible for extension services, for collecting and for processing the fruit bunches.

The Pir-trans program resulted in a significant shift in production from public to private estates and smallholder production. Further, the full effects of the program will not be felt until the turn of the century. Some projects approved under *Pir-trans* have yet to be completed, and there is a lag of about 8-10 years between initial plantings and full production for oil palm trees. Still, as can be seen in Figure 1, the public estates are still the largest source of palm oil in Indonesia. In fact, until 1992, most palm oil in Indonesia came from public estates

During the up-coming five years, some of the responsibilities the government assumed under *Pir-trans* will be handed over to newly formed cooperative organizations under the KKPA. The system is still relatively new and may evolve once the program is fully operational. Many in the palm oil industry are only vaguely aware of the program and few have concrete plans. An exception is P.T. Smart, which has one 6,000 hectare project under way in Lampung and two more in preparation for Riau and Kalimantan Selatan. Under current arrangements, a developer must establish a separate company in partnership with a cooperative of smallholders. The developer is responsible for supplying the development capital and the cooperative provides the land as its contribution to the company. The newly established company is eligible to draw on a loan from an "executing bank" at a rate of 11 percent during construction and establishment of the trees and 14 percent after the trees have matured. The 14 percent rate includes a 3 percent fee which is paid to the cooperative partner to cover administrative costs. In turn, the "executing bank" is eligible to borrow from the Bank of Indonesia at a concessionary rate of 4 percent. Since the spread is large between the BOI rate and the borrowing rate, developers have an incentive to establish their own executing bank. The development site itself follows the nucleus estate approach common under *Pir-trans*. Smallholder plots can range from 1 to 5 hectares, although land for alternative crops need not be located at each

housing site as under *Pir-trans*. To date, the share of total land devoted to smallholders versus the nucleus estate remains a minimum 80 percent.

Cost of Crude Palm Oil Production

Indonesia is the lowest cost significant producer of palm oil in the world.

Comparing production costs across different types of vegetable oil is difficult, since many oils such as soybean oil or rapeseed oil are jointly produced with meals used as animal feed. In addition, the fruit of the oil palm contains both a fleshy mesocarp from which palm oil is recovered, and a seed or kernel from which an oil and meal are also recovered. Estimating the cost of production for oil palm requires making assumptions about the value of the kernel by-product as well. (See Figure 2.) Still, only soybean oil from Argentina and Brazil is produced at a lower cost than palm oil in Indonesia and only when soybean meal prices are at average levels or above. Comparative studies, based on engineering techniques, place the cost of production of palm oil for new projects in Indonesia at \$200/ton. However, a recent paper based on field costs nine oil palm estates owned by Socfindo (International Planters Conference, October 24-26, 1994) suggests that the costs may be much lower. Table 2 provides the average costs for establishing new palm plants and maintaining the immature plants. Table 3 provides cost of production data for mature plantations, including depreciation and overhead. *For Socfindo, the cost of production for crude palm oil, ex-factory, was a remarkable \$127/ton in 1993.* International palm oil prices (in constant 1990 prices) averaged \$290/ton in 1990, the historic low, and averaged well over \$600/ton in 1995 -- providing a substantial level of profitability.

Figure 3 provides the distribution of costs for a mature palm oil plantation. Depreciation on the fixed initial investments constitutes the largest component of cost—roughly 26 percent of total costs. Variable costs, which determine the shutdown point for palm-oil producing estates averaged less than \$100/ton for the Socfindo estates. Annex 1 provides a more complete description of production costs.

Market Concentration in the Refining Industry

Through direct ownership and affiliation, five large refiners organized into two alliances influence more than 60 percent of the refining capacity in Indonesia and control the most popular name-brand cooking oils. While alternatives exist for consumers, including coconut-based cooking oil, this concentration still raises the issue of oligopolistic pricing. Table 4 provides the share of refining capacity for the Big Five Refiners. Together they represent over 61 percent of the industry and market the leading brand-names in cooking oil. A theoretical measure of market power can be derived by taking the market share of the Big Five and dividing it by the sum of the supply elasticity of competitors weighted by the remaining market share minus the (negative) elasticity of demand¹. The measure yields the percentage by which the monopolist should raise prices above marginal costs. (Akiyama and Larson, 1994) Using an elasticity of demand of 1.6 (Larson, 1990) and supply elasticities ranging from 1 to 2 yields a market power measure ranging from 26 percent to 31 percent. (Table 5.) In other words, if the Big Five Refiners were to collude, they may well be able to increase domestic prices roughly 26-31 percent above competitive levels.

However, the statistical evidence of monopolistic pricing is inconclusive.

Calculations of ex-factory cooking oil prices when compared to import parity prices reveal that from the reforms of 1991 to the introduction of the export tax in September 1994, ex factory prices averaged about 14 percent above import parity prices. (Figure 4) Still, the lack of import restrictions are also likely to mitigate the domestic market power of the Big Five. For example, as the elasticity of supply for competing imports increases, the market power of the Big Five goes to zero, regardless of their large market share. Further, monopolistic pricing is frequently characterized by stable-but-high prices. However the time series on prices indicates no difference between the coefficient of variation of international prices of olein from Malaysia and domestic wholesale prices for CPO-based cooking oil. (See Figure 5.)

¹ The measure of market power is given by $\frac{share}{\epsilon_s(1-share) - \epsilon^d}$, where share is the share of the Big Five refiners, ϵ_s , and ϵ^d are the price elasticities of supply for competitors and demand respectively.

III Market Interventions

Background

Prior to the export deregulation in June 1991, the palm oil subsector was subject to a number of policy interventions including administered prices and a single marketing chain. The policy objectives were at times contradictory goals of maintaining inexpensive supplies of cooking oil at stable prices and promoting exports. Recent interventions by the Bulog and continued allocations of PTP-origin palm oil are best understood in the context of historic interventions. An understanding of past policy interventions also helps explain why recent marketing interventions raise fears of a re-regulation of the industry.

Cooking oil is one of the 'Nine Essential Commodities' for Indonesian consumers. Recent and past interventions were intended to ensure adequate supplies of cooking oil for consumers at affordable prices. Tomich and Mawardi (1995) trace regulations intended to impose a crude palm oil (CPO) price ceiling back to 1973, but note that it was not until 1978 that effective regulations were instituted to establish a domestic price ceiling for CPO and to allocate supplies of CPO to Indonesian firms through quantitative export restrictions. At the time, more than two-thirds of CPO supplies came from the government-owned PTPs. Allocations of CPO supplies from public and private estates were administratively directed to specific firms for domestic processing or for export.

Because of the complex nature of the allocation process, four separate palm oil prices were administered by the late 1980s. All CPO produced by state-owned plantations, including oil originating with smallholders located around the nucleus estate, had to be marketed through the Joint Marketing Board (KPB-Medan). Foreign-owned plantations (PMA firms) were required to allocate a portion of their production to domestic market operations and provide a portion of their production to KPB-Medan. Domestically owned plantations (PMDN firms) were not subject to domestic allocations and were not required to market CPO through KPB-Medan. As a result, there was one price for CPO exported directly by PMA and PMDN plantations; a second price for CPO

exported through KPB-Medan; a third price allocated to domestic processors; and a fourth price was set for imported CPO.

Tomich and Mawardi analyze the effects of the policy interventions from 1978 to 1987 and concluded that the intervention policies harmed both consumers and producers. From 1978 to 1987, the combination of export taxes, domestic price ceilings and allocation requirements generated an -9 percent average nominal rate of protection for the palm oil estates. Consumer price data limited the analysis to a period in 1981 to 1987, but during that period Indonesian consumers paid roughly 6-12 percent above import parity for domestic cooking oil. *Tomich and Mawardi estimated the total cost to producers and consumers for 1982-87 at Rp 800 billion for consumers and Rp 387 billion for producers.*

Current Policy Issues

Since the removal of trade restrictions on palm oil on June 3 1991, domestic prices have been determined by events in the larger global market for fats and oils. Although Indonesia is a large producer of palm oil and coconut oil, Indonesia produces only 5-6 percent of the annual global market of 90 million tons of fats and oils. International vegetable oil prices are notoriously volatile and movements in international prices are quickly reflected in domestic prices. (See Figure 6.) Further, the consumption pattern of domestic vegetable-oil based cooking oils has a significant seasonal component during December through March. (See Figure 7.) Cooking oil is viewed as an essential commodity because of its historically significant role in the Indonesian diet. Further because of the dominant position of palm oil among cooking oils (Table 6), and because of its position as the most affordable of cooking oils, the recent rally in international prices raised concerns over domestic prices levels. Anticipation of historically high international prices during the holiday season led to additional calls for market interventions.

Growth in incomes has resulted in a diversified household budget with less importance given to cooking oil-- even among the poor. *Cooking oil comprises 1.4 percent of the CPI and 4 percent of the household budget of the poorest 20 percent of the*

rural population. As a result, the 21 percent increase in the prices of cooking oil in 1994 only contributed 0.3 points to the inflation rate. Further, the costs to the poorest consumers of the increase in palm oil was equivalent to a 0.4 percent decrease in their household income. It is unlikely, with average incomes growing at more than 6 percent, that the price increase generally created a burden for consumers.

Still, the issue retains political and social significance due in part to the historic importance of cooking oil to the diet and the history of government intervention in the market. *The Government of Indonesia intervenes in the market for palm oil in using three instruments: 1) a variable-rate export tax introduced in September 1994; 2) Bulog operations which included a CPO buffer-stock and government-subsidized imports of olein; 3) Continued directed sales of about 80 percent of production from state-owned estates (PTPs) to domestic markets at allocation prices which are at times below market prices.* For reasons explained below, only the variable export tax has had a demonstrable effect on domestic prices. Further, because of the current structure of the market, buffer stock operations, subsidized imports, and domestic allocations at below-market prices represent transfers that effect profits, but not final market prices. In short, these instruments can only have limited and transitory influence since domestic prices are determined by international prices and trade flows.

