Graduate School of Development Studies

The Effect of Crude Palm Oil (CPO) Export Tax on the Production of Its Derivative Products in Indonesia

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Dedication

This research is dedicated to my lovely late parents Basri and Rozalia, all my sisters and their husbands; Susi and Da Yun; Ayu and Bang Adi; Uni and Da Ed, and all my nieces who are the cutest in the world. Thanks' God for giving them as my big family.

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List of Acronyms

2SLS	Two Stage Least Squares
CPO	Crude Palm Oil
FAO	Food and Agricultural Organization
FEM	Fixed Effect Method
GAPKI	Association of Palm Oil Entrepreneurs of Indonesia
GDP	Gross Domestic Product
Ha	Hectare
HH	House Hold
IFS	International Financial Statistic
MPOB	Malaysian Palm Oil Board
OLS	Ordinary Least Square
PKO	Palm Kernel Oil
REM	Random Effect Method
SSE	Sum Square Error/ Sum Square Residual
TOT	Terms of Trade
WTO	World Trade Organization

Abstract

The recent condition of the Crude Palm Oil (CPO) production of Indonesia is that it becomes the number one in producing and the number two in exporting all over the world. However, in the other hand, there is a need to develop more its derivative products. It means the tendency to export has to be given a brake a bit in order to ensure the availability of CPO as the raw material for its downstream products. The availability is not only for the production of cooking oil made of palm oil as basic need for Indonesia society but also other derivative products that give more value added, employment, and Gross Domestic product (GDP). Most of the instrument has been used by the government for that purpose is by levying CPO export tax. Therefore, there is a willingness to examine how far export tax affects the development of CPO derivative products in Indonesia. This research examines three oleo chemical products which are fatty acid, fatty alcohol, and glycerol as the representative of derivative products in Indonesia with the period from 1997-2007. The analyses used are by using descriptive and regression-based analyses. The descriptive analysis is using graphs and regression-based analysis is using panel data analysis specifically Fixed Effect Method. The main conclusion got is that there is no significant effect of export tax on the derivative products production.

Relevance to Development Studies

The support from the government to infant industries especially the downstream industries are something necessary. Tax for material which is exported is that one of policies used for this purpose. The examination of the effectiveness of policy will give contribution for its development.

Keywords

Crude Palm Oil, Export Tax, Oleo Chemical Products, Fatty Acid, Fatty Alcohol, Glycerol, Descriptive Analysis, Regression-Based Analysis, Fixed Effect Method.

Chapter 1
Introduction

The aim of this paper is to investigate the effect of Crude Palm Oil (CPO) export tax on the performance of its derivative products in term of production in Indonesia. This is important because we need to know the impact of certain policy on the development of some industries, in this case the downstream products of CPO industries. We have used descriptive and regression-based analysis to examine it, and the main conclusion is that there is no significant effect of export tax on the derivative products production.

This introduction chapter consists of background, problem statement, research question, hypothesis, and the organization of the study that at a glance gives idea why I am doing and what I am going to do in this research.

1.1. Background

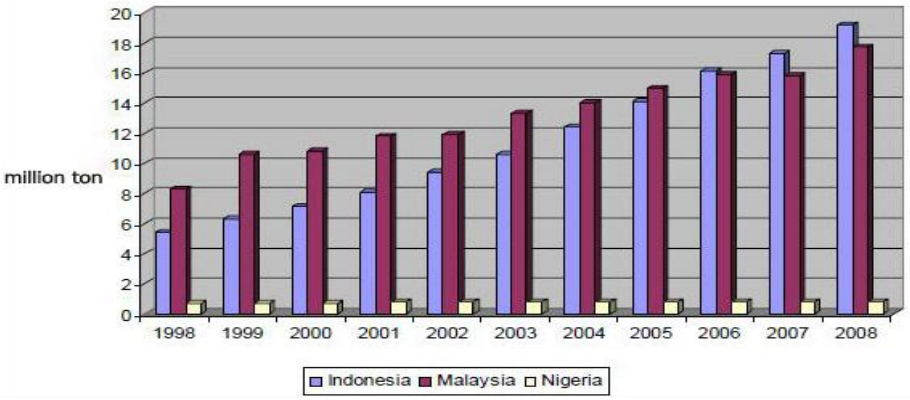
Recently, Crude Palm Oil (CPO) or palm oil has played an important role in Indonesia. Susila (2004) lists the reasons of it which are: its price can affect the inflation rate of Indonesia (Statistical Bureau of Indonesia, 2001), the high rate of absorbing labour force which is until 2003 absorbed two million workers and keeps increasing until now, and as the source of export earning.

In term of export, its trend has been increasing every year. Based on Financial and Economic Statistic of Indonesia (2004), total export of CPO gradually increased from 3.3 million ton in 1999 to 6.38 million ton in 2003. It means there was 136% increase of total export compare to that in 1999, and it was also followed by the increase of export value by 93% which was from USD1.1 billion in 1999 to USD 2.6 billion in 2003. In addition, the increase of the total export of CPO has also increased the export in percentage compared to the total export of Indonesia. In 2001, total export of CPO was only 2.18% of total export of Indonesia and it increased every year became 4.11% in 2002 and 4.3% in 2003.

With this growing up trend, since 2006 Indonesia has become the most prolific country in producing CPO and occupied on the second place of the biggest CPO exporting countries in the world. The comparison of CPO production among Indonesia, Malaysia, and Nigeria as the biggest producers in the world is shown in Figure 1 and the total export of Malaysia, Indonesia, Papua New Guinea, and Colombia as the biggest exporters in the world is shown in Figure 2.

Figure 1.

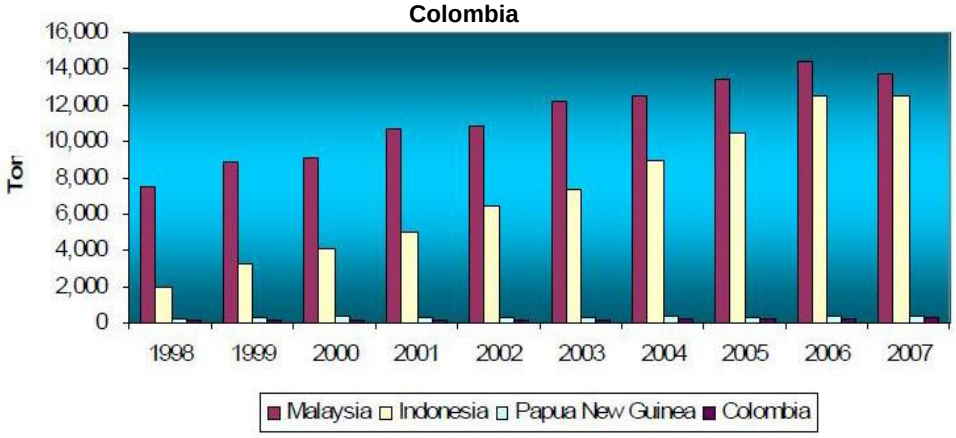
The comparison of CPO production among Indonesia, Malaysia, and Nigeria



Source: CEIC (Committee on Electronic Information and Communication) (2009)

Figure 2.

The comparison of CPO exports among Malaysia, Indonesia, Papua New Guinea, and Colombia



Source: Malaysian Palm Oil Board (2008)

Considering the tendency of domestic producers to export, the government has taken responsibility to control the sufficiency of domestic supply, to maintain the domestic price and to support the development of processing in-

dustry of CPO in Indonesia by using export restriction instruments. Piermartini (WTO, 2004) explains several forms of export restriction commonly used which are imposing export taxes, export bans, regulated exports, and supervised export. For this commodity, the Government of Indonesia mostly uses the export tax and this paper will focus on this kind of export restriction.

1.2. Problem Statement

Even though the export of CPO becomes an important source of GDP for Indonesia, expanding the CPO derivative industries recently has become more important. It is because the value added and labour absorption from CPO derivative are much greater than that of CPO raw. Until now, Indonesia has produced low rate products of CPO derivative which means it only gives lower Gross Domestic Product (GDP) than it should be.

Nowadays, the fact says Indonesia has been left behind from Malaysia in the development of the derivative products of CPO. The argument is even though Malaysia is only in the second place of the biggest producers of CPO in the world, statistic shows that only 30% of Malaysia total export is purely CPO (GAPKI/ Association of Palm Oil Entrepreneurs of Indonesia, 2010) while the rest are from its derivative products. In the other hand, Indonesia as the number one CPO producer in the world, the total export of CPO is still dominated by pure CPO which total export of pure CPO is 634,702 ton from total 1.203 million ton. It means the total pure CPO export of Indonesia approximately is around 53%.

Based on that fact, the Government of Indonesia tries to use export taxes in order to assure the sufficiency of domestic supply and to maintain the stability of domestic price as the key factors to support the development of CPO processing industry in Indonesia. To see the effect of export tax to the development of CPO derivative industries in Indonesia, this paper will examine the different production performance of the three oleo chemical products as CPO derivatives which are fatty acid, fatty alcohol, and glycerol.

1.3. Research Question

From this research, I would like to examine the effect of the export tax to the development of some CPO derivative industries of Indonesia. The question of this research is:

What is the effect of the export tax to the development of CPO derivative industries of Indonesia in term of total production? The representatives for derivative products here are oleo chemical products which are fatty acid, fatty alcohol and glycerol. The present research is considering a time period between 1997 and 2007.

1.4. Hypothesis

The hypothesis of this research is that the export tax has increased the CPO derivatives production of Indonesia.

1.5. The Organization of the Study

This study will be organized in six chapters which are except the first and sixth chapters; there will be conclusion part for each of them. The first chapter is introduction, which consists of background, problem statement, research question, hypothesis and the organization of the study. Moreover, this chapter will be followed by a description of CPO Derivative Industry in Indonesia and the Government Policies as the second chapter. It will describe the growth of CPO production, the ownership and supply chain of CPO of Indonesia, its derivative Industries and the Export Tax as the Government Policy, and lastly it is closed by a conclusion from what I got from this chapter.

The third chapter is theoretical framework. This chapter has three sub chapters. The first sub chapter will explain the effect and the arguments of levying export tax that will be explained in two separated parts. Furthermore, the second sub chapter will discuss previous researches that examine the effect of policy to the development commodity and its industry and the analysis for CPO in Indonesia. Then, it is followed by the conclusion of this chapter.

The fourth chapter is the descriptive analysis of the effect of CPO export tax to its derivative products and followed by regression-based analysis in the

next chapter. Chapter five which is regression-based analysis will explain data collection method, empirical framework, the result of the examination, the verification of model, the interpretation, and conclusion for the result of regression. Finally, the last chapter is the conclusion for the research.

Chapter 2
Description of the CPO Derivative Industries in Indonesia and the Government Policies

This chapter explains more about the background of this research that already mentioned briefly in Chapter 1. We will discuss deeper about the contribution of non oil and gas sectors that keep increasing until now which most of them are using Crude Palm Oil as the material. Furthermore, it be explained the condition of CPO production and export of Indonesia, the condition of its derivative products, the reason and the mechanism of imposing export tax by the government. In other words, the purpose of this chapter is to support the background of this research so that it can be reasonable and readers can realize that this is something important to do.

