DETERMINANT FACTORS OF INDONESIA'S COCOA BEAN EXPORTS TO THE UNITED STATES OF AMERICA

THESIS

SUSI LESTARI
0706180615

UNIVERSITY OF INDONESIA
FACULTY OF ECONOMICS
MASTER OF PLANNING AND PUBLIC POLICY
DEPOK
JANUARY 2009

DETERMINANT FACTORS OF INDONESIA'S COCOA BEAN EXPORTS TO THE UNITED STATES OF AMERICA

THESIS

Submitted in partial fulfillment of the requirements
For the degree of Master of Economics

SUSI LESTARI
0706180615

UNIVERSITY OF INDONESIA
FACULTY OF ECONOMICS
MASTER OF PLANNING AND PUBLIC POLICY
DEPOK
JANUARY 2009

STATEMENT OF AUTHORSHIP

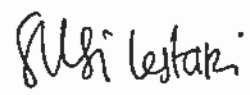
"I certify that the attached material is my original work. I declare that no other person's work has been used without due acknowledgement".

Except where I have clearly stated that I have used some of this material elsewhere, it has not been presented by me for examination in any other course or unit at this or any other institution.

I understand that the work submitted may be reproduced and/or communicated by the University or third party authorized by the University for the purpose of detecting plagiarism.

Name	: Susi Lestari
Student Register Number	: 0706180615
Document	: Thesis
Title of Thesis	: Determinant Factors of Indonesia's Cocoa Bean Exports to the United States of America
Date	: January 2009
Advisor/Supervisor	: Dr. Widyono Soetjipto

Depok, January 2009



Susi Lestari

PAGE OF ENDORSEMENT

This thesis is proposed by

Name	: Susi Lestari
Student Register Number	: 0706180615
Program	: Master of Planning and Public Policy
Title of Thesis	: Determinant Factors of Indonesia's Cocoa Bean Exports to the United States of America

It has been defended to board of examiners and submitted in partial fulfillment of the requirements for the degree of Master of Economics in Master of Planning and Public Policy, Faculty of Economy, University of Indonesia.

BOARD OF EXAMINERS

Supervisor : Dr. Widyono Soetjipto (.....)

Examiner : Dr. Andi Fahmi Lubis (.....)

Examiner : Prof. Dr. Lepi T. Tarmidi (.....)

Stipulated in : .....

Date : .....

ACKNOWLEDGEMENT

Alhamdulillahirabbil'alamin, I praise thank heavens to Allah SWT, because only by the permission of Allah, finally I could complete this research that be entitled of: "Determinant Factors of Indonesia's Cocoa Bean Exports to the United States of America". This research is a partial fulfillment of the requirements for for Master Degree at Master of Planning and Public Policy, Faculty of Economics, University of Indonesia. Furthermore, it is pleasure to thank to peoples who made this research possible.

1. Mr. Widyono Soetjipto, my supervisor who has assisting me with his patience in finished this thesis. Without his guidance this thesis would not have been possible to finish. Thank also to Mrs. Sri, LPEM Secretary for the helpful.
2. All Faculty Members of Master Program in Planning and Public Policy, Faculty of Economics, University of Indonesia (MPKP-FE UI). Mr. B. Raksaka Mahi and Mrs. Hera Susanti, the Head and the Secretary of the Program of Master of Planning and Public Policy, Mr. Andi Fahmi, Mr Lepi, Mr. Mahyus, Mr Iman Rozani, Mbak Ira, Mbak Siti, Mas Asep and all other staffs. Thank you for the great support during my study in MPKP.
3. Mr. Roger Freeman and all of ITAP-USAID staffs, who gave me an opportunity to get the master degree.
4. Mr. Karyanto Suprih, and all officials and staff at Finance Bureau, Ministry of Trade, for all the supports. Thanks to Mr. Firman and Mr. Yudi from TREDA for the time to help me to college the data.
5. All of my friends, Suci, Ida, Dea, Irma, Lintang, Hani, Ali, Bambang, Ayu, Erick, Ernest, Friska, Afifah, Krisna, Mario, Musokib, Ina, Gina, Tion, Jonathan, Taufik and Willy, thank for being great partners during I studied at MPKP-ITP class.
6. To my parents and parents in law "thanks to always praying for me, give me an inspiration and spirit to finish my study", thanks to my sister, brothers, and all my family for the support. I would thanks to my lovely husband Annang

who always support me with all his love; because of you I have enthusiasm to take my master degree. I dedicate this thesis for you….

Finally, I realize this thesis remains far away from perfect. Therefore, the constructive suggestions are welcome.

Depok, January 2009

Susi Lestari

STATEMENT OF ASSERTION

As civitas academia of University of Indonesia, I who signed on below:

Name	: Susi Lestari
Student Register Number	: 0706180615
Study of Program	: Master of Planning and Public Policy
Department	: Economics
Faculty	: Economics
Kind of Opus	: Thesis

For development in science, I agree to give to University of Indonesia a Non-Exclusive Royalty – Free Right on my thesis in title:

"Determinant Factors of Indonesia's Cocoa Bean Exports to the United States of America."

along with the available of sets of equipment (if needed). By a Non-Exclusive Royalty – Free Right, University of Indonesia has right to save, formatted, manage in database, maintain and publicized my thesis without ask the license from me as along as write down my name as writer/inventor and as owner of copyright.