A. Export Tax

The variable-export tax is linked to FOB prices for CPO and three CPO products: refined, deodorized, and bleached palm oil (RBD PO), crude olein, and RBD olein. The price levels are announced by the Ministry of Trade monthly, and are based on average spot prices. The level of the tax calculated by applying a schedule of average tax rates to the difference between the price announced by the Ministry of Trade and a floor price set in the tax code. Taxes are then assessed on a per-ton basis according to product type regardless of the price actually contracted. (This feature reduces the incentives to under-invoice.) Stearin which is lower-valued and represents about 20.5 percent of CPO by weight is excluded from export taxes as are other minor by-products. Table 7 provides

the tax schedule and Table 8 provides a calculation of the actually taxes imposed since September 1994. Annex 2 provides an example of the monthly decree which fixes the export tax for crude CPO and the CPO products.

The tax is modeled on a similar policy in Malaysia and is designed to tax windfall profits during boom periods. Cost of production for CPO in Indonesia is generally estimated at less-than \$200/ton. When international prices remain below \$435/ton, no tax is levied on exports. As international prices rise from \$435 to \$800/ton, average tax levels rise from zero to 18 percent. As a result, the tax does not generate a large burden on the profitability of producing crude palm oil.²

The construction of the tax code does create two anomalies, both of which can be remedied. First, because of the way the tables are written, the tax rate does not smoothly increase. In fact, for some values, the tax actually declines slightly as international prices rise. This kinked tax schedule is illustrated in Figure 8. More importantly, the marginal tax rates between CPO and the various CPO-based products are determined independently. As a result, the processing margins can and do differ from international levels. Because of the independence of the tax rates on products from the underlying tax rate on crude palm oil, processors cannot know their processing margins until the tax is announced. *In short, the current structure of the tax distorts the market signals for processing and generally lowers the incentives to process oil domestically.* Also, the incentives or disincentives to process fluctuate widely. In fact, because of the tax, margins can and have been negative. This point is illustrated in Figure 9 which maps the spread between the price of olein and the price of crude. The true processing margin is determined simultaneously between the price of the crude and the price all of the processed products (olein, stearin, etc.). However, as can be seen by the graph, the tax has generally lowered the spread between the price of crude and olein discouraging local processing in favor of off-shore processing.

² To see how the tax works consider the August 31, 1994 decree given in Annex 2. Using average prices in August, the decree states that the September tax will be based on an FOB price for CPO of \$548/ton. The tax is then calculated as 48 percent of the difference between the FOB price and the floor price, or $.48 \times (\$548 - \$435) = \$54.24/\text{ton}$.

Further, the inability of processors and traders to predict the effect of the tax on margins impedes many common methods of managing price risk. Forward contracts up to 45 days have evolved in Indonesia in recent years. Normally, these contracts, based on a Rotterdam price, allow processors to sell their CPO-based products forward as they purchase their crude CPO, locking in profits. However, since the tax is fixed on the last day of the month for the up-coming month, the processor cannot calculate his margin in advance and can only use intra-month risk management techniques.

Below, several reasons are given for reconsidering the export tax. *However if the export tax remains in place, the two anomalies created by the tax code can be remedied by: 1) re-writing the schedule in terms of rates based on the FOB price rather than rates on the difference between the FOB price and the floor price; 2) basing the export tax for all products on the CPO content of the item.* For example, in November, the FOB price of palm oil was \$578/ton and the export tax was set at around \$63/ton. By setting the export tax for RBD olein at \$46/ton (73 percent of the CPO tax since one ton of CPO produces on average .73 tons of olein), the stearin tax at \$15.44 (24.5 percent) and the tax on the remaining products at \$1.56/ton (2.5 percent), the tax will neither discourage nor encourage the domestic processing.

The export tax generally has been effective in lowering domestic ex-factory, wholesale, and retail prices for cooking oil. Figure 10 plots the ex-factory and retail prices of cooking oil derived from palm oil with the import parity price of RBD olein. (Palm-oil based cooking oil is a more refined version of RBD olein.) The ex-factory cooking oil price mirrored the import parity price of olein from the liberalization of the palm oil market in June 1991 until the imposition of the export tax in September, 1994. Since then, the local ex-factory price has shifted downward and has averaged less than the olein import parity price. The relationship between the cooking oil and the olein price has been unstable with both positive and negative margins. This is in part due to the backward looking nature of the export tax calculation. Since the export tax for any given month is based on the observed international price for the previous month, the changes in the tax rate will lag changes in the spot price. Further, since the tax rate is also progressive, the

relationship is even further complicated. Still, on average, the tax has resulted in the expected outcome, as can be seen in Table 9. The average tax rate went from zero to just under 16 percent for RBD olein, while the ratio of the import parity price of olein and the ex-factory price of palm oil based cooking oil dropped 16 percent, from a 1.14 to 0.98. In other words, the spread above import parity dropped from a positive 14 percent to a negative 2 percent. Also, the average mark-up between the domestic wholesale and retail price of cooking oil has been unaffected by the import tax, averaging 19 percent prior to the export tax and 20 percent following the imposition of the tax.

The incidence of the tax falls primarily on producers, most of which are off-Java, and about 22 percent of which are smallholders. With the margins along the processing chain unaffected by the export tax, the incidence falls on producers. The tax therefore transfers income from palm oil growers—smallholder, private, and public estates and transfers that income to consumers, mostly urban consumers, mostly on Java.

Unfortunately, the domestic price for most crude palm oil is not directly observed. Prices on domestic crude oil marketed by the Joint Marketing Office (JMO), the marketing arm of the state plantations, are available. As shown later, the JMO has sometimes been directed to supply local processors at less than export equivalent prices. However, the ratio of the JMO crude price to the ex-factory palm-oil based cooking oil price has remained steady at about 71 percent following the introduction of the export tax. (See Table 9.) Spreads did increase somewhat as international prices boomed (Figure 11); however, large spreads occurred before and after the tax and may more linked to JMO directives than a more general market based phenomena.

A small spreadsheet model, available from the author, was constructed to measure the welfare effects of the export tax. The results are summarized in Tables 10 and 11. The model is described in Annex 3. The analysis was based on international and domestic prices for January and November 1995. The results are sensitive to the relative international prices and the processing margins. January was near the high end of the boom and November near the low end. Together the two simulations bracket the likely welfare effects of the tax. *Generally, the government and consumers benefit from the tax*

at the expense of the plantation sector. Further, export revenues are significantly depressed.

The tax lowers domestic prices which increases domestic consumption as consumers choose more palm oil over coconut oil and other consumables than they would at international prices. Under the base-line scenarios, a demand elasticity of -1.6, taken from an econometric model (Larson, 1990) was used, although an alternative elasticity of -0.9 was also used to test the sensitivity of the results. When international prices were high as in January, the tax resulted in an almost 24 percent increase in domestic demand, (when compared to a no-tax high-domestic price alternative scenario) diverting supplies otherwise exported. On an annualized basis, export revenues were lowered by \$US 384 million and plantation revenue fell by nearly \$US 400 million (\$US 120 million from smallholders). Local refiners gain volume, but lose revenue under this scenario. Consumers gain \$US 164 million in consumer surplus and the government gains about \$US 182 million in government revenue.

Using a less elastic demand schedule and lower price level gives more conservative measure of the welfare effects. Still, using these conservative assumptions, the export tax results in an annual \$US 277 million loss for plantations, including a \$US 83 million loss to smallholders. The loss to producers is equivalent to about 1% of agricultural GDP. Consumers would gain \$US 123 million in consumer surplus or about 66 cents per consumer. The government would pick up \$US 126 million in tax revenue. Refiners would take a lower margin, but would gain revenues due to an increase in volume. Total net welfare falls by \$US 10 million. In addition, export revenues drop by \$158 million.

B. Directed Domestic Sales

While private plantations are free to dispose of their products according to the dictates of the market, palm oil from the PTPs must be marketed through the Joint Marketing Office. In addition, roughly 80 percent of the palm oil must be sold domestically. The public estate sector does not own processing facilities, so the oil is sold as crude. Generally, the JMO is free to pursue the highest possible domestic price.

However, the private sector is not similarly restricted and private sector activity keeps the domestic market in competitive equilibrium with international prices. Consequently, under normal circumstances, the JMO will receive a competitive price, despite the restriction that it must sell domestically. Conversely, eliminating both the restriction that all PTPs *must* market through the JMO and lifting the restriction that a certain portion of sales must be for the domestic market, would also have little to no effect on domestic prices.

However, *occasionally, as in the first quarter of 1995, the JMO is directed to offer crude to the domestic refiners at below-market prices.* The episode was not long-lasting, as can be seen in Figure 12. Figure 12 graphs the difference between the price for domestic sales and the export price as well as the export tax for crude palm oil. Normally, the two vertical bars should be about equal. In December 1994, the JMO was able to take advantage of local shortages to do better than expected. However in January and February 1995, the office was directed to sell at lower prices and did so.

Since domestic market prices are determined by international prices (net of export taxes), selling into the domestic market at reduced prices can have no lasting effect on domestic prices—the transfer is intra-marginal. This is shown graphically in Figure 13. If the JMO is required to sell at P_d rather than P_w an amount represented by S_1 , those purchasing the crude are still free to export the crude themselves, or use the crude to displace oil that they would otherwise purchase. Since the oil is not consumed in crude form, the policy results in a direct transfer from the producers of the oil, the government-owned PTPs and their smallholder partners, to whoever purchases the crude—primarily large agribusiness. Despite the good intentions of the directive, consumers are not made better off. The amount of the transfer is represented by the shaded rectangle defined by the P_w , P_d and the line at S_1 .