2.1. The Structure of Economy of Indonesia

2.1.1. The General Structure of Economy of Indonesia

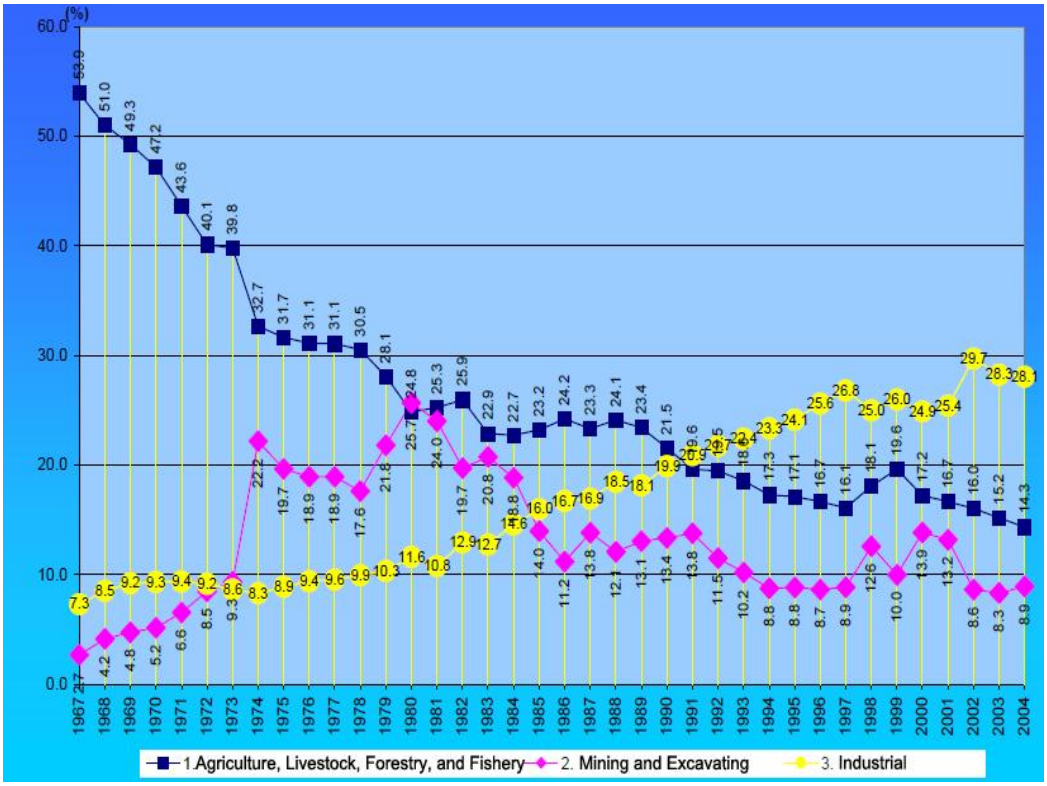
With the increasing growth of Indonesian economy since 1967 until 1997, there has been structural transformation which was the contribution of agricultural sector has become lower and generally the contribution of industrial sectors to the Gross Domestic Product (GDP) of Indonesia has been increased. Started from 1967, industrial sector contributed only 7.5% of overall economy while agricultural sector was the highest which contributed 53.9% for the economy. Furthermore, it was reported that the contribution of industrial sector kept increasing until 1997 at the end of President Soeharto era, the second president of Indonesia, by contributing 26.8% of GDP while agricultural contributed only 16.1%. Figure 3 below shows the dynamic of the three biggest sectors that contribute to the Indonesia economy.

Meanwhile there was a different story from the mining and excavating sectors. The average role of mining and excavating sector more or less has been the same except from 1974 until the mid of 1980s when the oil boom increased significantly. The role even exceeded the contribution of industrial sec-

tor. We can see from the figure that in 1973, the contribution of this sector to the economy was 9.3% and increased considerably to 22.2% in 1974. The mining and excavating sectors reached its peak point in 1980 by contributing 25.7% while agricultural sector gradually decreased to 24.8% in the same year.

Figure 3.

The Development of the Role of Sectors to the Indonesian Economy



Source: Industrial Ministry of Indonesia, 2008

Moreover, in the following era or in the transitional administration era which noted by a quick replacement of presidents, the role of industrial sector has gradually increased from 25% of GDP which is 238, 897 billion Rupiah in 1998 to 28.1% which is 652,700 billion Rupiah in 2004. At the same time, the era of Habibie, Abdurrahman Wahid and Megawati regimes, the agricultural sector significantly decreased in percentage from 18.1% in 1998 to 14.3% in 2004 even though it still increase in absolute number from 172,827.60 billion Rupiah in 1998 to 354,400 billion Rupiah in 2004. The same condition happened with mining and excavating sectors which decreased in percentage from

12.6% in 1998 to 8.9% in 2004 although it still increased in absolute term from 120,328.60 billion Rupiah in 1998 to 196,900 billion Rupiah in 2004.

Furthermore, the proportion of contribution keeps continuing until now despite the Asian Crisis in 1997 and 1998. However, more or less the share of contribution of each sector still persists until now. We can conclude from the figure that there is a significant increased of industrial sector for the Indonesian economy. I will discuss the contribution of non oil and gas as the branch of industrial sector for the Growth Domestic Product of Indonesia in the next section.

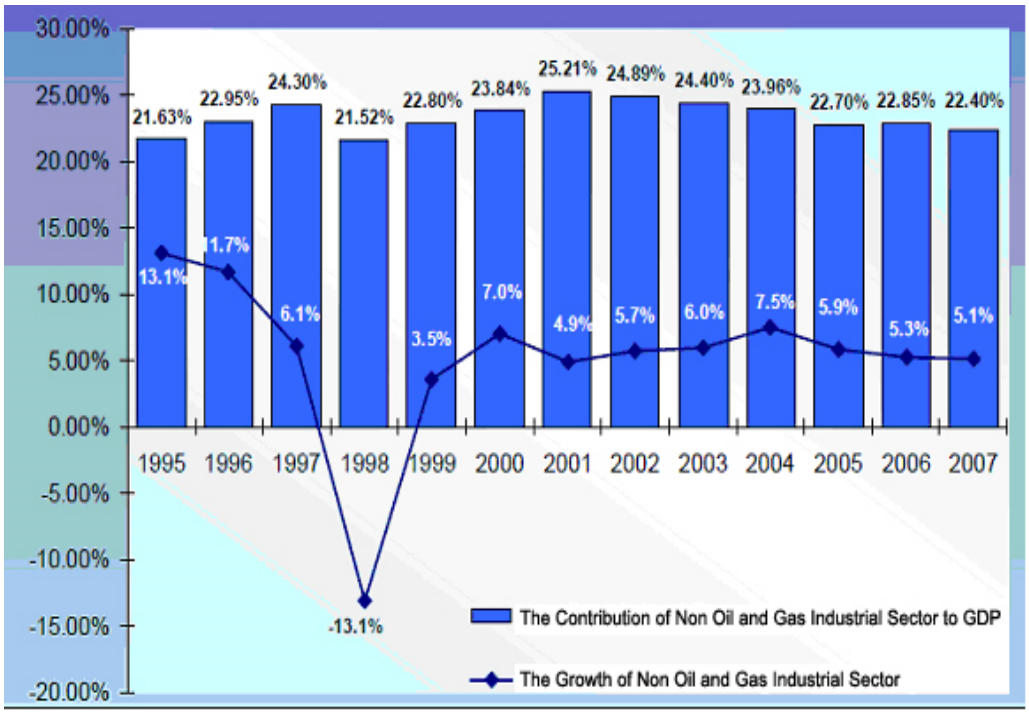
2.1.2. The Contribution of Non Oil and Gas Sectors for Indonesia GDP

If we consider breaking down all sectors including the sectors in Figure 3 and other sectors, we will get detail information on the sectors contribution. Based on the Industrial Ministry of Indonesia (2008), in 2007 the sectors that gave highest contribution for Indonesia GDP were industrial sector with 27.01%; trade, hotel and restaurant with 14.93%, agriculture with 13.8%, and mining and excavating sector with 11.4%. From the industrial sector, Industrial Ministry of Indonesia (2008) also shows that 22.4% is coming from non oil and gas industrial sector and the oil and gas sector is only 4.61% from national GDP. Figure 4 shows the growth and contribution of non oil and gas industrial sector to the national GDP of Indonesia.

From the non oil and gas industrial sector we can also break it down into more detail sectors. The contribution of each sector is shown at the table 1. From that table, we can see that the three biggest contribution comes from foods, water, and tobacco; transportation and parts; and fertilizer, chemical, and rubber industry with 29.79%; 28.70%; and 12.49% consecutively in 2007. For food, water, and tobacco and fertilizer, chemical, and rubber industry; one of the raw materials most used for them is palm oil or Crude Palm Oil (CPO). In the other words, those are some of the goods that are the derivative products of CPO.

Figure 4.

The Growth and Contribution of Non Oil and Gas Industrial Sector for Indonesian GDP



Source: Statistical Bureau of Indonesia (2008)

Table 1.

The Contribution of Each Sector of Non Oil and Gas Industrial Sector for Economy of Indonesia (2005-2007)

Branch of Industry	Percent (%)		
	2005	2006	2007
Food, Water, and Tobacco	28.18	27.95	29.79
Textile, Leathers, and Footwear Industry	12.20	11.91	10.56
Wood Goods and Forestry Industry	5.55	5.82	6.19
Paper and Printing	5.41	5.24	5.12
Fertilizer, Chemical, and Rubber Industry	12.26	12.56	12.49
Cement and Mineral Excavating Industry	3.89	3.80	3.70
Iron, Metal, and Steel	2.88	2.69	2.58
Transportation and Parts	28.72	29.09	28.79
Other Goods	0.92	0.94	0.85
Total	100.00	100.00	100.00

Source: Statistical Bureau of Indonesia, 2008

2.2. The Crude Palm Oil (CPO) of Indonesia

2.2.1. The Growth of CPO of Indonesia

Indonesian Palm Oil production has increased significantly in the last 40 years. If we take a look to the past, in 1967 Indonesia had area of plantation only 105,808 ha and it soared became 2.5 million ha. The soared was happened remarkably in 1990-1997 when there was extension of plantation mostly at private farming averagely 200,000 ha every year. The fast growth of plantation area also happened 5 years later which were from 2.96 million ha in 1999 to 3.8 million ha in 2003 (Statistical Bureau of Indonesia, 2008). It means in average there was additional area more than 200 million ha every year in average.

Recently, since 2006, Indonesia has been the biggest producer of CPO worldwide. At that year, the area of palm oil of Indonesia was 6.1 million ha with the total production 16 million ton. It grows again in 2007 in which the area increased of 6.78 million ha produced 17.37 million ton. Together with Malaysia, Indonesia takes almost 90% of world CPO production and produces 16.050.000 ton from 6.611.000 ha of land, which exceeds Malaysia with 15.881.000 ton (MPOB for data on Malaysia). For the addition, the plantations also employ more than 4 million workers besides 2 millions the head of household who are the plasma farmers (Saragih, 2009).

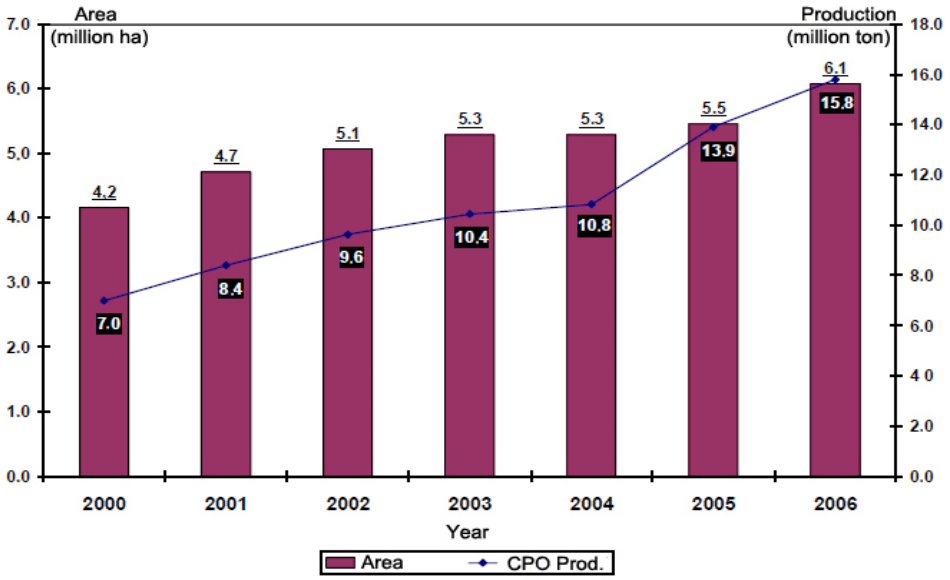
Figure 1 in the first chapter gives the complete illustration of the growth of production of Indonesian and Malaysian CPO. Furthermore, Figure 5 below shows the area of plantation of CPO of Indonesia from 2000-2006, and Figure 2 in Chapter 1 shows the export of CPO of Indonesia compared with the other exporter countries.

2.2.2. The Ownership of Plantation and Marketing

From the plantation view, the palm oil plantation is divided by three ownerships which are household farm, state farm, and private farm with different pattern of supply chain. Table 2 shows the ownership and production of the plantation.

Figure 5.

The Production and Plantation Area of CPO of Indonesia (2000-2006)



Source: Statistical Bureau of Indonesia (2008)

Household farming usually has limited area of plantation which is approximately between 1 and 10 ha. Because of the limited area, the farmers only can sell the fruits to the villager/ local seller which near to the location of the farms and continue to sub-district seller, or sold it through local Koperasi Unit Desa (KUD/ Auction) before going to the processor or industries. Figure 6 below shows the supply chain of palm oil marketing of household farm (pattern 1 and pattern 2).

Table 2.

The Ownership and Production of CPO (2000-2006)

Year	Area (Ha)				CPO Production (Ton)			
	HH Farm	State Farm	Private farm	Total	HH Farm	State Farm	Private Farm	Total
2000	1,166,758	588,125	2,403,194	4,158,077	1,905,563	1,460,954	3,633,901	7,000,508
2001	1,561,031	609,947	2,542,457	4,713,435	2,798,032	1,519,289	4,079,151	8,396,472
2002	1,808,424	631,566	2,627,068	5,067,058	3,426,740	1,607,734	4,587,871	9,662,345
2003	1,854,394	662,803	2,766,360	5,283,557	3,517,324	1,750,651	5,172,859	10,440,834
2004	2,220,338	605,865	2,458,520	5,284,723	3,847,157	1,617,707	5,365,526	10,830,389
2005	2,356,895	529,854	2,567,068	5,453,817	4,500,769	1,449,254	5,911,592	13,900,000
2006	2,636,425	696,699	2,471,802	6,074,926	5,130,635	1,935,826	6,324,346	15,800,000

Source: Statistical Bureau of Indonesia (2008)

Moreover, each state farm in the same regional collect their products together and sell the products by Collective Marketing Office, while each private farm sells its products independently, and both of them sell it directly to the exporters or to the domestic industries first. Furthermore, state and private farm usually already processed the fruit becomes Crude Palm Oil (CPO) or Palm Kernel Oil (PKO) before sell them. Figure 7 shows the supply chain of CPO marketing of state and private farm.

Figure 6.
The pattern of supply chain of CPO of Household Farm

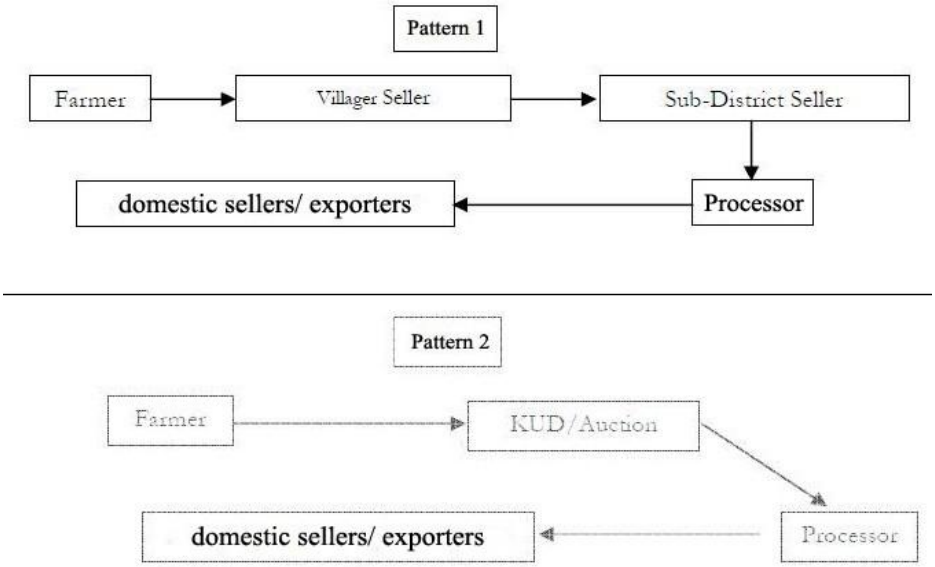
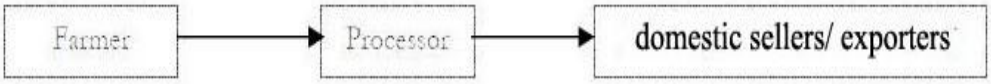


Figure 7.
The pattern of supply chain of CPO of State and Private Farm



2.2.3. The Tendency to Export

With the high production of CPO in Indonesia, the producers are able to export their products. Prasetyani (2005) shows that in 2003, the income for Indonesia reached US$ 2.6 billion or 4.3% from total export of Indonesia which were 61 billion. This export value was increased significantly compared

to 2002 which was US$ 2.35 billion or 4.11% from total export. It also increased compared to 2001 which was US$ 1.23 billion or 2.18% of total export.

Moreover, the opportunity to sell it abroad determines by the high international demand, and gets profit faster for the producers keep increasing. It creates the more and more tendency for the producers to export until now. Figure 2 in Chapter 1 shows the increase of growth Indonesia since 1998 until 2007.

2.3. Crude Palm Oil (CPO) Derivative Industries of Indonesia

Even though it looks profitable, the tendency to export CPO creates many problems and has weaknesses. The lack of CPO availability in domestic realm makes the CPO derivative industries in Indonesia are not developed well. Different case with Malaysia that already has good efficiency and technology for producing more advance products, Indonesia depends very much on the amount of CPO as the material due to less efficiency and technology. It is said that until 2009, Malaysia have produced 120 kinds of derivative products of CPO, while Indonesia only produces 23 of them even though the percentage of domestic consumption in Malaysia much less than in Indonesia. In addition, the less diversification of CPO products also happens because most of them are used for producing cooking oil made of palm oil due to the big population of Indonesia. Table 3 below shows the comparison of the CPO output, export, and the use of CPO domestic consumption, which is used also for processing downstream products, compared with that of Malaysia.

Moreover, the value added of derivative products is much greater than that of merely the CPO. It also means we lose the opportunity to get higher benefit in view point of absorbing labour from the industries and more income from higher profit of derivative products. In the other words, the more diverse the industries lead to more employment and more revenue. Figure 8 shows the derivative products of CPO or we can say the products that CPO more or less as its material. We divide the derivative products into three sectors which are food, oleo chemical, and others. The products of food sector which are olein

as the intermediate products used for the next derivative products such as cooking oil, margarine, fat powder, vegetable ghee, and substitute for cocoa butter. Furthermore, the products of oleo chemical sectors are fatty acid, fatty alcohol, glycerol, stearin, acid soap, fat, detergent, and so on. Other sectors that come from CPO are fertilizer and another type of soap. Meanwhile, Table 4 shows the value added of various derivative or downstream industries of CPO.

Table 3.
The Use of CPO in Indonesia and Malaysia

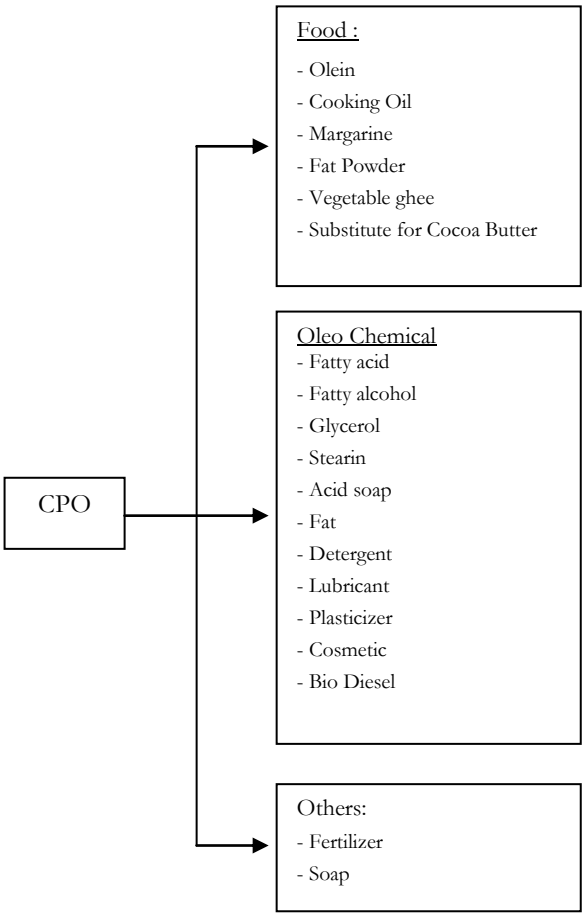
Year	CPO Production of Indonesia (million ton)	Export (million ton)	% of Domestic Consumption	CPO Production of Malaysia (million ton)	Export (million ton)	% of Domestic Consumption
1998	5.64	1.48	73.78	8.30	7.47	10.06
1999	6.01	3.30	45.08	10.60	8.91	15.92
2000	7.58	4.11	45.79	10.80	9.08	15.92
2001	9.10	4.90	46.10	11.80	10.63	9.96
2002	10.02	6.33	36.80	11.90	10.89	8.52
2003	10.44	7.37	29.41	13.30	12.27	7.77
2004	12.23	9.00	26.44	14.00	12.58	10.18
2005	14.60	10.44	28.52	15.00	13.45	10.37
2006	16.00	12.54	21.63	15.90	14.42	9.29
2007	18.50	12.65	31.62	15.80	13.75	6.49

Estimation is made by the author based on the data from Statistical Bureau of Indonesia (2008) and MPOB (2008)

For the derivative products in Indonesia, CPO is mostly used by food industry especially cooking oil industry, and cosmetic and pharmaceutical industries coming from oleo chemical industries. Figure 9 shows that from the total of CPO production, averagely, 60% of it is used for export while the rest for domestic derivative industries. The derivative industries produced are 29.6% for cooking oil; 6.8% for oleo chemical; 2% for soap; and 1.6% for margarine.

Figure 8.

The Derivative Products of CPO



Source: Industrial Ministry of Indonesia (2008)

Table 4.

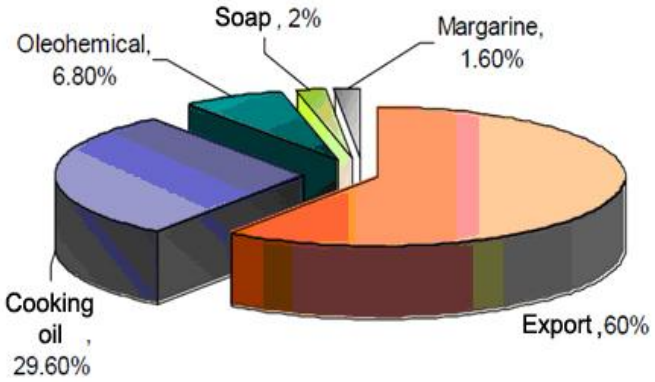
The Value Added of Various Derivative Products of CPO

No.	Product	Value added from CPO (CPO as reference)
1.	Olein & Stearin	20%
2.	Fatty Acids	50%
3.	Ester	150%
4.	Surfactant/ Emulsifier	200%
5.	Soap	300%
6.	Wax	300%
7.	Cosmetic (lotion, cream), talcum powder, shampoo	600%

Source: Industrial Ministry of Indonesia (2009)

Figure 9.