Since monthly sales data is not available, it is not possible to exactly calculate the cost of the policy to the public estate sector. However, average prices and sales can be used to give some indication. *From September 1994 to August 1995, the spread between the export price and domestic sales price for JMO sales averaged about \$17.27/ton more*

than the export tax. The \$17.27 average includes several months when the JMO was able to do better in its domestic sales than the export price net of the export tax

The domestic sales price may be below the border equivalent due to transport; however even with a generous assumption of \$2.50/ton for transport, the difference remains \$14.77. Since annual estate production is about 1.8 million tons, this difference amounts to about \$26.6 million in lost revenue. It is unclear how much of this difference was due to directed sales. However the estimate is probably a conservative measure of the cost to estates of marketing through the JMO. *Since the PTPs are publicly owned, the primary effect of the directed marketing through the JMO is a transfer of \$26.6 million from the public estates to the domestic purchasers of PTP crude. However roughly 18 percent of the crude is produced by smallholders who suffer a loss of about \$4.8 million.*

C. Bulog operations.

In July, 1995 the National Logistics Agency (Bulog) announced the start of a buffer stock operation designed to bring the price of domestic cooking oil down from about Rp 1,600 to Rp 1,410 by September 1995. The operations were expected to cut large-scale vendors out of the distribution line, bringing products directly from producers to small-scale vendors and retailers. The buffer stock, made up of directed sales (half from the PTPs and half from large private plantations), was expected to build up to 75,000 tons of CPO. Cooking oil demand in Indonesia contains a significant seasonal component, with consumption running 10 to 20 percent higher during December, January and February during the New Year and *Idul Fitri* holidays and the buffer stock was intended to prevent price run-ups during the seasonal increase in demand.

In July, nine private CPO producers agreed to provide allocations of CPO totally 37,500 tons to the Bulog. (The allocations are given in Table 12.) With domestic prices running around Rp. 1,387, the private producers agreed to a sales price of around Rp 1,235. PTPs were directed to provide a similar amount. \$55.5 million (Rp 125 billion) was set aside as an interest-free loan from Bank Indonesia to finance the purchases. During the subsequent months however, the firms made partial deliveries to the Bulog as

international prices remained high. By September, the Bulog had accumulated around 16,000 tons-- 10,000 tons from the PTPs and 6,000 from the private estates. Prices dipped briefly in the early fall and some additional stocks were accumulated. *However, with prices falling below Rp 1,235 and producers anxious to sell to the Bulog at the agreed-upon price, the Bulog suspending the buffer-stock operation with stocks at 20,000 tons at the beginning of November.*

With the suspension of the CPO stocking, the Bulog switched to stock-piling olein, purchasing about 86,000 tons of crude olein from Malaysia. Since the Bulog has access to interest-free loans, it can import the olein at lower-than-market cost. Further, if needed, the olein can be sold into the domestic market at below-market prices.

In addressing temporary shortages, the import of olein has advantages over stockpiling CPO, since the olein can be converted into cooking oil more quickly. However, there are limitations to the influence the olein imports are likely to have on the domestic market. *First, since domestic prices are still determined by international prices less export taxes, the Bulog cannot influence the domestic price of olein over an extended period.* Olein purchased cheaply can simply be exported for profit, or substituted for domestic supplies which are then exported. *Second, some of the temporary shortages in olein supplies may be an unintended consequence of the current tax schedule which has discriminated against the local production of olein.* As explained above, this comes from the fact that the tax for the palm oil products are not based on the CPO content of the products, thereby changing the relationship between the domestic CPO price and the domestic olein price—to the detriment of local processing. The spread between CPO and crude and RBD olein are given in Table 13, along with the implied tax rate on the spread. The implied tax is calculated as the difference between the spread in international markets and the domestic spread. At times, the implicit tax on processing has exceeded 100% resulting in negative margins.

IV Long-term Development Issues.

Land procurement and titles

Oil palm trees produce fruit on a continuous basis, with seasonal variations. Once ripe, the fresh fruit bunches must be processed quickly to prevent a build-up of acid in the oil. Fruit which has not been crushed within 48 hours has limited value. Palm oil plantations are usually built around a processing facility, which, in turn, requires the leasing or purchase of large contiguous tracts of land. Smallholder production may appear once an estate has been established. In fact, smallholder development was a requirement to qualify for many of the government investment programs. *However, the process of identifying and acquiring land remains a major impediment to establishing new estates. This process is made more difficult from the fact that very little of the land is titled.*

Once a plantation company has identified a potentially suitable site, the company begins a two-pronged approval process. The company first files an application with the Director General of Estates for a location permit. The location permit also requires the approval of the local governor, and an application is also sent to the local government at the same time. The estate company conducts a location study which it provides to both the local and central government. Once both applications are approved, the central and local forestry agencies conduct a review of the project's impact. Once this review process is complete, the complicated process of identifying settlers and providing compensation to those settlers is begun. Since the land is infrequently titled, these negotiations can be complicated and intractable. Following the negotiations, the land is typically leased for 30 years with an option to renew, rather than purchased outright.

The lack of clear title certainly builds a barrier to investment in tree crops. However, the implication for smallholders is much broader. Lack of title inhibits transfers of ownership in general, and smallholders who may wish to migrate to better opportunities may have to abandon valued properties. *Settlers, who have gained partial rights, but not title, to land in nucleus estates may be similarly tied to those development projects.*

Direct Investment and a Potential Role for the World Bank

The Government of Indonesia has always either invested directly or provide incentives for new palm oil plantations in Indonesia. *Given the profitability of palm oil in Indonesia and the comparative advantage of the country in providing vegetable oil to the rapidly growing world market, the need for further incentives in the form of subsidized loans is questionable.* The local plantation companies are well capitalized and some have direct links with large multinational companies. Further, many of the large Malaysian plantations have recently looked to Indonesia for new investment opportunities, as land and labor costs have limited the returns to new projects in Malaysia.

Still, establishing new plantations is an expensive and risky venture, requiring large initial outlays of capital, with long lead times before generating income. Talks with domestic and foreign plantation companies suggested three impediments to further investment. First, as already discussed, is the uncertainty associated with the land procurement process. Second, for some areas, the transportation infrastructure is inadequate. Third, many investors, especially foreign investors, are uncertain about the extent of current and future government interventions in the palm oil market. Some of this arises from a misunderstanding of Indonesian policies. For example, in a paper presented at the April 1995 Kuala Lumpur Commodity Exchange Price Outlook Forum, a delegate speculated that the Bulog would require private producers to contribute 25-30 percent of their output to the logistical agency (Hwa, 1995).

Currently, the incentives provided by inexpensive credit have been effective in providing new capital flows to the palm oil sector. At the same time, *the private capital market is mature enough to take on an increased role mitigating the need for government subsidies. The Bank can assist by helping to address directly the impediments to private sector investment through 1) land titlement programs; 2) investments in infrastructure; and 3) addressing issues of policy risk.*

The Bank has past experience in project lending for land titlement and infrastructure in Indonesia. Issues of policy risk have been addressed primarily through dialogue with the government on policy issues. In other countries in other sectors, the

Bank has entered into partnership with governments to provide explicit guarantees against non-commercial risk to private sector investors. The GOI may well want to discuss with the Bank how such schemes could be used as an alternative to subsidized lending. Under interest-subsidy schemes, the GOI takes on the risk that private borrowers will be unable to repay for any reason. Under a guarantee, neither the Bank nor the Government of Indonesia would shoulder any commercial risk. Instead, the guarantees would target directly uncertainties over policies.

Conclusions

During the last twenty years, the history of the palm oil industry in Indonesia is one of evolution from government sponsorship and market interventions to private sector initiative in response to international price signals. The evolution of the market from public to private sector, while substantial, is incomplete. Investments in new oil palm estates receive preferential financing terms. Further, marketing interventions aimed at reducing inflation and assisting consumers remain but with unintended consequences.

Of the intervention tools, the export tax appears effective in the domestic price of crude palm oil and ultimately the cost of refined cooking oil from palm oil. However, because of substantial gains in income, cooking oil is of limited importance in the household budget of even the poorest consumer in Indonesia. As a result although the issue itself is important politically and socially, the gains to consumers from the tax are not significant economically, averaging less than a dollar per consumer per year.

The export tax transfers up to \$99 million from producers to consumers and the government by depressing exports. Since the tax is only brought to bear when profits are unusually high, the export tax does not create an unmanageable burden on the sector. However most production occurs off-Java and 22 percent of the growers are smallholders. As a result, the tax runs counter to the government's development priorities. Since the advantages to consumers is limited, the government should drop the tax.

The structure of the tax does create a real burden on processors and, if the tax is not dropped, it should be changed to allow international price signals for processing services to reach domestic processors. Because the tax rates on palm oil products are determined independently of the underlying price of crude, the marketing margins for processors cannot be known in advance, precluding effective risk management. Additionally, the structure of the tax discourages local processing. If the tax is not repealed, the tax rate for processed palm oil products should be based on the crude oil content of those products.

The other forms of interventions -- Bulog interventions and restrictions on JMO sales-- are ineffective in lowering domestic prices and create uncertainty for investors. These interventions should be eliminated.

The processing market is quite concentrated with two alliances among five large processing groups controlling more than 60 percent of the market. Still, while the potential for oligopolistic pricing exists, the statistical evidence is equivocal.

The interest subsidies provided to private investors are an indirect instrument for overcoming the risks and uncertainties associated with establishing estates with a smallholder component. The evolution of the palm oil sub-sector from heavily public to primarily private may be accomplished by targeting the obstacles to private investment directly. The Bank can play a role in that process by designing projects that address 1)land titlement, 2) rural infrastructure; and 3) policy risk.