The Consumption of CPO in Indonesia



Source: Capricorn Indonesia Consult Inc. (2009)

For this research, we will discuss the most common oleo chemical products produced in Indonesia which are fatty acid, fatty alcohol, and glycerol. The availability of data and the clearer manufacturing process compared with that of palm oil cooking oil are the limitation and consideration for the products chosen.

2.4. The Export Tax as the Government Policy

Because of the tendency to export can create some problems domestically, the government of Indonesia tries to make it slower. The intervention used by the government has been in form of buffer stock, import subsidy, export tax, and the others. Anyway, the most restriction used is export tax. Ernawati (2007) argues that export tax is the most effective way in affecting the willingness to export CPO.

In Indonesia, the history of regulation over CPO was started in 1978 which continued by several regulations until 1983 in order to maintain the sufficiency of domestic CPO supply by managing export mechanism and the supply chain system. After the domestic supply deemed sufficient, in 1991 the government wiped out the regulation. Later on, in 1994, suddenly the world price of CPO soared and it affected the export behaviour again. Some scholars say that this happened because Indonesia has been a price taker even though as one of the CPO biggest producers in the world.

Furthermore, the increased export activities caused the scarcity of CPO in domestic supply and generated the soar of domestic cooking oil made of palm oil price. Hence, the main concern for the government at the time was how to control the domestic price stability of cooking oil as one of basic needs for the society and as the main derivative product of CPO in domestic market. The intervention used to control it was by imposing export tax in 1994 as much as 10%-12% and started to focus on this policy from this year onward. Moreover, there have been some changes of the magnitude of CPO which were two times in 1997, in 1998, three times in 1999, in 2001, and the latest are in 2007 and 2008.

Meanwhile, along with the remarkable development of CPO production, since 2006 Indonesia has become the biggest producer in the world. Regarding this condition and because the domestic price of cooking oil made of palm oil is more or less already stable, there has been more possibility to develop more the other derivative products of CPO. The idea is the value added will be higher and the industries can absorb more labour. Then, from the main objective of levying CPO export tax view point, the priority already has changed which is to induce the development of varied CPO derivative products including cooking oil made of palm oil which has been already prevalent in domestic derivative CPO industries.

Table 5 below shows the change of export tax magnitude got from Taxes General Directorate (2009). These changes show the attempt of the government to affecting the total export by changing the magnitude of export tax depends on condition at that time. Usually, the tax rate is set by the enactment of law from Minister of Finance of Indonesia based on the price basis of CPO export counted by Trade Ministry of Indonesia. The measurement of CPO export price basis which is based on the average of international price in Rotterdam (international market of CPO) subtracted by the shipment, insurance, and surveyor cost. Figure 10 below shows the mechanism of export tax setting.

Table 5.

The Export Tax (1994-2008)

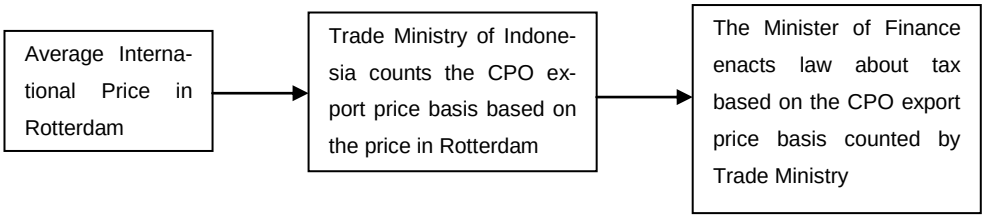
No.	Year	Export Tax (%)
1.	1994	10-12
2.	July 1997	2-5
3.	December 1997	Addition of Export Tax as much as 40-70
4.	July 1998 – February 1999	60
5.	February 1999 – June 1999	40
6.	June 1999 – July 1999	30
7.	July 1999 – September 1999	10
8.	September 1999 – February 2001	5
9.	February 2001 – June 2002	3
10.	June 2002 – October 2005	3
11.	October 2005 – July 2007	1.5
12.	July 2007 – September 2007	6.5
13.	September 2007 – November 2007	7.5
11.	November 2007 – March 2008	10
12.	2008 - now	20

Source: Ministry of Finance of Indonesia (2009)

Based on those changes, this research will examine the effect of export tax on the development and performance of CPO derivative products of Indonesia in term of production. Considering the availability of the data, the derivative products that will be used here are the products of derivative industries which are fatty acid, fatty alcohol, and glycerol as ones of the main derivative products in Indonesia, between 1997 and 2007. Since there are changes of the magnitude of export tax which happens several times in one year, then, the magnitude used is the average in that year. The magnitude of export tax that we used in this research can be seen in Appendix 1.

Figure 10.

The Mechanism of CPO ExportTax Setting in Indonesia



2.5. Conclusion of this Chapter

Because now Indonesia can produce more CPO, has stable cooking oil domestic price, and already becomes the biggest CPO producer all over the world, the possibility to develop CPO derivative products also becomes higher. The government concerns with this issue because more production down-stream products mean more value added, employment, and GDP Indonesia. The idea is only how to hinder the tendency to export by CPO producers. Therefore, the Government of Indonesia uses policy which is export tax so that there will be adequate CPO to produce its derivative products.

Chapter 3
Theoretical Framework

This chapter is written in order to give theoretical framework as an academic basis for this research. We will discuss what the literatures say about the effect of export tax and its arguments for imposing it. Furthermore, we also will discuss some previous researches which relate to the field of this research in order to have guidance for doing it in the proper way from their findings.

3.1. The Effect and the Arguments of Levying Export Tax

3.1.1. The Effect of Export Tax

Focusing on export tax, Piermartini (WTO, 2004) explains the effects of export tax from the viewpoint of welfare effect and income effect distribution. From the point of view of welfare effect, the success of the export tax depends on the ability of countries to influence the price of the world. If the export tax is imposed by a large country in context it has a greater share of the product that is exported, then it will absolutely affect the world price. Otherwise, it cannot happen.

If the export tax in the large country is exist, the domestic price of that country will decrease because the exporters will prefer to sell domestically, the export volume will decrease and automatically the international price will increase. Moreover, the decreased volume and the higher international price will lessen the demand of the commodity from the rest of the world. Meanwhile, the higher international price decreases the demand of the commodity also means the foreign exporters are suffering in case of the elasticity of demand is higher than the elasticity of supply.

Furthermore, Piermartini (WTO, 2004) also explains the effect of the export tax from the point of view of the distribution of income among consumers and producers of taxed commodity, the effects to other commodities, and how income is redistributed across production factors. Firstly, we start from the distribution of income between consumers and producers of taxed com-

modity. In large country that imposes export tax, the domestic price will decline. This means the consumers, in our case the derivative products producers will benefit from the decline of price and the government will also benefit because of the revenue from the tax, while the producers will suffer because of the decrease of domestic price leading the decline of profit. Thus, to sum up, from the point of view of income redistribution in large country which is export, there is income redistribution from the domestic producers to the domestic consumers and the government.

Conversely, this condition happens in importing countries, which are the producers gain from the higher international price, while the consumers suffer because of that. Thus, there is redistribution of income from the consumers to the producers.

Furthermore, for the small exporting countries, there is no effect to the international price because of the levying of the export tax. The domestic price will be decline below the international price while the international price remains unchanged. This means there is redistribution income from domestic producers to consumers while there is no redistribution income in foreign countries which import the commodity.

Secondly, we discuss the distribution of income on other sectors in economy because of the export tax. Because of the export tax, the domestic price will decrease and the domestic demand will increase. This also means the demand for substitute commodity will decrease while the demand for complementary product of the taxed commodity will increase. Moreover, in terms of raw material, the raw material producers will suffer because of the decrease of domestic price, while the processing industry of that commodity will gain profit because of the cheaper raw material.

The last point is the income distribution across production. The effect of the tax depends on the mobility of a sector to another sector. If the specific factors of imposed tax can be easily moved to another sector, it will not be an issue, while it matters for the specific factors in short and long run which are immobile and used intensively in that sector.

3.1.2. The Arguments of Levying Export Tax

Up to now, we have already talked about the effect of export tax. Now, the question is: what are the objectives of the government to impose the tax? Piermartini (WTO, 2004) says there are some backgrounds of government to levy it. These are improving Terms of Trade (TOT), stabilizing domestic prices of commodity, export earnings and income, controlling inflationary pressures, subsidizing infant industries, retaliating to tariff escalation in export markets, easing the challenges of government revenue collection, and reducing poverty. I will explain all of them.

The Terms of Trade argument explains that the export tax will increase the relative price of export compare with import as long as the country that imposes export tax is a large country or has a big share of the products. If the country is not a large country, an alternative way is to collude among them even though it is rather difficult to be applied in some extended period and need specific characteristic which is finite supplies controlled by small number of countries and a relatively low price elasticity of demand such as oil.

The next argument is to stabilize domestic prices of commodity due to the volatility of export earnings. If the export is unstable which means the domestic price and the world price also unstable, then some problems will emerge. Piermartini (WTO, 2004) presents the problems which are: it could disrupt investment planning decision, misallocate resources and adversely affect growth; creating uncertainty of living cost of farmers; making Balance of Payment problems; and negative impact on public finance. To lessen the unstable domestic price, there is a way that government can use which is the using of progressive tax. Progressive tax is a higher magnitude of tax when the export is high and the lower magnitude of tax when the export is low. The objectives of progressive tax are to protect domestic consumers from the higher domestic price, increase the revenue of the government, and to create redistribution income from the exporters.

The third argument is to control inflationary pressures. The further explanation of this argument are: the export tax reduce the domestic price, the low domestic price of raw material will reduce the price of derivative products, and

the export tax will lessen the negative impact of tendency of higher consumption due to the lower international price of some products. However, in the long term, this policy can increase domestic price due to the lack of domestic supply.

The next argument is related to the subsidizing of the infant industry. As we know that the developing countries depends much on the export of raw commodities while raw commodities only give low value added to the GDP of a country. To increase the GDP, the government needs to convince the expansion of export manufacturing or processing products. Meanwhile, the tendency to export will also discourage the development of processing industry because of the high domestic price and lack of domestic supply. By imposing export tax, the export of raw material will decrease and there will be more domestic supply of raw commodities, while the domestic price of raw commodities decrease also. This condition will help the industry which is still new to growth. This is the concern of this study.

The next argument is to retaliate the tariff escalation in export markets. Tariff escalation is a strategy of importing countries to charge higher tariff to processing products than to raw commodities. Because of this strategy, the exporter country can use export tax as a way to retaliate the tariff escalation. Furthermore, there is also argument to ease the challenges of government revenue. The export tax is a kind of tax that rather easy to administer and transparent. However, it is more plausible to use it for developing countries; there is still problem for the sustainable government budget due to the volatility of international price of commodities. In order to reduce this problem, usually government uses a buffer fund. A buffer fund is a kind of export tax stock that is deposited when export prices are high and could be used as subsidy when export prices are low. The last argument is the export tax is used to help the poor. The export tax helps the poor through the returns on the production factors, the relative change in the prices of consumed goods, and the redistribution of the fiscal revenue.

3.2. Previous Researches

Commonly, most of the researches for agro industry related to policies implementation by using simultaneity equation. This type of methodology has been used because of the interrelated impact on several sectors. The application of simultaneous equation also relates to the use of time series analysis. With this type of data, we can make a research for a long range of time that match with the purpose of the impact directly.

In Indonesia, some researches by using that way also already have been done. Drajat (2003) examined the effect of trade liberalization for rubber, cocoa, coffee, and tea industries of Indonesia. The others are Abidin (2000) and Ernawati (1997) who also analyzed the impact of trade liberalization for sugar industry. Furthermore, for CPO industry, research has been done by Zulkifli (2000) who examined the impact of trade liberalization. Also Susila (2004) who examined the CPO industry, concerning the effect of export tax to the growth rate of investment, CPO production, trade, and farm income and welfare distribution. Moreover, Obado et al (2009) assess the impact of export tax using 2SLS (Two Stage Least Squares) method on the mature area, production, export, domestic price, consumption, and domestic stock of CPO also the welfare of consumers.

Generally, the finding of the researches on the CPO is that the export tax is an effective instrument in controlling the domestic price of cooking oil. Nonetheless, without considering the long term profit due to the higher domestic and foreign demand, labour absorption, and value added of more advance downstream industries based on their forecast for the future; the export tax will hurts the CPO raw industries in term of the profit that they will get in the sense of the loss of profit per unit sold of cooking oil.

Susila (2004) found that between 1994 and 1999 export tax had a negative relationship with palm oil plantation/ investment, domestic production, and export. Furthermore, he also found that export tax was very effective in controlling domestic price of CPO as well as the domestic price of cooking oil. For his projection in year 2000-2010, he found that there will be loss or nega-

tive impact for CPO industry in term of the decrease of value added and employment because of the low price.

Similar with the findings of Susila (2004), Obado et al (2009) finds that there is negative relationship between CPO export tax and the palm oil plantation, production, export, domestic price. Moreover, it has positive relationship with domestic consumption and stock or in the other words the export tax increases the welfare of domestic consumer. However, the result also says that the increase of export tax will lead the production of CPO to be decline because of the controlled domestic price and low profit for the producers.

Different with the methodology of those previous researches, even though will be based the same simultaneous mechanism of Indonesia Crude Palm Oil, this research will use panel data analysis in representing the impact of a policy to the performance in different industries other than cooking oil. If previous researches were focusing only on cooking oil, this research will assess the development which is in term of production of more advance products that have more value added from the selling in domestic and foreign market.

Meanwhile, by pooling the data of several industries in a range of time, we will know the impact of policy intervention especially export tax on the production of CPO derivative products. What we are going to do in this research is taking the exogenous variables coming from the reduced form of the simultaneous mechanism of Indonesia CPO used by Susila (2004) to prevent simultaneity bias and is expected to be useful for our research, and putting them in panel data analysis. Furthermore, the ability of panel data analysis to work in shorter range of time also gives benefit for the research due to the availability of data. We will discuss this again in Chapter 5, the methodology for regression-based analysis.

3.3. Conclusion of this Chapter

In the first part of this chapter, we talk about the effect and arguments of imposing export tax. The effects are discussed from the viewpoint of welfare effect and income effect distribution. Moreover, the arguments of levying it are improving Term of Trade (TOT), stabilizing domestic price of commodity,

supporting infant industries, retaliating to tariff escalation in export market, easing the challenges of government revenue collection, and the last is reducing poverty.

The second part of this chapter discusses about the previous researches which relate to the impact of government policy on the performance of agro industries in Indonesia and most of them use simultaneous equation due to the interrelation of the related sectors. Two of them are the researches from Susila (2004) and Obado et al (2009) which examine the effect of CPO export tax on the palm oil plantation, production, export, CPO domestic price, and cooking oil made of palm oil domestic price. Generally, the findings are; it has negative relationship with all of them, which means the higher the export tax leads to the lower mature area, production, export, CPO domestic price, and cooking oil made of palm oil domestic price. Moreover, the finding also shows the positive impact for the consumer welfare because of the controlled domestic price, while it gives negative impact for the producers of CPO and cooking oil especially in the long term. Lastly, I will use Susila's research for my own research and the methodology of this research will be explained more in Chapter 5.

Chapter 4
Descriptive Analysis of the Effect of CPO Export Tax to the Development of CPO Derivative Products in Indonesia

In this part we will analyze descriptively the effect of the CPO export tax on the domestic price, the availability of CPO domestically, and the development of its derivative products by using graphs. The purpose of using the graphs is to give clear illustration and understanding about the impact of CPO export tax on them. Furthermore, the derivative products used are oleo chemical products which are fatty acid, fatty alcohol, and glycerol as mentioned in Chapter 1. The data collection will be explained in the next chapter.

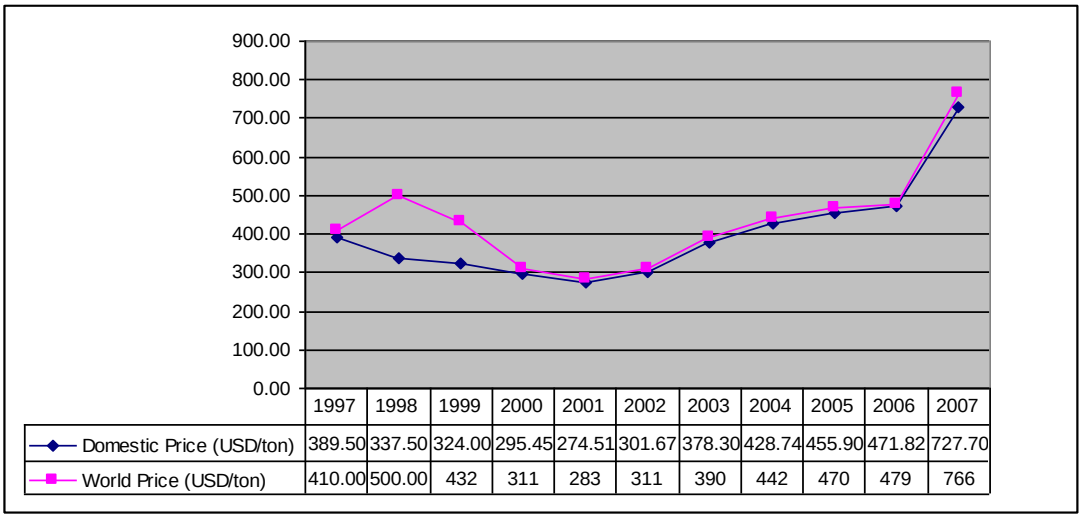
4.1. The Effect on the Domestic price

One of the main objectives in imposing CPO export tax in Indonesia is to keep CPO domestic price stable or at least not very fluctuated due to the fluctuated changes of CPO world price by using deliberate calculation to determine the magnitude of export tax. Usually the fluctuation comes from the decrease or increase of supply from big producers or the decrease or increase of world demand. From Figure 11 below, we can see the movement of world and domestic price from 1997 until 2007. Generally, the government can maintain the domestic price not soar as much as the world price. It might be in 1998 was the very successful story while the Asian crisis happened. At that time Indonesia still can maintain its CPO domestic price decrease while the exchange rate of Indonesia fell down rapidly.

Moreover, after that suffering time, Indonesia still had stable domestic price even though it is keep increasing especially in 2007 when it reached the peak point. However, in general the government of Indonesia is successful in maintaining the domestic price related to the inflation problem and the fluctuation of world price as the constraints particularly until 2000.

Figure 11.

The Movement of Indonesia Domestic Price and World Price of CPO



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic Price (USD/ton)	389.50	337.50	324.00	295.45	274.51	301.67	378.30	428.74	455.90	471.82	727.70
World Price (USD/ton)	410.00	500.00	432	311	283	311	390	442	470	479	766

4.2. The Effect on the Availability of CPO Domestically

Another objective in imposing export tax is to maintain the availability of CPO as input material for its derivative products. This is a crucial aspect for the development of such downstream products. To examine the availability of CPO domestically, it can be based on the willingness of exporting because of the difference of world domestic price and domestic price, which is the subtraction of export tax from world price based on the mechanism in figure 10 explained in Chapter 2. In the other words, after comparing the world price to the price after subtracting tax from it, which is domestic price, we can see the willingness of exporters to export due to the opportunity of getting more margin of profit. The higher margin or profit in doing export leads to lower availability of CPO domestically as the input material for its downstream products.

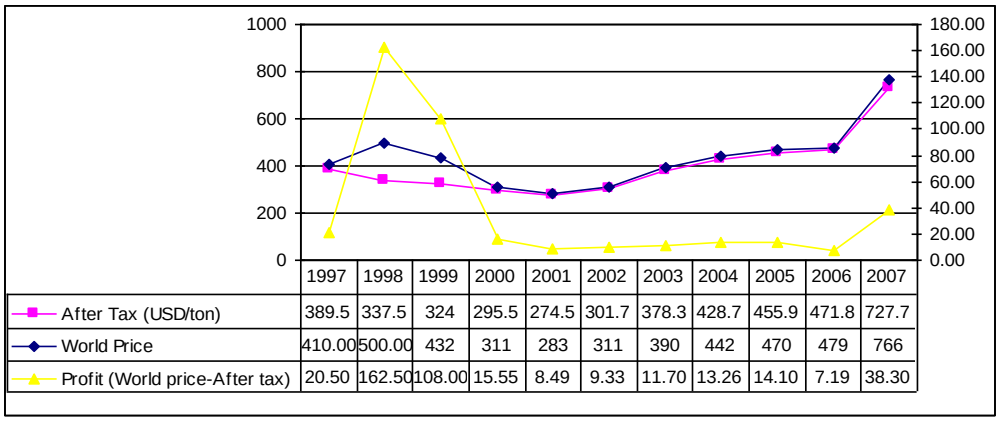
For this purpose, we draw graphs of the world price with domestic price or world price minus taxed, and the profit got from the subtraction of world price with after tax. Figure 12 below shows the movements of world price between 1997 until 2007 and the domestic price after getting taxed.

From the graph, we can see that after getting taxed, generally the profit margin for doing export is quite small. Except in 1998 and 1999, the price comparison is very close which are only around 8-21 USD. If we look at year 2006, when the world price at its peak after 1998, the profit margin that can be

got in doing export is only 7.19 USD because of the export tax. It means doing export is not really interesting anymore because of the margin of profit that is very small. Furthermore, different story happened in 2007, when the world price increased significantly while the export tax seems responded less or it might be the government was late in responding, to hinder the temptation to export. However, generally, there should be no problem in terms of the availability of CPO in Indonesia because of the profit of doing export is not much.

Figure 12.