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Annex 1: Average oil palm fresh fruit bunch production costs for nine Socfindo estates

Cost Category	1991		1992		1993	
	Rp/ton	\$US/ton	Rp/ton	\$US/ton	Rp/ton	\$US/ton
UPKEEP						
Imperata control	172.2	0.09	190.7	0.09	160.9	0.08
Weeding	1,840.0	0.92	1,908.1	0.93	2,103.7	1.00
Manuring	5,372.9	2.70	5,865.0	2.84	5,090.6	2.41
Pruning	929.7	0.47	992.5	0.48	938.5	0.44
Other upkeep	3,009.8	1.51	3,069.3	1.49	3,227.1	1.53
TOTAL UPKEEP	11,324.6	5.69	12,025.6	5.83	11,520.8	5.46
HARVESTING						
Harvesting	5,050.7	2.54	5,351.5	2.60	5,601.1	2.65
Transport to mill	2,997.8	1.50	3,039.2	1.47	3,134.3	1.49
TOTAL HARVESTING	8,048.5	4.04	8,390.7	4.07	8,735.4	4.14
PROCESSING						
Processing	4,932.2	2.48	5,018.5	2.43	5,172.6	2.45
Maintenance	5,206.3	2.61	4,210.4	2.04	3,970.3	1.88
TOTAL PROCESSING	10,138.5	5.09	9,228.9	4.47	9,142.9	4.33
GENERAL EXPENSES	8,525.8	4.28	9,653.3	4.68	8,869.7	4.20
PACKING	80.5	0.04	62.1	0.03	68.7	0.03
TOTAL EX-FACTORY	38,117.9	19.14	39,360.6	19.09	38,337.4	18.17
FOR.	584.4	0.29	506.5	0.25	536.0	0.16
FOB	280.9	0.14	274.9	0.13	329.9	0.16
FIXED COST HEAD-OFFICE	4,799.3	2.41	5,380.4	2.61	4,872.7	2.31
TOTAL CASH COST	43,782.5	21.98	45,522.3	22.08	44,126.0	20.91
DEPRECIATION	11,593.0	5.82	12,451.3	6.04	15,105.4	7.16
TOTAL BOOK COST	55,375.4	27.80	57,973.7	28.12	59,231.4	28.07

Source: Socfindo

Annex 2: Text from Export Decree

THE IMPOSITION OF EXPORT TAX ON CRUDE PALM OIL (CPO), REFINED BLEACHED DEODORIZED PALM OIL (RBD PO), CRUDE OLEIN AND REFINED BLEACHED DEODORIZED OLEIN (RBD OLEIN) (Decree of the Minister of Finance No. 439/KMK.017/1994 dated August 31, 1994)

THE MINISTER OF FINANCE,

- a. That with a view to controlling the selling price of cooking oil on the domestic market, it is deemed necessary to impose export tax on CPO, RBD PO, Crude olein and RBD Olein;
- b. That it is necessary to regulate the imposition of export tax on CPO, RBD PO, Crude olein and RBD Olein in a decree of the Minister of Finance.

In view of:

1. Government Regulation No. 1/1982 on the realization of exports, imports and the flow of foreign exchange (Statute Book of 1982 No. 1, Supplement to Statute Book No. 321 0) as already amended by Government Regulation No. 24/1985 (Statute Book of 1985 No. 32, Supplement to Statute Book No. 3291);
2. Presidential Decree No. 96/M/1993;
3. The Decree of the Minister of Finance No. 738/KMK.00/1991 dated July 29, 1991 on the customs procedure in the export sector. The Decree of the Minister of Finance No. 291/KMK.01/1 994;
4. The Decree of the Minister of Finance No. 534/KMK.013/1992 dated May 27, 1992 on the rates of and the procedure for payment and depositing of export tax and or export surcharges.

Taking into account :

1. The letter of the Minister/State Secretary No.B-166/M.Sesneg, 8/1994 dated August 26, 1994;
2. The letter of the Minister of Trade No. 580/M/VIII/94 dated August 30, 1994.

DECIDES:

To stipulate :

THE DECREE OF THE MINISTER OF FINANCE CONCERNING THE IMPOSITION OF EXPORT TAX ON CRUDE PALM OIL (CPO), REFINED BLEACHED DEODORIZED PALM OIL (RBD PO), CRUDE OLEIN AND REFINED BLEACHED DEODORIZED OLEIN (RBD OLEIN).

Article 1.

Hereinafter referred to as :

1. Floor prices are highest export prices which are not subject to export tax.
2. Export prices are FOB prices which are announced by the Minister of Finance monthly.

Article 2.

- (1) Crude palm oil (CPO), refined- bleached deodorized palm oil (RBD PO), crude olein and refined bleached deodorized olein (RBD olein) shall be subject to export tax.
- (2) The export tax as meant in paragraph (1) shall be imposed if the price of cooking oil on the domestic market is above Rp 1,250/kg.

Article 3.

- (1) The method of calculating the export tax to be paid for the respective commodities as meant in Article 2 paragraph (1) shall be as follows:

The volume multiplied by the tariff, times (the price of the relevant export commodity minus the floor price), times the foreign exchange rate.

(2) The amounts of export tax shall be calculated on the basis of the rates contained in the attachment to this decree.

Article 4.

The Minister of Finance shall announce the (FOB) export prices of the respective commodities at the end of each month on the basis of average prices on the international market over the last 2 (two) weeks.

Article 5.

The procedure for the payment and depositing of export tax shall be according to the provisions in as stipulated in the Decree of the Minister of Finance No. 534/KMKO13/1992.

Article 6.

This decree shall come into force as from September 1, 1994 with the provision that the deadline for exports which are not subject to export tax shall be August 31, 1994 as proved by B/L on Board.

For public cognizance, this decree shall be announced by publishing it in the State Gazette of the Republic of Indonesia.

Stipulated in Jakarta.
On August 31, 1994.
THE MINISTER OF
FINANCE,
sgd.
MAR'IE MUHAMMAD.

ATTACHMENT

RATES OF EXPORT TAX

<u>NO</u>	<u>PRICES US\$/MT</u>	<u>EXPORT TAX RATES/MT</u>
I. CRUDE PALM OIL (CPO)		
1.	Floor Price 435	0%
2.	FOB Price:	
a.	Above 435 up to 470	60% x (HE- HD)
b.	Above 470 up to 505	56% x (HE- HD)
c.	Above 505 up to 540	52% x (HE- HD)
d.	Above 540 up to 575	48% x (HE- HD)
e.	Above 575 up to 510	44% x (HE- HD)
f.	Above 610	40% x (HE-HD)
II. REFINED BLEACHED DEODORIZED PALM OIL (RBD PO)		
1.	Floor Price 460	0%
2.	FOB Price :	
a.	Above 460 up to 500	60% x (HE - HD)
b.	Above 500 up to 540	56% x (HE - HD)
c.	Above 540 up to 580	52% x (HE - HD)
d.	Above 580 up to 620	48% x (HE - HD)
e.	Above 620 up to 660	44% x (HE - HD)
f.	Above 660	40% x (HE - HD)
III. CRUDE OLEIN (CRD OLEIN)		
1.	Floor Price 465	0%
2.	FOB Price	
a.	Above 465 up to 510	75% x (HE- HD)
b.	Above 510 up to 555	70% x (HE- HD)
c.	Above 555 up to 600	65% x (HE- HD)
d.	Above 600 up to 645	60% x (HE- HD)
e.	Above 645 up to 690	55% x (HE- HD)
f.	Above 690	50% x (HE- HD)

NO PRICES US\$/MT EXPORT TAX RATES/MT

VI. REFINED BLEACHED DEODORIZED OLEIN (RBD OLEIN)

1. Floor Price 500		0%		
2. FOB Price				
a. Above 500	up to 550	75%	x	(HE - HD)
b. Above 550	up to 600	70%	x	(HE - HD)
c. Above 600	up to 650	65%	x	(HE - HD)
d. Above 650	up to 700	60%	x	(HE - HD)
e. Above 700	up to 750	55%	x	(HE - HD)
f. Above 750		50%	x	(HE - HD)

Note : MT = Metric Ton.

HE = Export Price, HD = Floor Price.

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EXPORT PRICES OF CRUDE PALM OIL (CPO), REFINED BLEACHED
DEODORIZED PALM OIL (RBD PO), CRUDE OLEIN AND REFINED
BLEACHED DEODORIZED OLEIN (RBD OLEIN) FOR EXPORT
TAX CALCULATION

(Decree of the Minister of Finance No. 440/KMK.017/1994 dated August 31, 1994)

THE MINISTER OF FINANCE,

Considering:

that for the calculation of export tax on CPO, RBD PO, crude olein and RBD olein as meant in the Decree of the Minister of Finance No. 439/KMKO17/1994 dated August 31, 1994t it is necessary to stipulate export prices of the said commodities in a decree of the Minister of Finance.

In view of:

The Decree of the Minister of Finance No. 439/KMKO17/1994 dated August 31, 1994.

DECIDES:

To stipulate :

THE DECREE OF THE MINISTER OF FINANCE CONCERNING EXPORT PRICES OF CRUDE PALM OIL(CPO), REFINED BLEACHED DEODORIZED PALM OIL (RBD PO), CRUDE OLEIN AND REFINED BLEACHED DEODORIZED OF FIN (RBD OLEIN) FOR EXPORT TAX CALCULATION.

Article 1.

The (FOB) export prices of CPO, RBD PO, crude olein and RBD olein for the calculation of export tax as meant in the Decree of the Minister of Finance No. 439/KMKO17/1994 dated August 31, 1994 for the month of September 1994 shall be fixed as the following:

- | | |
|----------------|-------------|
| a. CPO | US\$ 548/MT |
| b. RBD PO | US\$ 591/MT |
| c. Crude Olein | US\$ 612/MT |
| d. RBD Olein | US\$ 642/MT |

Article 2.

This decree shall come into force as from September 1, 1994.

Stipulated in Jakarta.
On August 31, 1994.
THE MINISTER OF
FINANCE,
sgd.
MAR'IE MUHAMMAD,

BN. 5604/560517-9-1994

Annex 3: Model description

Because palm oil is a tree crop, supplies of palm oil are determined by the stock of trees which in turn are determined by past investments. Vintage approaches which measure cohorts of trees from earlier investments are effective in forecasting supplies. However, for the purpose of the model used for analyzing the welfare effects of the export tax, supplies are treated as predetermined and fixed. There are several reasons for this choice. The shut-down point for palm oil estates in Indonesia is probably around \$US 100/ton or less. The tax begins when prices reach \$435/ton. Since production costs are below \$200/ton, the tax only enters into the investment decision when prices are well above the shut-down point and profit rates are in excess of 100%. The tax may reduce expected profits and therefore investment and future supplies beginning in 2000 when the 1996 investment begin to yield. However, this effect is likely to be swamped by larger policy and market issues. The government policy of providing loans at below-market rates certainly has a greater impact on profitability, given the long maturation process, than the tax. It is also likely that other barriers like inadequate infrastructure and difficulties in securing leases to large contiguous tracks of land are binding constraints to new investments rather than insufficient profits. Indeed, these factors probably help explain why profit rates are so high.

With supplies fixed and prices determined by international prices net of taxes, the model is driven through the demand function. As domestic prices drop, the demand for olein raises as consumers substitute palm oil for coconut oil. The price of coconut oil is unchanged by the export tax, remaining at international levels. The demand for olein equation was derived using the elasticity of demand for palm oil estimated by Larson (1992) and passing a log-linear demand schedule through point defined by the November price (and under an alternative scenario the January price) and the consensus prediction of domestic demand this year -- 2.4 million tons (crude equivalent.) -- then solving for the intercept. A 0.78 conversion rate was used to convert crude to olein resulting in the following demand equation:

$$D^{olein} = 41489 (P^{domestic})^{-1.6}$$

The demand for olein generates a derived demand for crude oil. Because of transport costs and more than adequate domestic processing capacity, olein imports are rare. For the purposes of the modeling exercise, the processing is done locally and the demand for olein is converted into the derived demand for crude:

$$D^{crude} = D^{olein} / .078$$

Exports are then the residual from the domestic supply of 4.4 million tons. Consumer surplus changes are measured as the integral of the log-linear demand function evaluated with and without the export tax:

$$\Delta CS = (D^{no\ tax} P^{no\ tax} - D^{tax} P^{tax}) / (1 + \epsilon^d)$$

Tax revenue is calculated by taking the exports times the export tax; export revenue is calculated by taking the export price times exports; and producer income is taken as production times the domestic price. Changes to refining revenues are calculated by taken the domestic after-tax margins times the demand for crude with the tax minus the international margins times the demand for crude without the tax.

Table 1: Palm oil production in Indonesia, 1975-1994 (tons).

Year	Public Estate	Private Estate	Smallholder	Total
1975	271,171	126,082	-	397,253
1976	286,096	144,910	-	431,006
1977	336,891	120,716	-	457,607
1978	336,224	165,060	-	501,284
1979	438,756	201,724	760	641,240
1980	498,858	221,544	770	721,172
1981	533,399	265,616	1,045	800,060
1982	598,653	285,212	2,955	886,820
1983	710,431	269,102	3,454	982,987
1984	814,015	329,144	4,031	1,147,190
1985	861,173	339,241	43,016	1,243,430
1986	912,306	384,919	53,504	1,350,729
1987	988,480	352,413	165,162	1,506,055
1988	1,102,692	454,495	156,148	1,713,335
1989	1,184,226	597,039	183,689	1,964,954
1990	1,247,156	788,506	376,950	2,412,612
1991	1,360,363	883,918	413,319	2,657,600
1992	1,489,745	1,076,900	699,605	3,266,250
1993	1,469,156	1,370,272	582,021	3,421,449
1994 *)	1,785,315	1,410,030	899,138	4,094,483

Source: Directorate General of Estates

Table 2: Socfindo establishment costs and up keep for new palm oil plantings

	1991	1992	1993
New Plantings			
Extension (\$US/ha.)	1,406	1,305	1,361
Replanting (\$US/ha.)	1,114	1,188	1,239
Upkeep (immature plants, \$/ha.)	303	335	325

Source: Socfindo

Table 3: Average cost of production for palm oil for Socfindo estates in 1993

	Rp./ton FFB	US\$/ton FFB	\$US/ton CPO
Upkeep for plants	11,520.8	5.46	24.82
Harvesting	8,735.4	4.14	18.82
Processing	9,142.9	4.33	19.70
Transport, packing	934.6	0.44	2.01
General estate expenses	8,869.7	4.20	19.11
Headquarters	4,872.7	2.31	10.50
Depreciation	15,105.4	7.16	32.54
Ex-Factory costs	39,203.4	18.58	84.45
Total cash costs	44,076.1	20.89	94.95
Total including capital	59,181.5	28.05	127.49

Source: Socfindo

Table 4: Capacity and capacity share for Big Five palm oil refiners

	Annual Capacity	
	thousand tons	capacity share
Hasil Karsa Group		
PT. Singa Mas Jaya Perdana	325.00	6.3%
PT. Asap Abadi	400.00	7.7%
PT. Hasil Kesatuan	147.88	2.8%
PT. Hasil Abadi Perdana	88.80	1.7%
sub-total	961.68	18.5%
Musim Mas Group		
PT. Musim Mas	380.00	7.3%
PT. Siringo-Ringo	90.00	1.7%
PT. Mega Surya Mas	152.00	2.9%
PT. Bina Karya Prima	255.00	4.9%
sub-total	877.00	16.9%
Sinar Mas Group		
PT. Ivo Mas Tunggal	212.00	4.1%
PT. Sinar Meadow	30.00	0.6%
PT. Mulyo Rejo	118.80	2.3%
PT. Smart Corporation	271.00	5.2%
sub-total	631.80	12.2%
Salim Group		
PT. Sawit Malinda	45 00	0.9%
PT. Sayang Heulang	210 00	4.0%
PT. Inti Boga Sejahtera	210 00	4.0%
sub-total	465 00	8.9%
Bukit Kapur Group		
PT. Bukit Kapur Rekasa	180 00	3.5%
PT. Sinar Alam Permai	70 00	1.3%
sub-total	250 00	4.8%
TOTAL	3,185.48	61.3%

Source: Bulog

Table 5: Market power calculation

Market Share of the Big Five	0.61	0.61
Elasticity of demand	1.60	1.60
Elasticity of supply (others)	1.00	2.00
...		
Market power	31%	26%

Source: World Bank

Table 6: Production and supply of cooking oil from crude coconut and palm oil.

Year	Production		Import		Export		Supply	
	Coconut	Palm	Coconut	Palm	Coconut	Palm	Coconut	Palm
1982	432	575	1	0	14	168	419	407
1983	432	376	0	0	0	0	432	376
1984	473	668	0	0	35	0	438	668
1985	517	498	0	0	23	0	494	498
1986	545	514	0	0	5	0	540	514
1987	575	725	0	0	118	0	457	725
1988	567	888	0	0	207	0	360	888
1989	589	948	0	0	197	0	392	948
1990	651	1,055	0	0	194	0	457	1,055
1991	656	993	7	0	198	0	465	993
1992	654	1,654	11	0	351	0	314	1,654
1993	661	1,431	34	0	258	0	437	1,431

Source: Food Balance Sheet for Indonesia, CBS

Table 7: Tax schedule for palm oil and palm oil products

CRUDE PALM OIL (CPO)		
Floor Price 435		
FOB Price:		Tax rate on
Above	Up to	Export price minus floor price
435	470	60%
470	505	56%
505	540	52%
540	575	48%
575	610	44%
610		40%

REFINED BLEACHED DEODORIZED PALM OIL (RBD PO)		
Floor Price 460		
FOB Price:		Tax rate on
Above	Up to	Export price minus floor price
460	500	60%
500	540	56%
540	580	52%
580	620	48%
620	660	44%
660		40%

CRUDE OLEIN (CRD OLEIN)		
Floor Price 465		
FOB Price:		Tax rate on
Above	Up to	Export price minus floor price
465	510	75%
510	555	70%
555	600	65%
600	645	60%
645	690	55%
690		50%

CRUDE OLEIN (CRD OLEIN)		
Floor Price 500		
FOB Price:		Tax rate on
Above	Up to	Export price minus floor price
500	550	75%
550	600	70%
600	650	65%
650	700	60%
700	750	55%
750		50%

Source: Ministry of Finance

Table 8: Export tax for crude palm oil and palm oil products

Year/ Month	CPO (US\$/ton)				RBD PO (US\$/ton)				Crude Olein (US\$/ton)				RBD Olein (US\$/ton)			
	Floor Price	Export Price	Tariff Rate	Export Tax	Floor Price	Export Price	Tariff Rate	Export Tax	Floor Price	Export Price	Tariff Rate	Export Tax	Floor Price	Export Price	Tariff Rate	Export Tax
1994 Sep	435	548	9.9%	54.20	460	591	10.6%	62.90	465	612	14.4%	88.20	500	642	14.4%	92.30
Oct	435	583	11.2%	65.10	460	613	12.0%	73.40	465	631	15.8%	99.60	500	661	14.6%	96.60
Nov	435	594	11.8%	70.00	460	624	11.6%	72.20	465	629	15.6%	98.40	500	659	14.5%	95.40
Dec	435	686	14.6%	100.40	460	743	15.2%	113.20	465	717	17.6%	126.00	500	747	18.2%	135.90
1995 Jan	435	662	13.7%	90.80	460	678	12.9%	87.20	465	650	15.7%	101.80	500	680	15.9%	108.00
Feb	435	598	12.0%	71.70	460	637	12.2%	77.90	465	613	14.5%	88.80	500	641	14.3%	91.70
Mar	435	631	12.4%	78.40	460	687	13.2%	90.80	465	673	17.0%	114.40	500	703	15.9%	111.70
Apr	435	653	13.4%	87.20	460	714	14.2%	101.60	465	695	16.5%	115.00	500	725	17.1%	123.80
May	435	584	11.2%	65.60	460	627	11.7%	73.50	465	636	16.1%	102.60	500	666	15.0%	99.60
Jun	435	576	10.8%	62.00	460	613	12.0%	73.40	465	605	13.9%	84.00	500	635	13.8%	87.80
Jul	435	610	12.6%	77.00	460	643	12.5%	80.50	465	631	15.8%	99.60	500	681	15.9%	108.60
Aug	435	620	11.9%	74.00	460	650	12.9%	83.60	465	638	16.3%	103.80	500	668	15.1%	100.80
Sep	435	566	11.1%	62.90	460	598	11.1%	66.20	465	589	13.7%	80.60	500	619	12.5%	77.40
Oct	435	557	10.5%	58.60	460	594	10.8%	64.30	465	578	12.7%	73.50	500	608	11.5%	70.20
Nov	435	578	10.9%	62.90	460	605	11.5%	69.60	465	590	13.8%	81.30	500	620	12.6%	78.00
Average		603	11.9%	72		641	12.4%	79		632	15.4%	97		664	14.8%	99