The Comparison of World Price and the Price Offered After Getting Taxed



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
After Tax (USD/ton)	389.5	337.5	324	295.5	274.5	301.7	378.3	428.7	455.9	471.8	727.7
World Price	410.00	500.00	432	311	283	311	390	442	470	479	766
Profit (World price-After tax)	20.50	162.50	108.00	15.55	8.49	9.33	11.70	13.26	14.10	7.19	38.30

4.3. The Effect on the Production of the Oleo chemical Products

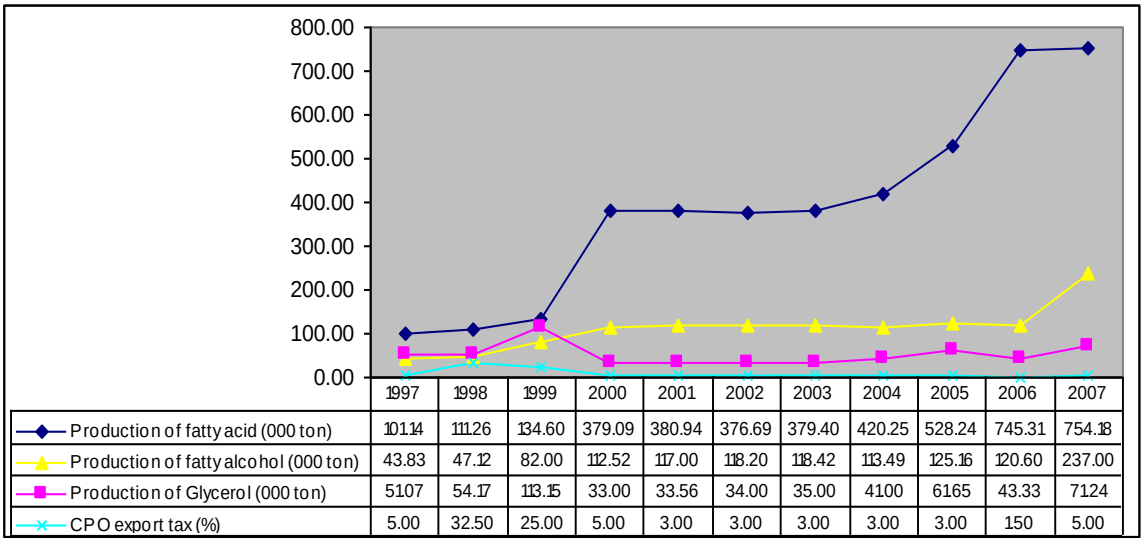
From the analysis of previous subchapter about the availability of CPO domestically, we can expect that there is no problem in producing its derivative products. Another way to examine it is by using graphical representation. The graph below will illustrate it clearly.

From the graph below, with the story of determination of CPO export tax, in overall there is a significant effect of tax policy to the increase of production of those three derivative products especially for fatty acid, even though there are decreases at several years. The stable increasing trend since 1997 is showed by fatty acid, and fatty alcohol as a downstream product of fatty acid. This could be happen because the demand for oleo chemical products in the world is dominated by these two oleo chemical products. From these two oleo

chemical products, various consumed products for people could be produce such as soap, cosmetic, plastic, pharmaceutical and the others.

Figure 13.

The Export Tax and the Production of Fatty Acid, Fatty Alcohol, and Glycerol



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Production of fatty acid (000 ton)	101.14	111.26	134.60	379.09	380.94	376.69	379.40	420.25	528.24	745.31	754.18
Production of fatty alcohol (000 ton)	43.83	47.12	82.00	112.52	117.00	118.20	118.42	113.49	125.16	120.60	237.00
Production of Glycerol (000 ton)	51.07	54.17	113.15	33.00	33.56	34.00	35.00	41.00	61.65	43.33	71.24
CPO export tax (%)	5.00	32.50	25.00	5.00	3.00	3.00	3.00	3.00	3.00	1.50	5.00

Furthermore, the increased production of fatty acid and fatty alcohol in Indonesia also means the increased in CPO derivative products industries especially for oleo chemicals that will be used for other downstream products. From the graph, we can see that the productions of these two have gradually increasing even though there was a decrease in 2002 and 2003 for fatty acid and in 2004 for fatty alcohol.

For glycerol, the graph shows that the production is rather unstable since 1997. After the increase in 1997, 1998, and remarkable increase in 1999, suddenly the production significantly goes down in 2000 which is 51,065; 54,172; 113,150 ton in 1997, 1998, and 1999 respectively, becomes only 33,000 ton in 2000. After that year, the production of glycerol is quite stable and increase except in 2006 that decrease from 61.65 in 2005 becomes 43.33 in 2006.

However, we still can conclude from the graph that it might suggest that in this case there is enough development for the derivative products of CPO as the effect of the export tax imposition. Even though it still needs more improvement and thorough examination, the stable domestic price, the availability of CPO as the input for its downstream products and there is increase in the production of the derivative products are the good evidences that the ex-

port tax imposed for years in this research is an effective way in the development of CPO derivative products in Indonesia.

Compared with the previous researches, there is an agreement that export tax has been controlling the domestic price of CPO especially in order to control the price of domestic cooking oil made of palm oil. Furthermore, the finding of this research also can be used as an argument to the previous researches that the export tax can gain the benefit for its derivative products producers, while the previous researches says that it can give loss for the cooking oil producers. Anyway, there also could be relationship that the producers of cooking oil with move to other derivative products because the market of cooking oil is not profitable anymore means the more development of CPO derivative products.

4.4. Conclusion of this Chapter

From the graphs, we can see that the export tax is successful in controlling domestic price. This finding conforms to the results of previous researches that argue that export tax is an effective way to control domestic price. Moreover, the second graph shows the profitable index of the exporters after getting taxed that is generally very small. This condition discourages export and gives more availability of CPO domestically. The last one is to see the impact of export tax to fatty acid, fatty alcohol, and glycerol. It shows the significant increase for fatty acid, quite stable increase for fatty alcohol, and fluctuation for glycerol. However, although the graphs cannot give strong and clear evidence, we could say that it might be there is improvement for the production of oleo chemical products especially fatty acid which is much used for downstream products.

Chapter 5
Regression-Based Analysis

This chapter discusses the regression-based analysis to see the impact of the export tax. Panel data analysis is used to pool the three oleo chemical products as dependent variables and some independent variables which are taken from the research of Susila (2004) that use time series analysis. Because he uses time series analysis, he can use simultaneous equation in his research. Meanwhile, this research is using Panel data analysis in examine the production of fatty acid, fatty alcohol, and glycerol. Therefore, we only take the exogenous variables of Susila's research to prevent the simultaneity bias due to the interrelated sectors or mechanism. Then, we do regression using Fixed Effect Method as the best method in this case after comparing it with other method. However, the finding cannot conform to the hypothesis due to the insignificant result of export tax variable.

5.1. Data Collection Method

Data that has been used in this research are the secondary data from 1997 to 2007. All of them have been accessed mostly from Ministry of Industrial of Indonesia, FAO (Food and Agricultural Organization), Statistical Bureau of Indonesia, and IFS (International Financial Statistics). The description of data related with CPO and the oleo chemical products can be seen in Appendix 2. Moreover, the data of exchange rate, interest rate, domestic rubber price, and per capita income of Indonesia can be seen Appendix 3.

5.2. Empirical Framework

In order to get the effect of export tax to the production of derivative products of palm oil in Indonesia or CPO, this paper will use panel data. Generally, panel data is the combination of time series data meaning the same object that we observe in some period and the cross section data meaning some objects we observe in one time. Then, in the panel data, we observe some ob-

jects in some periods of time. The benefit of this method is we will know the behaviour of each derivative industry as the effect of export tax. The year that we will use is between 1997-2007 which represents enough for this research because there are some changes in magnitude of taxes in that period.

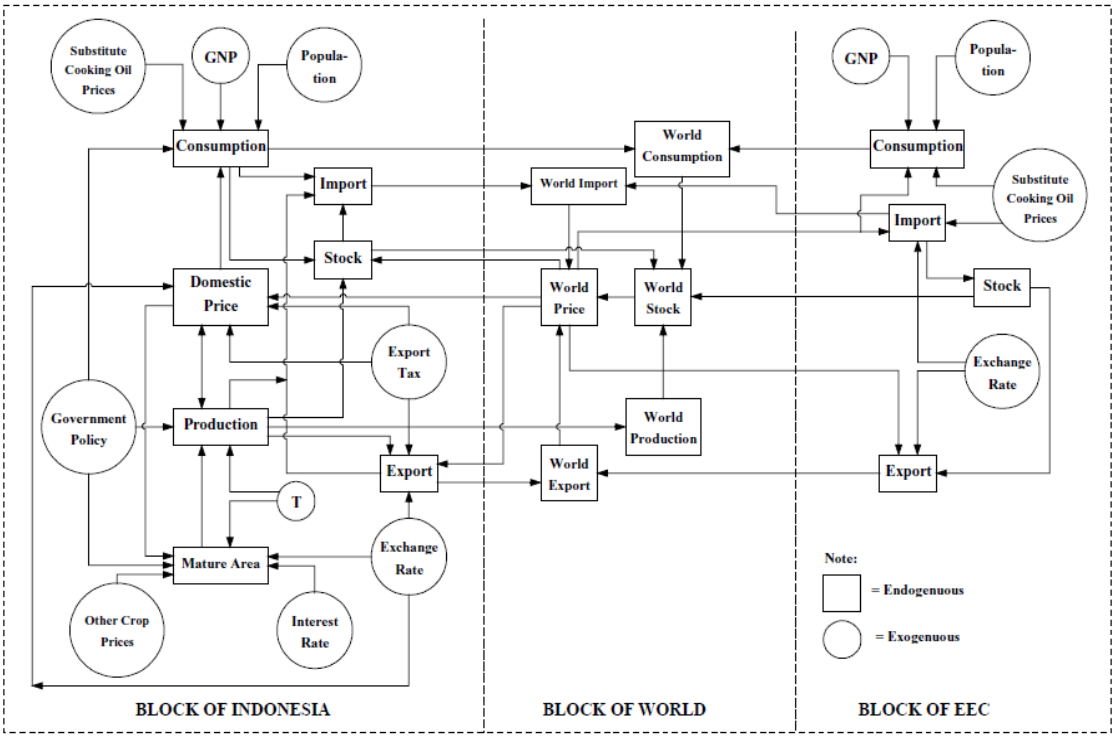
Moreover, I will use the three main oleo chemical products which are fatty acid, fatty alcohol, and glycerol as the object of the research which represent the more advance downstream product compare to cooking oil assessed in the previous researches. I put those three products as the dependent variables, and pool them together with the same independent variables from 1997-2007 as the explanatory variables that affect the dependent variables. As we know panel data analysis has two methods which are Fixed Effect Method and Random Effect method (Gujarati, 1997). In order to get the best method and result, we will compare both of them based on the results and also Ordinary Least Square (OLS).

For the independent variables, I take variables that are exogenous in the research of Susila (2004), which are shown by circle shape in figure 14, as independent variables to prevent the simultaneity bias due to the characteristic of interrelated sectors. Also other variables which are the determinants of the production of CPO derivative products in Indonesia, which are oleo chemical products, are used for the sake of research. The whole mechanism of simultaneous relationship of Crude Palm Oil is shown in figure 14 below.

Based on the mechanism from the figure that has three blocks, the variables that we will use are only variables that are represented by circle shape. From the block of Indonesia, we take export tax, exchange rate, interest rate, other crop price, which is the domestic price of rubber as the alternative crop for the farmers, and per capita income as the composition of GDP and population which is the same way used by Susila (2004). Moreover, also the same way with Susila (2004), we do not use variable substitute cooking oil price in the model even though he put it in the figure of relationship mechanism. Meanwhile, different case with the variable government policy, we do not use it because the variable points out the dummy variable of policy before and after 1991 that is not relevant anymore with this research.

Figure 14.

The General Theoretical Model of Crude Palm Oil (CPO)



Furthermore, the other two blocks used by Susila (2004) are for the purpose of showing the activity of European countries which is not really in the same direction with this research. To simplify the research, we will use the rest of the world demand of CPO as the representation of the two blocks, which shows the need of rest of the world that attracts export. Lastly, we also put the demand of the derivative products as the important determinant of the production of them.

For relationship, export tax is an exogenous mechanism that responds to the change of CPO world price. The higher export tax is supposed to make a higher amount of production of derivative product of palm oil or CPO. Exchange rate is also a factor that determines the tendency to export CPO. The higher the exchange rate or the weaker the domestic currency means the higher tendency to export due to the higher income of the exporters. It then creates the lower production of CPO derivative products. Furthermore, interest rate and other crop price are the factors that influence the willingness of planting

the palm oil. The higher interest rate and other crop price lead the lower production of palm oil, the lower availability of CPO as the input material for its derivative products, and eventually the lower production of the derivative products. Moreover, per capita income relates with the consumption of the domestic CPO which in case of Indonesia it means the higher consumption for cooking oil made of palm oil. Therefore, it makes the production of other derivative products become lower due to the lack of availability of CPO.