Source: Ministry of Finance and World Bank

Table 9: Effects of the export tax on selected variables

	Average	
	July '91 to August '94	September '94 to October '95
Tax Rate	0%	16%
Ratio of ex-factory cooking oil to olein import parity	1.14	0.98
Retail cooking oil over wholesale price	0.19	0.20
Share of JMO crude to ex-factory cooking oil price	0.72	0.71

Source: World Bank Calculations

Table 10: Tax effects on selected prices, November 1995

International prices:	Malaysia, Fob	Domestic price	Tax Rate
	\$US/ton		
Crude Palm Oil (CPO)	578	515	11%
Refined Palm Oil (RBD PO)	605	535	12%
Crude Olein (CRD Olein)	590	509	14%
Refined Olein (RBD Olein)	620	542	13%
Spreads			
RBD PO-CPO	27	20	25%
CRD-Olein-CPO	12	-6	153%
RBD Olein-CPO	42	27	36%

Source: World Bank Calculations

Table 11: Welfare effects of the export tax

Demand (million tons)	With Tax	Scenarios		
		January baseline	November baseline	November low elasticity
Domestic demand RBD Olein	1.75	1.33	1.41	1.55
Derived CPO demand	2.40	1.82	1.94	2.13
CPO export	2.00	2.58	2.46	2.27
Change in				
Tax revenue (million \$)		182	126	126
Consumer surplus (million \$)		165	123	129
per capital consumers surplus (\$)		0.84	0.63	0.66
Export earnings (million \$)		-384	-269	-158
share of agricultural GDP		-1.4%	-1.0%	-0.6%
Refiner revenue (million \$)		-99	-74	13
Plantation revenue (million \$)		-400	-277	-277
as share of agricultural GDP		-1.5%	-1.0%	-1.0%
smallholder revenue (million \$)		-200	-83	-83
as share of agricultural GDP		-0.7%	-0.3%	-0.3%
Net welfare (loss)		-152	-102	-10
share of agricultural GDP		-0.6%	-0.4%	0.0%

Source: World Bank Calculations

**Table 12: Buffer stock
allocations of crude palm oil**

	tons
Sinar Mas Group	9,000
Salim Group	8,500
Sucofindo	5,000
Raja Garuda Mas	3,500
Tolam Tiga Indonesia	3,000
Lonsum Indonesia	2,600
Astra	4,000
Duta Permai	900
Indecda	1,000
Total	37,500

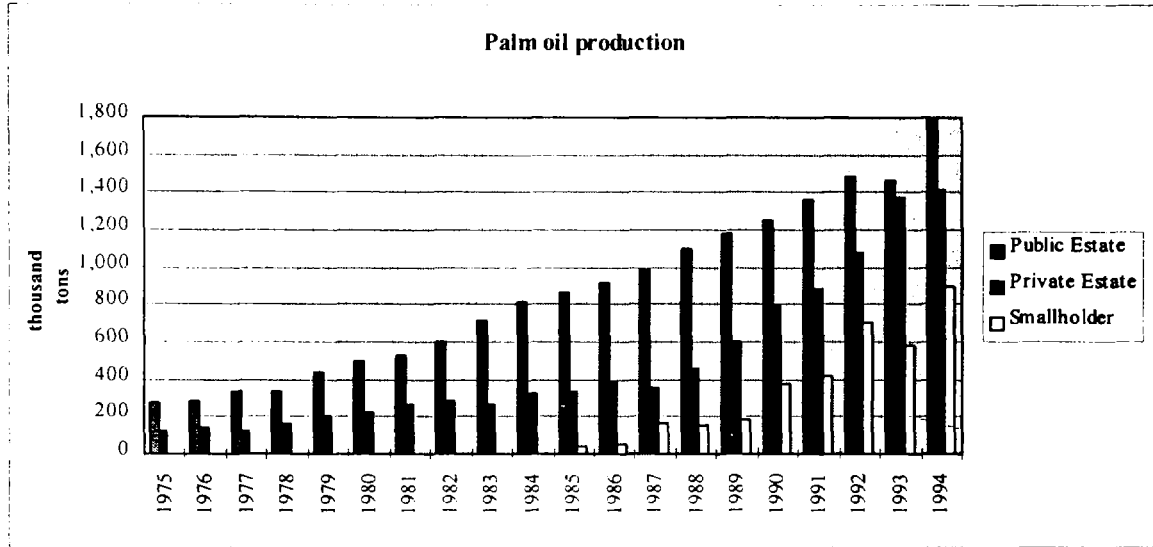
Source: Bulog

Table 13: Spreads between process products and crude palm oil

Date	RBD CPO - CPO			Crude olein - CPO			RBD olein - CPO		
	Domestic	World	tax	Domestic	World	tax	Domestic	World	tax
Sep-94	34.30	43.00	20%	30.00	64.00	53%	55.90	94.00	41%
Oct-94	21.70	30.00	28%	13.50	48.00	72%	46.50	78.00	40%
Nov-94	27.80	30.00	7%	6.60	35.00	81%	39.60	65.00	39%
Dec-94	44.20	57.00	22%	5.40	31.00	83%	25.50	61.00	58%
Jan-95	19.60	16.00	-23%	-23.00	-12.00	-92%	0.80	18.00	96%
Feb-95	32.80	39.00	16%	-2.10	15.00	114%	23.00	43.00	47%
Mar-95	43.60	56.00	22%	6.00	42.00	86%	38.70	72.00	46%
Apr-95	46.60	61.00	24%	14.20	42.00	66%	35.40	72.00	51%
May-95	35.10	43.00	18%	15.00	52.00	71%	48.00	82.00	41%
Jun-95	25.60	37.00	31%	7.00	29.00	76%	33.20	59.00	44%
Jul-95	29.50	33.00	11%	-1.60	21.00	108%	39.40	71.00	45%
Aug-95	20.40	30.00	32%	-11.80	18.00	166%	21.20	48.00	56%
Sep-95	28.70	32.00	10%	5.30	23.00	77%	38.50	53.00	27%
Oct-95	31.30	37.00	15%	6.10	21.00	71%	39.40	51.00	23%
Nov-95	20.30	27.00	25%	-6.40	12.00	153%	26.90	42.00	36%
Avg:	30.77	38.07	17%	4.28	29.40	79%	34.13	60.60	46%

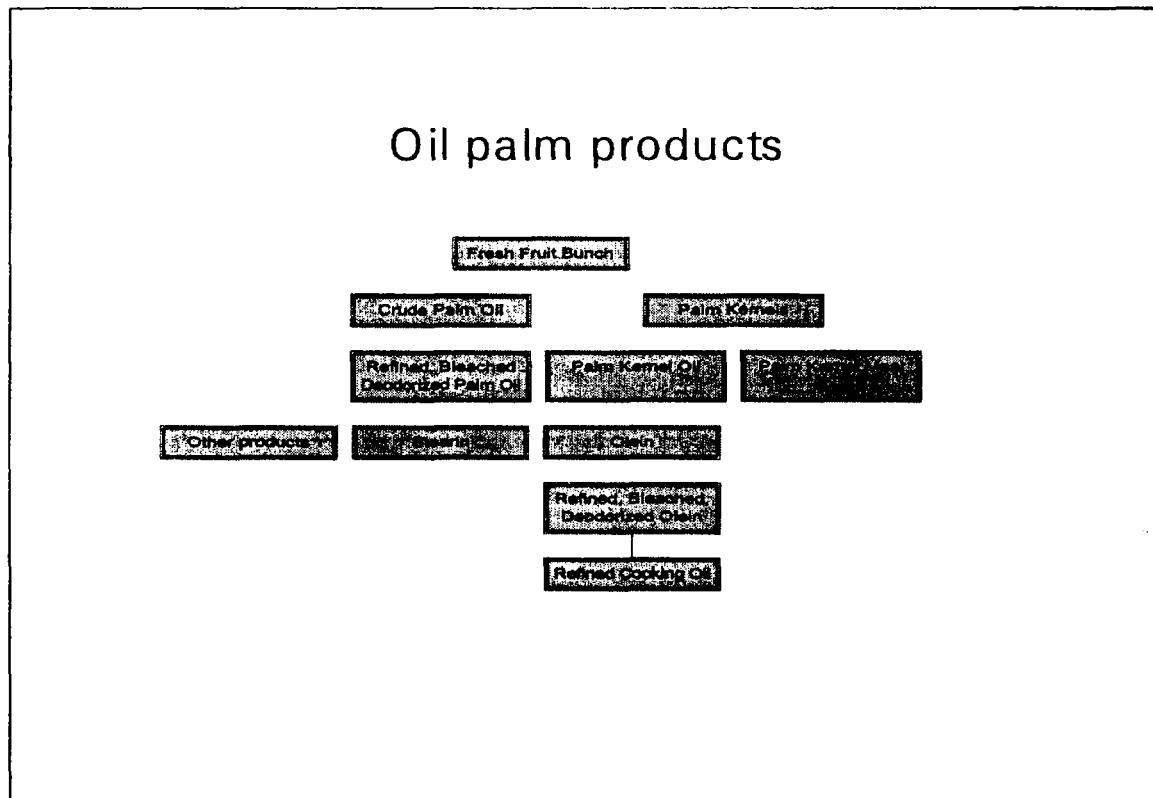
Source: World Bank Calculations

Figure 1: Palm oil production in Indonesia by type of producer



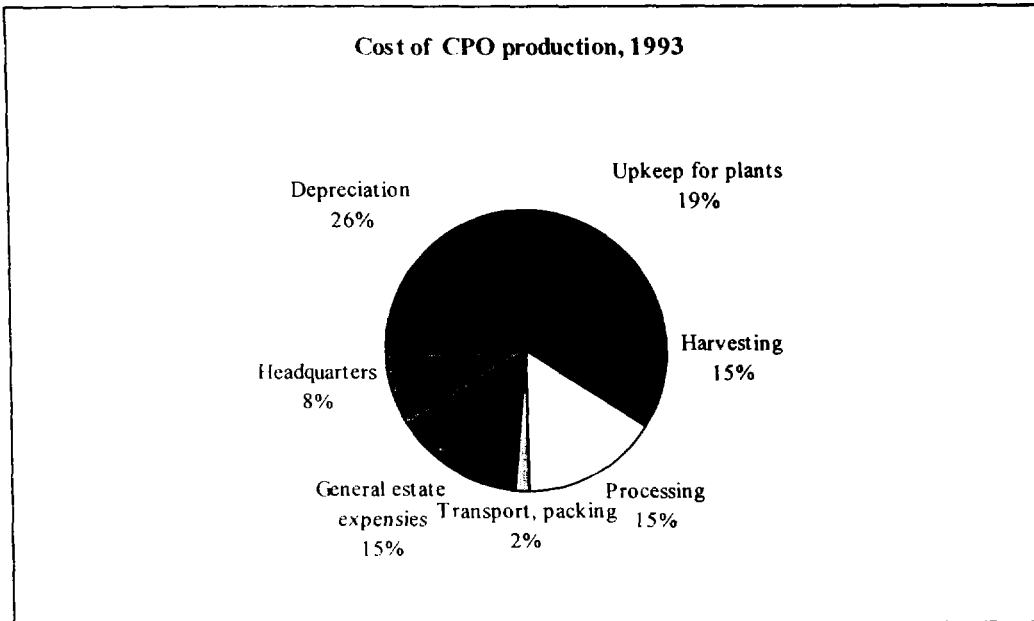
Source: Director General of Estates

Figure 2: Selected oil palm products



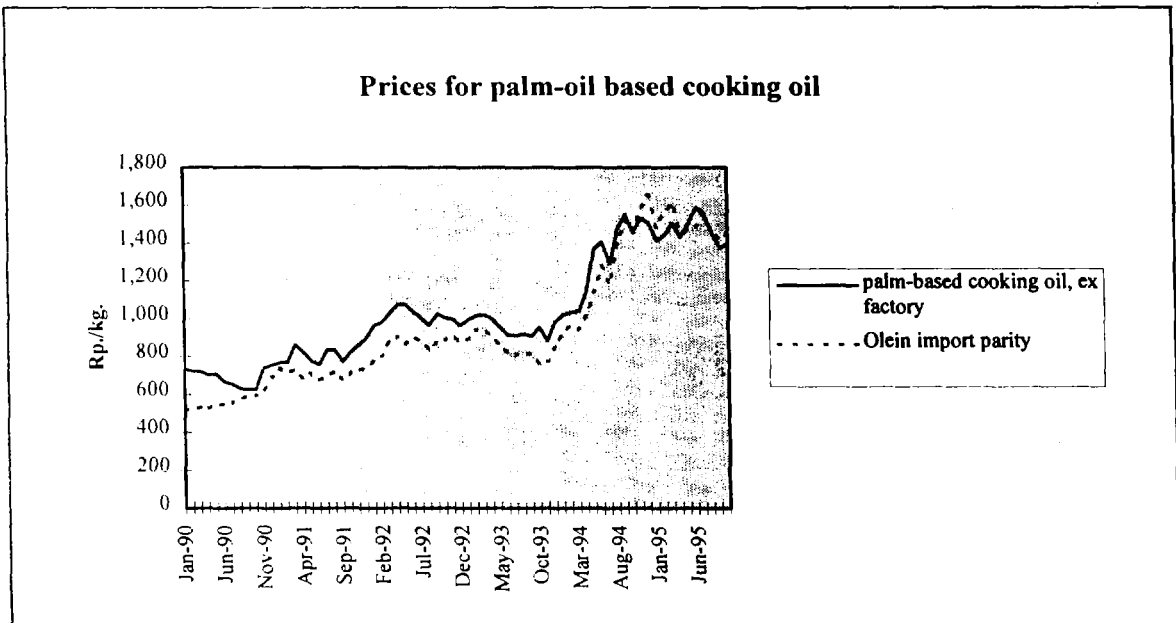
Source: World Bank

Figure 3: Composition of production costs for mature palm oil plantation.



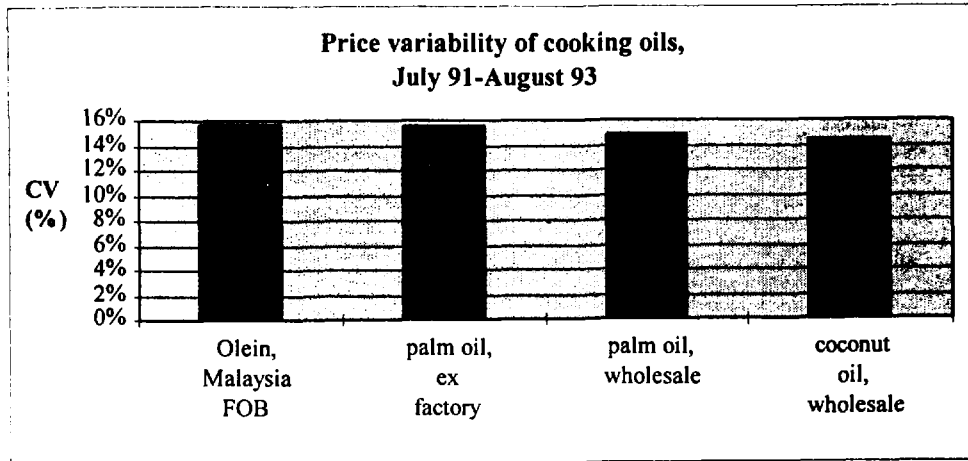
Source: Socfindo

Figure 4: Cooking oil and import parity prices.



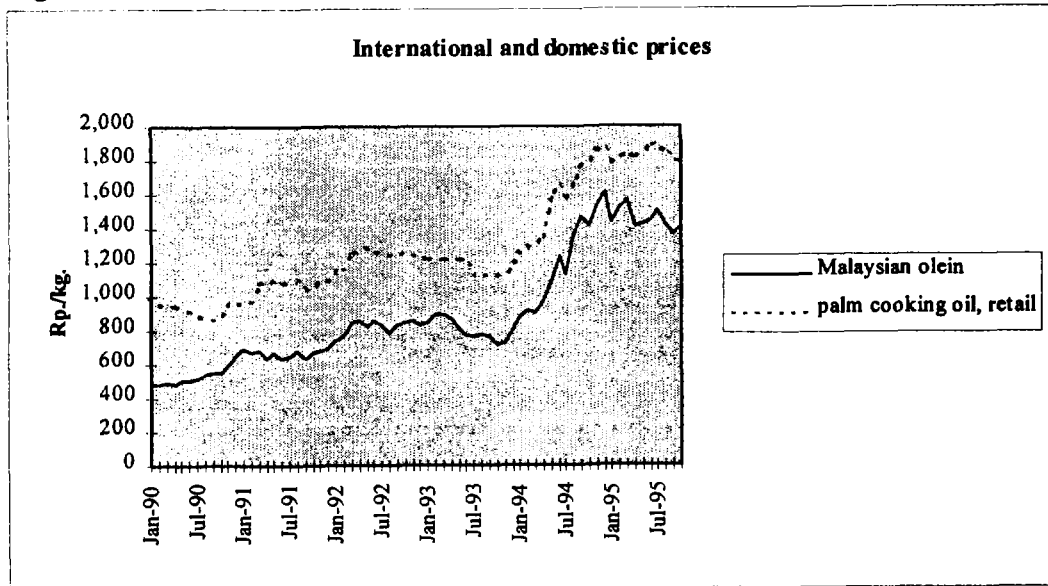
Source: World Bank

Figure 5: Variability of selected vegetable oil prices.