Also, the higher the demand or consumption of CPO of the rest of the world leads to the higher attraction for exporters to export more, meaning the lower opportunity for derivative products produced more. Meanwhile, the world demand for the derivative products is affecting the production of the derivative products by the higher the world demand of derivative products leads higher production of the derivative products.

To sum up, we will use and pool three products which are fatty acid, fatty alcohol, and glycerol as dependent variables. Each of them is examined from 1997-2007 and uses the same independent variables. They are CPO export tax in percentage, exchange rate in USD/Rupiah, interest rate in percentage, other crop price which is rubber price in Rupiah/kg, per capita income of Indonesia in thousand Rupiah, rest of the world demand of CPO in thousand ton, and world demand of each derivative product in thousand ton.

After collecting the variables and data, we will do some tests using Ordinary Least Square (OLS), Fixed Effect, and Random Effect Methods to examine the effect of export tax to the production of derivative products which are oleo chemical products. The methods are then compared based on the results, and for Fixed Effect and Random Effect methods, we will use Hausman test as the method commonly used in comparing them (Gujarati, 1997). We will use software Eviews 4 for all regression analysis activities.

For the variables in equation, except export tax and interest rate that are already in percentage, we will use logarithm term to see the relative change of the independent variables and the effect to the dependent variables. Therefore, eventually we get overall equation which has signs for of each equation that represent the relationship. The equation is shown below. The plus signs mean

there is positive relationship and the negative signs mean there is negative relationship and the ln symbol before the variables means they are in log term.

The equation is:

$$\ln DP = \alpha + \underset{(+)}{\beta tax} + \underset{(-)}{\chi \ln XR} + \underset{(-)}{\delta IR} + \underset{(-)}{\phi \ln Rubber} + \underset{(-)}{\varphi \ln Inc} + \underset{(-)}{\gamma \ln ROW} + \underset{(+)}{\eta \ln DPWD} + \varepsilon$$

Which are:

DP = total production of CPO derivative products (ton)

tax = tax over export of CPO (%)

XR = Indonesia Exchange Rate (USD/Rupiah)

IR = Indonesia Interest Rate (%)

Rubber = Domestic Rubber Price (Rupiah/kg)

Inc = per capita income (000 Rupiah)

ROW = CPO demand of the rest of the world (000 ton)

DPWD = World demand of the derivative products (000 ton)

ε = error term

5.3. The Result

As mentioned before, we will do three regression which are OLS (Ordinary Least Square), Fixed Effect Method, and random effect Method. We do regression by using software Eviews 4, and we get the results below:

5.3.1. Ordinary Least Square (OLS)

First of all, we make regression by Ordinary Least Square (OLS). The result is:

Dependent Variable: LNDP?
Method: Pooled Least Squares
Date: 08/22/10 Time: 07:14
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.880881	0.885327	-2.124504	0.0437
TAX?	-1.25E-07	4.76E-07	-0.262898	0.7948
LNXR?	0.002333	0.016072	0.145168	0.8857

IR?	0.000202	7.15E-05	2.829196	0.0091
LNRUBBER?	-0.040529	0.016512	-2.454500	0.0214
LNINC?	-5.89E-05	7.31E-05	-0.805161	0.4283
LNROW?	0.000584	9.81E-05	5.950741	0.0000
LNDPWD?	9.53E-05	4.58E-05	2.078299	0.0481

R-squared	0.982000	Mean dependent var	6.000000
Adjusted R-squared	0.976960	S.D. dependent var	3.211308
S.E. of regression	0.487439	Sum squared resid	5.939921
Log likelihood	-18.53058	F-statistic	194.8439
Durbin-Watson stat	1.419375	Prob(F-statistic)	0.000000

From the result, we get that from all variables, only variable tax, lnXR, and lnInc are statistically not significant which are greater than 0.05. The other variables which are IR, lnRubber, lnROW, and lnDPWD are statistically significant which are lower than 0.05.

Based on the statistics, it shows that our model is good enough though. We get the value of R^2 and adjusted R-squared are quite high. The R-squared we get is 98.20%. This means the independent variables can explain 98.20% variance of derivative products. Moreover, adjusted R^2 which gives indication the closeness of the independent variables to the dependent variables is 97.69% that is also very good. Furthermore, from Durbin-Watson statistic, we get the result 1.42 meaning we cannot conclude whether there is serially autocorrelation or not (Nachrowy, 2006). Serially autocorrelation happens when there is correlation among time series observation (Nachrowy, 2006).

Overall, even though the R^2 is big, the model is not really convincing because three of the independent variables are not significant. For a while, we left it behind and we go on to the other methods as the comparison.

5.3.2. Fixed Effect Method

The result of using Fixed Effect Method is:

Dependent Variable: LNDP?
Method: Pooled Least Squares
Date: 08/23/10 Time: 01:02
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX?	-4.63E-07	9.52E-07	-0.486750	0.6310
LNXR?	0.001623	0.016781	0.096724	0.9238

IR?	0.000204	7.45E-05	2.745484	0.0115
LNRUBBER?	-0.040556	0.017151	-2.364693	0.0269
LNINC?	-5.77E-05	7.60E-05	-0.759593	0.4552
LNROW?	0.000590	0.000103	5.724310	0.0000
LNDPWD?	9.40E-05	4.77E-05	1.969177	0.0611
Fixed Effects				
_FAC--C	-1.776719			
_FAL--C	-1.906258			
_GL--C	-1.940284			
R-squared	0.982135	Mean dependent var		6.000000
Adjusted R-squared	0.975144	S.D. dependent var		3.211308
S.E. of regression	0.506291	Sum squared resid		5.895611
Log likelihood	-18.40703	F-statistic		140.4887
Durbin-Watson stat	1.412348	Prob(F-statistic)		0.000000

Using Fixed Effect Method, we get R^2 and adjusted R^2 which are not much different from those of OLS. They are 98.21% and 97.51% consecutively, while R^2 and adjusted R^2 of OLS are 98.20% and 97.69%. Furthermore, we do not talk about Durbin-Watson statistic because Fixed Effect Method does not put the assumption of free of autocorrelation as its requirement (Nachrowy, 2006). The other statistic that we can use for the comparison is the value of Sum Square residual (SSE). The lower SSE means the less discrepancy between data and the model that we got (Gujarati, 1997). It means the lower the SSE shows the better representation of the model about the data. The comparison of SSE between OLS and FEM, we get the value of SSE of OLS is 5.94 and the value of SSE of FEM is 5.895. This means from this statistic, FEM is better than OLS.

For the significance of independent variables, Fixed Effect Method also is not better than Ordinary Least Square. It is shown from less number of statistically significant variables. If OLS has four statistically significant independent variables, FEM only has three significant independent variables which are IR, lnRubber, and lnROW. Therefore, up to know, based on statistic and the significance of independent variables, we could intent to use OLS because it gives better estimation than FEM.

However, using OLS method in this research is not really reliable. The reason is that because the mechanism of OLS method that pools all three oleo chemical products together becomes one single equation. Unfortunately, the characteristic of those three products are not really similar, and then it is not

realistic at all if we have only one intercept for those three. Therefore, we should consider the Fixed Effect Method again for the sake of this research.

The other explanation of the result of FEM is not good because of the problem of heteroscedasticity. Heteroscedasticity is a problem that happens because of the inconsistent variance of the model (Gujarati, 1997). This problem comes related with the characteristic of panel data which consists of cross section and time series observation that sometimes there exists correlation among the residual (Gujarati, 1997). Hence, to ensure that it is disappear, we make the variance to be constant. Using software Eviews 4, we get the result below:

Dependent Variable: LNDP?
Method: Pooled Least Squares
Date: 08/23/10 Time: 05:45
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX?	-4.63E-07	1.01E-06	-0.460492	0.6495
LNXR?	0.001623	0.012387	0.131038	0.8969
IR?	0.000204	6.34E-05	3.225842	0.0037
LNRUBBER?	-0.040556	0.011283	-3.594408	0.0015
LNINC?	-5.77E-05	7.01E-05	-0.824169	0.4183
LNROW?	0.000590	0.000101	5.853766	0.0000
LNDPWD?	9.40E-05	4.45E-05	2.113705	0.0456
Fixed Effects				
_FAC--C	-1.776719			
_FAL--C	-1.906258			
_GL--C	-1.940284			

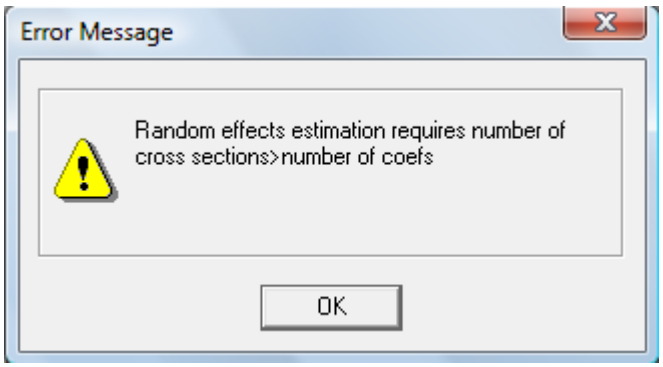
R-squared	0.982135	Mean dependent var	6.000000
Adjusted R-squared	0.975144	S.D. dependent var	3.211308
S.E. of regression	0.506291	Sum squared resid	5.895611
Log likelihood	-18.40703	F-statistic	140.4887
Durbin-Watson stat	1.412348	Prob(F-statistic)	0.000000

After making the variance constant, the result shows that the value of R^2 and adjusted R^2 are now more or less the same with OLS and the sum squared residual is still better than that of OLS. Furthermore, there is a change of the significance of independent variables which variable lnDPWD becomes significant. Then, now we have four independent variables which are IR, lnRubber, lnROW, and lnDPWD. Therefore, because the model we get now is already

better than OLS statistically, we will throw OLS away from our consideration. However, we still need to do the last method which is Random Effect Method because three insignificant variables are not really good for a model and especially the variable tax as the main idea of this research is insignificant. Hence, we do Random Effect Method in following part.

5.3.3. Random Effect Method

Doing regression by Random Effect Method, the software gives message below:



The message says that this method needs the number of dependent variables that are greater than the number of years. This has agreement with the opinion of some scholars about which one is better between Fixed Effect Method and Random Effect Method. In the other words, there is a question when we suppose to use FEM and otherwise, when we suppose to use REM. It said that if the number of years is greater than the number of dependent variables, then we should use Fixed Effect Method. In the other hand, if the number of years is lower than the number of dependent variables, then we should use Random effect Method (Gujarati, 1997).

Therefore, based on the message from the software and the opinion, we cannot perform Random Effect Method for this research. This also means that we do not need to do Hausman test that has purpose of comparing FEM and REM. Then, the conclusion is we will use Fixed Effect Method for this research. In addition, I also tried regression in absolute term in order to choose

the best one for this research. The one that we discuss here is the best one. The other version of regression that I tried is shown in Appendix 4.