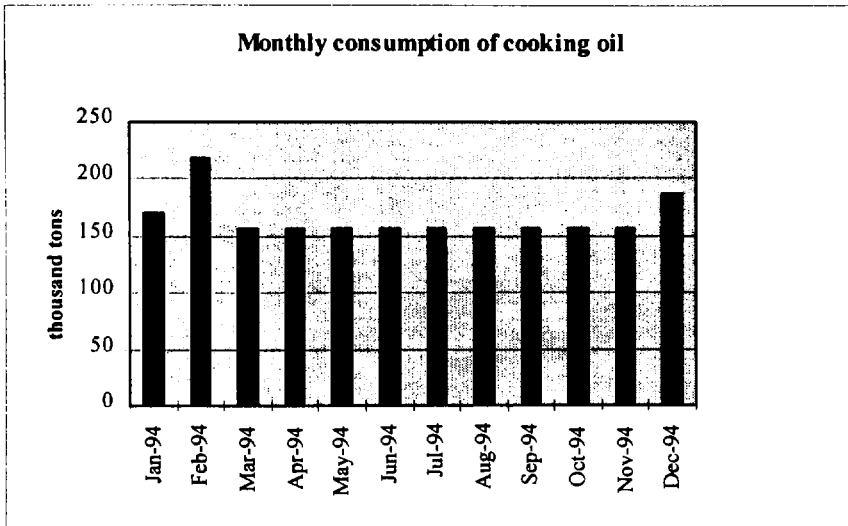
Source: World Bank

Figure 6: Prices for Malaysian olein, FOB and domestic palm cooking oil



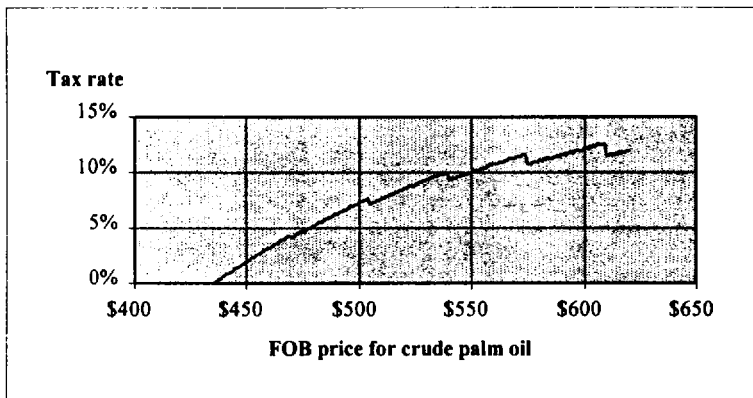
Source: World Bank

Figure 7: Seasonal variation in cooking oil consumption



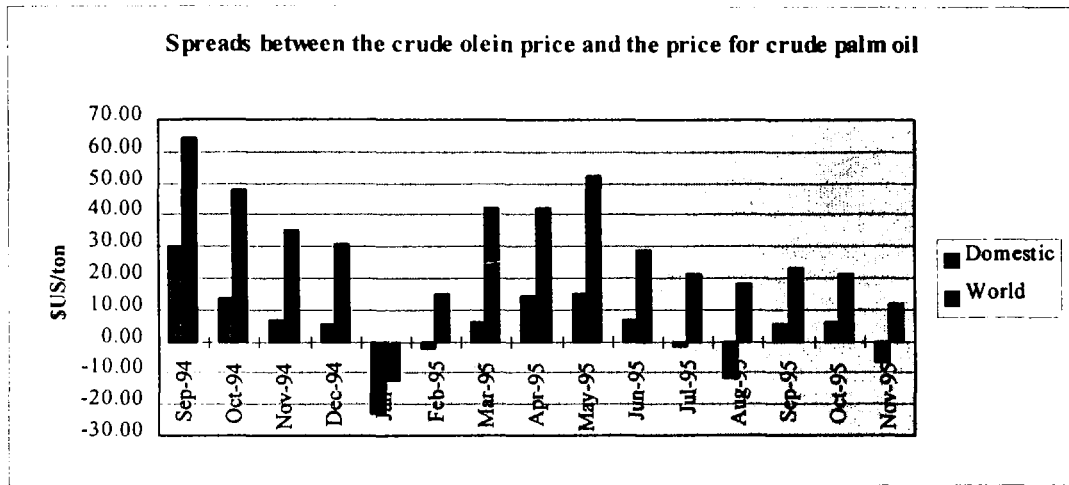
Source: Central Bureau of Statistics

Figure 8: Tax schedule for crude palm oil



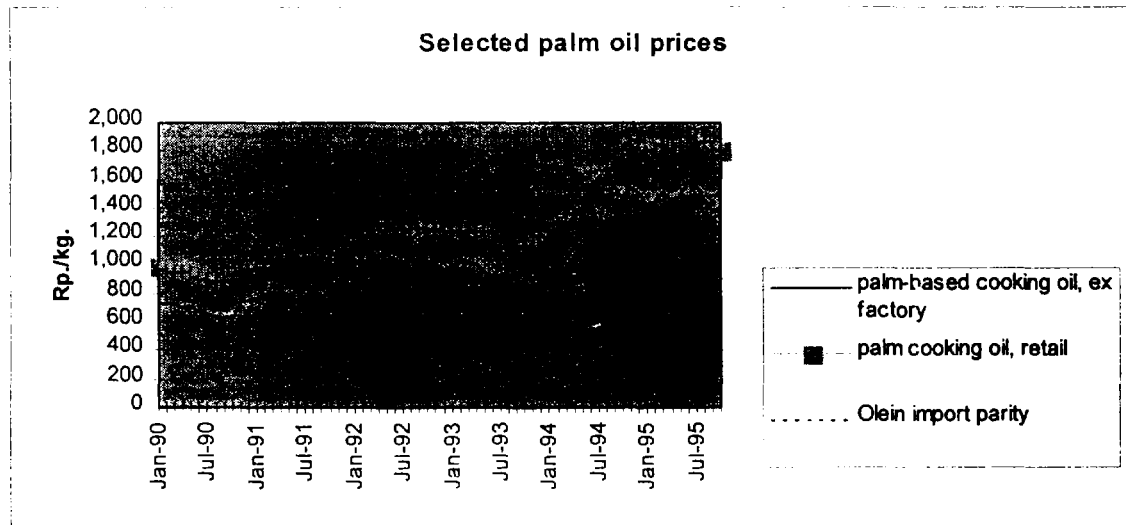
Source: World Bank Calculations

Figure 9: Olein and crude palm oil spread



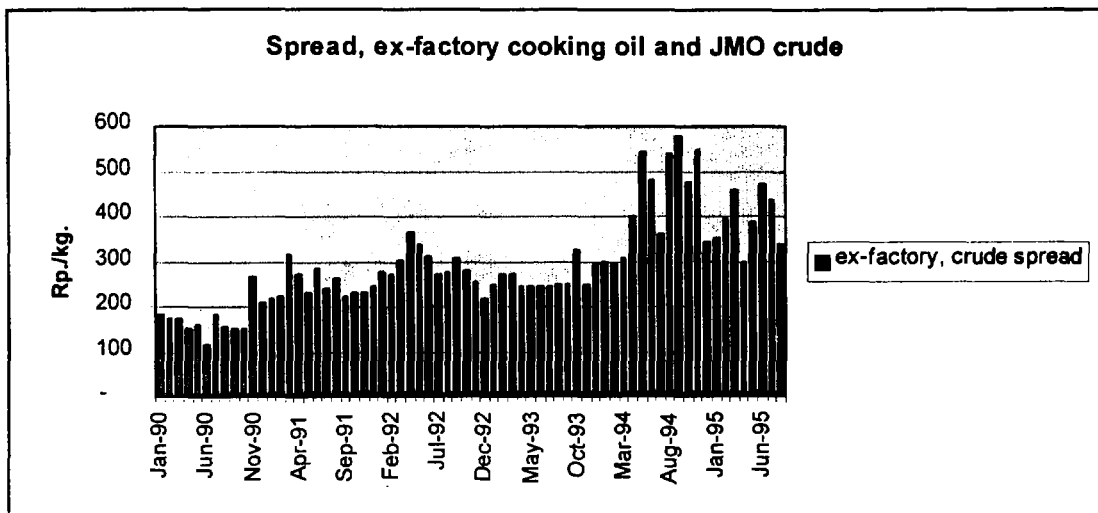
Source: World Bank Calculations

Figure 10: Domestic prices and olein import parity price



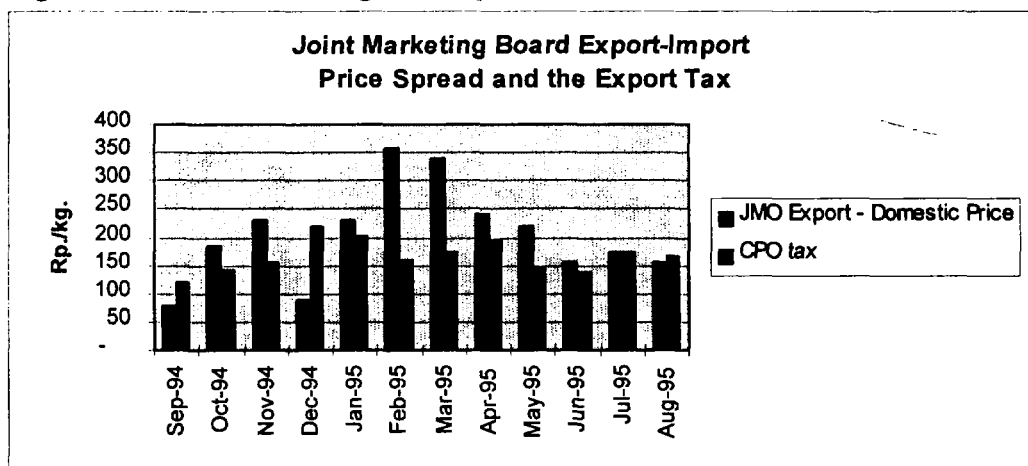
Source: World Bank

Figure 11: Export price minus domestic price for JMO crude



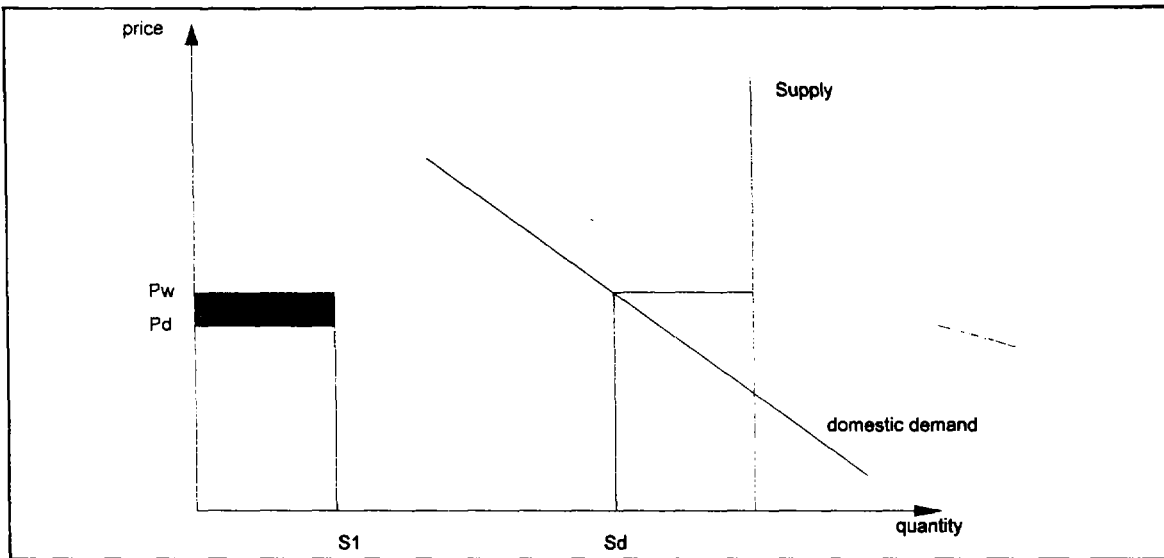
Source: World Bank

Figure 12: Joint Marketing Board prices and the tax



Source: JMB and World Bank

Figure 13: Directed sales transfer income but do not effect prices



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