5.4. The Interpretation

Up to now, we have models that try to explain the impact of export tax to the development of CPO derivative products especially oleo chemical products which are fatty acid, fatty alcohol, and glycerol. The models are:

a. Equation for fatty acid:

LNDP_FAC = -1.777 - 4.633TAX_FAC + 0.0016LNXR_FAC + 0.0002IR_FAC - 0.041LNRUBBER_FAC - 5.775LNINC_FAC + 0.00059LNROW_FAC + 9.396LNDPWD_FAC

b. Equation for fatty alcohol:

LNDP_FAL = -1.906 - 4.633TAX_FAL + 0.0016LNXR_FAL + 0.0002IR_FAL - 0.041LNRUBBER_FAL - 5.775LNINC_FAL + 0.00059LNROW_FAL + 9.396LNDPWD_FAL

c. Equation for glycerol:

LNDP_GL = -1.94 - 4.633TAX_GL + 0.0016LNXR_GL + 0.0002IR_GL - 0.041LNRUBBER_GL - 5.775*LNINC_GL + 0.00059LNROW_GL + 9.396LNDPWD_GL

From the model we can list the interpretation as below:

- CPO export tax, Indonesia exchange rate, and Indonesia per-capita income cannot explain the change of CPO derivative products in Indonesia in this case fatty acid, fatty alcohol, and glycerol.
- Without the change in the independent variables, the oleo chemicals industries production in Indonesia from 1997-2007 are decreases by 1.777% for fatty acid; 1.906% for fatty alcohol; and 1.94% for glycerol. Furthermore, the product that experience most decrease is glycerol. It is followed by fatty alcohol and fatty acid consecutively.
- If Indonesia interest rate increases by 1%, then the oleo chemical production in Indonesia from 1997-2007 increases by 0.0002% for all of them. However, the sign is different from the sign we expected.

- If domestic rubber price of Indonesia increases by 1%, then each oleo chemical products production will decrease by 0.041%.
- If CPO demands of the rest of the world increases by 1%, each oleo chemical products production will increase by 0.00059%. Furthermore, the same case with the result of variable Indonesia interest rate, the sign we get is different from what we expected.
- If the world demand of the three derivative products increases by 1%, each oleo chemical products production will increase by 9.396%.

5.5. Conclusion for Regression-Based Analysis

What we conclude from the regression-based analysis is Indonesia interest rate; domestic rubber price of Indonesia; the CPO demands of the rest of the world; and the world demand of the derivative products have strong relationship with the production of CPO derivative products which in this case are oleo chemical products: fatty acid, fatty alcohol, and glycerol. The relationship is positive for Indonesia interest rate, the CPO demands of the rest of the world; and the world demand of the derivative products. As we know that the positive relationship means the increase of Indonesia interest rate, the CPO demands of the rest of the world; and the world demand of the derivative products drives the production of the oleo chemical products increase. The opposite case is for the negative relationship which is the increase of domestic rubber price of Indonesia will decrease the production of the oleo chemical products.

The weakness is that even though the R^2 is high enough that represents the good ability of the model to explain the variation of the production, there is no statistically evidence to claim that export tax of CPO, as the centre of the story of this research, affects the production of the three oleo chemical products. It means the conclusion cannot conform to the hypothesis that we made in the beginning. This might happen because we still need more variables or data or somehow unique characteristic of oleo chemical products that is not covered in this model.

Furthermore, the insignificant effect could be also because of the long term period factor or in the other words there is effect at the beginning but the effect is disappear after some periods. Also, we can say that it could be because of the characteristic of linear regression. It is actually significant in the beginning or certain periods but, the line made by regression creates insignificant in average. The other explanation could be the issue of simultaneity bias come from simultaneous mechanism of the sectors.

Lastly, comparing with the previous researches, there is no direct evidence from this type of analysis of this research that the export tax will affect and benefit the derivative productions and their development. Therefore, more scrutinized research will be needed to get a model that is better in explaining the impact of policy to this sector in Indonesia whether the export tax or other policies.

Chapter 6
Conclusion

The whole story in this paper is about an examination of policy to the agro industry related with the attempt to develop its downstream industries. The agro industry discussed is Crude Palm Oil (CPO), and some oleo chemical products which are fatty acid, fatty alcohol, and glycerol as the representative of the downstream or derivative products of CPO. CPO is an important commodity in Indonesia shown by the recent condition that Indonesia is the number one biggest producer and the second biggest of exporters in the world.

The more and more increase of CPO export has two implications. The first implication is the increase export will also increase the enthusiasm of this sector for exporting that leads to more income and employment for everybody involved including the farmers of palm oil. The other implication is the increase tendency of export will create some problems which are the lack of availability of the material that later creates higher domestic demand, and also causes the downstream industries related with CPO will develop slower. This is a typical problem of developing countries that relies its economy on export primary goods that only gives low value added, income, and employment compare with those in more advance products. To brake this tendency and the responsibility to develop the downstream industries that will give more benefit for economy of Indonesia, the government of Indonesia has designed some policies and the main policy used for this commodity is export tax.

This paper discusses the impact of the policy in two ways which are descriptive and regression-based analyses. From the descriptive analysis using graphs, we get that the export tax policy has a significant impact in affecting the stability of domestic price, the enough domestic availability of CPO as intermediate input for its downstream industries; however, it is not really strong enough to say that it affects the production of derivative products represented by fatty acid, fatty alcohol, and glycerol. However, we can still conclude from this kind of analysis that the finding can counter the finding of previous re-

searches that argues that the export tax gives loss or negative impact to the derivative producers in long term. Another explanation is that it might be the loss of cooking oil producers convince them to move to other derivative products of CPO that means the mode development of CPO derivative products.

From regression-based analysis, we use Fixed Effect Method of Panel Data Model for the production of those oleo chemical products. The independent variables used to explain the overall story of policy and the impact are CPO export tax, Indonesia exchange rate, Indonesia interest rate, domestic rubber price, Indonesia per capita income, CPO demand of the rest of the world, and the world demand of the derivative products. The model is not really good in explaining the relationship of the independent variables and the productions of derivative products which are from seven independent variables, only four of them are statistically significant. Also, the variable CPO export tax itself as the centre of the story is not significant in this model. Therefore this research cannot give a counter to the previous researches that the export tax will develop the derivative products of CPO. More deliberate researches will be needed in order to prove the impact of the policy in Indonesia, whether it is export tax or other policies, on a commodity to the development of its downstream products in a good and more reasonable model.

Appendices

Appendix 1

The export tax used in this model after adjusted averagely for certain year (1997-2007)

Year	CPO Export Tax (%)
1997	5.00
1998	32.50
1999	25.00
2000	5.00
2001	3.00
2002	3.00
2003	3.00
2004	3.00
2005	3.00
2006	1.50
2007	5.00

Appendix 2

Data of the production of the derivative products, their world demand, and the CPO demand of the rest of the world.

year	Production of fatty acid (ton)	Production of fatty alcohol (ton)	Production of glycerol (ton)	World Demand of fatty acid (000 ton)	World Demand of fatty alcohol (000 ton)	World Demand of Glycerol (000 ton)	CPO Demand of the rest of the world (000 ton)
1997	101141.00	43826.00	31537.16	2340.74	1437.81	542.54	16000.00
1998	111255.00	47116.00	32017.43	2544.28	1489.96	561.05	15200.00
1999	134600.00	82000.00	32505.00	2765.52	1544.00	580.20	17000.00
2000	379085.00	112517.00	33000.00	3006.00	1600.00	600.00	19000.00
2001	380939.00	117000.00	33560.00	3081.15	1656.00	620.00	20200.00
2002	376685.00	118200.00	34000.00	3158.18	1713.96	640.67	22000.00
2003	379400.00	118420.00	35000.00	3237.13	1773.95	662.02	24800.00
2004	420250.00	113490.00	41000.00	3318.06	1836.04	684.09	26700.00
2005	528241.00	125158.00	61648.00	3600.00	1900.30	706.89	30400.00
2006	745307.00	120600.00	43328.00	3888.00	1966.81	730.46	26000.00
2007	754180.00	237000.00	49827.20	4199.04	2124.16	754.57	34900.00

Source:

FAO (2008), MPOB (2007), bappebti.go.id (2009), and Industrial Ministry of Indonesia (2008)

Appendix 3

Data of Indonesia exchange rate and interest rate, domestic rubber price, and per capita income of Indonesia.

year	XR (USD/ Rp.)	Interest rate (%)	Rubber Price (Rp/kg)	Per capita Income (000 rupiah)
1997	4650.00	20.00	6469.00	3090.27
1998	8025.00	38.44	11498.00	4640.25
1999	7100.00	12.51	10039.00	5266.15
2000	9595.00	14.53	10997.00	6565.12
2001	10435.00	17.62	8068.00	7672.29
2002	8940.00	12.93	8354.00	8377.39
2003	8465.00	8.31	9720.00	9138.09
2004	8990.00	7.43	13357.00	10284.59
2005	9751.00	12.75	14299.00	12272.32
2006	9141.00	9.75	16443.85	14591.80
2007	9141.00	8.00	18910.43	17085.01

Source:
Statistical Bureau of Indonesia (2008) and IFS (International Financial Statistics) (2008)

Appendix 4

Using OLS

Dependent Variable: DP?
Method: Pooled Least Squares
Date: 08/24/10 Time: 10:54
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.880881	0.885327	-2.124504	0.0437
TAX?	-1.25E-07	4.76E-07	-0.262898	0.7948
XR?	0.002333	0.016072	0.145168	0.8857
IR?	0.000202	7.15E-05	2.829196	0.0091
RUBBER?	-0.040529	0.016512	-2.454500	0.0214
INC?	-5.89E-05	7.31E-05	-0.805161	0.4283
ROW?	0.000584	9.81E-05	5.950741	0.0000
DPWD?	9.53E-05	4.58E-05	2.078299	0.0481

R-squared	0.982000	Mean dependent var	6.000000
Adjusted R-squared	0.976960	S.D. dependent var	3.211308
S.E. of regression	0.487439	Sum squared resid	5.939921
Log likelihood	-18.53058	F-statistic	194.8439
Durbin-Watson stat	1.419375	Prob(F-statistic)	0.000000

Using FEM

Dependent Variable: DP?
Method: Pooled Least Squares
Date: 08/24/10 Time: 10:59
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX?	-4.63E-07	9.52E-07	-0.486750	0.6310
XR?	0.001623	0.016781	0.096724	0.9238
IR?	0.000204	7.45E-05	2.745484	0.0115
RUBBER?	-0.040556	0.017151	-2.364693	0.0269
INC?	-5.77E-05	7.60E-05	-0.759593	0.4552
ROW?	0.000590	0.000103	5.724310	0.0000
DPWD?	9.40E-05	4.77E-05	1.969177	0.0611
Fixed Effects				
_FAC--C	-1.776719			
_FAL--C	-1.906258			
_GL--C	-1.940284			

R-squared	0.982135	Mean dependent var	6.000000
Adjusted R-squared	0.975144	S.D. dependent var	3.211308
S.E. of regression	0.506291	Sum squared resid	5.895611
Log likelihood	-18.40703	F-statistic	140.4887
Durbin-Watson stat	1.412348	Prob(F-statistic)	0.000000

Using FEM after making the variance constant

Dependent Variable: DP?
Method: Pooled Least Squares
Date: 08/24/10 Time: 11:00
Sample: 1997 2007
Included observations: 11
Number of cross-sections used: 3
Total panel (balanced) observations: 33
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX?	-4.63E-07	1.01E-06	-0.460492	0.6495
XR?	0.001623	0.012387	0.131038	0.8969
IR?	0.000204	6.34E-05	3.225842	0.0037
RUBBER?	-0.040556	0.011283	-3.594408	0.0015
INC?	-5.77E-05	7.01E-05	-0.824169	0.4183
ROW?	0.000590	0.000101	5.853766	0.0000
DPWD?	9.40E-05	4.45E-05	2.113705	0.0456
Fixed Effects				
_FAC--C	-1.776719			
_FAL--C	-1.906258			
_GL--C	-1.940284			

R-squared	0.982135	Mean dependent var	6.000000
Adjusted R-squared	0.975144	S.D. dependent var	3.211308
S.E. of regression	0.506291	Sum squared resid	5.895611
Log likelihood	-18.40703	F-statistic	140.4887

Durbin-Watson stat	1.412348	Prob(F-statistic)	0.000000

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