Thus this statement I made truly.

Made in: Depok

Date: January 2009

Susi Lestari

Susi Lestari

ABSTRACT

Name : Susi Lestari
Study Program : Master of Planning and Public Policy
Title : Determinant Factors of Indonesia's Cocoa Bean Exports to the United States of America

Cocoa is a commodity which plays a very important role in Indonesian economy. The successful cocoa area expansion and product increase in two decades have improved Indonesian cocoa market share in the world. The objective of this thesis is to analyze determinant factors which influence Indonesia's cocoa beans export to the United States of America in the period of 1976-2006. This thesis uses simultaneous equation model which consists of two equations, they are supply and demand for export of Indonesia's cocoa beans. The result of simultaneous equation model estimation in general has the magnitude and coefficient which are suitable with economic theory and previous research. The result of the supply of export for Indonesia's cocoa beans model estimation shows that two explanatory variables that are cocoa beans production and cocoa beans export on lagged one year are statistically significant at 5 per cent level of confidence. On the other hand two variables are not significant based on statistical criteria; they are relative price of export price with domestic price and dummy automatic detention. The result of the demand for export estimation for Indonesia's cocoa beans model shows that two explanatory variables namely Gross Domestic Product of USA and export price of cocoa beans on one year lag are statistically significant at 5 per cent level of confidence. On the contrary two variables are not significant based on statistical criteria; they are relative price of Indonesia's export price with Ivory Coast's export price and export volume of Ivory Coast to USA.

Keywords: cocoa, simultaneous equation, supply and demand for export

ABSTRAKSI

Nama : Susi Lestari
Program Studi : Magister Perencanaan dan Kebijakan Publik
Judul : Faktor-faktor Yang Mempengaruhi Ekspor Biji Kakao Indonesia ke Amerika Serikat

Kakao adalah komoditi yang sangat penting bagi perekonomian Indonesia. Kesuksesan perluasan area kebun kakao dan peningkatan produk dalam dua decade telah meningkatkan pangsa pasar Indonesia di dunia. Tujuan tesis ini adalah untuk menganalisa faktor-faktor yang mempngaruhi ekspor biji kakao Indonesia ke Amerika Serikat dalam periode 1976-2006. Tesis ini mengunakan model persamaan simultan yang terdiri dari dua persamaan, yaitu penawaran dan permintaan ekspor biji kakao Indonesia. Hasil estimasi model persamaan simultan secara umum mempunyai tanda dan koefisien yang sesuai dengan teori ekonomi dan penelitian terdahulu. Hasil estimasi model penawaran ekspor biji kakao Indonesia menunjukkan bahwa dua variable penjelas yaitu produksi biji kakao dan ekspor biji kakao tahun sebelumnya secara statistik signifikan pada 5 persen tingkat keyakinan. Disisi lain dua variable tidak signifikan berdasarkan kriteria statistik yaitu harga relative dari harga ekspor dengan harga domestic dan dummy penahanan otomatis. Hasil estimasi model permintaan ekspor biji kakao Indonesia menunjukkan bahwa dua variabel penjelas yaitu Produk Domestic Bruto Amerika Serikat dan harga ekspor tahun sebelumnya signifikan pada level 5 percen. Di lain pihak dua variabel tidak signifikan berdasarkan criteria statistic, yaitu harga relative dari harga ekspor biji kakao Indonesia dengan harga ekspor Pantai Gading serta variabel volume ekspor Pantai Gading ke Amerika Serikat.

Kata Kunci: kakao, persamaan simultan, penawaran dan permintaan ekspor

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

LIST OF ANNEXES

CHAPTER I
INTRODUCTION

1.1. Background

In Indonesia economy, plantation has an important role because it can absorb numbers of labor force, generate foreign earnings, environmentally friendly, and provide multiplier effect.

Cocoa is one of agriculture plantation commodity in Indonesia. Furthermore cocoa is one of the 10 main export commodities that become the concern of Ministry of Trade to be developed. Based on Trade Research Development Agency of the Ministry of Trade (2007), cocoa plantation has provided job and income for more than 400,000 people. Cocoa is also relatively fast growing industry, as indicated by a 7.9% annual growth rate on production in the last decade. Cocoa also gives contribution to the foreign earning as the three biggest export revenue in the plantation sector after CPO and Rubber. With the production of around 450.000 tons per year, Indonesia is the third biggest cocoa bean producer in the world after Ivory Coast and Ghana. In 2006 it is estimated that Indonesia has market share around 13.6% from total production of cocoa bean in the world.

Plantation of cocoa in Indonesia experiences fast development in last 20 years. Based on Directorate General Estate Crop at the Ministry of Agriculture (2007), in 2006 area plantation of Indonesia cocoa is 1.32 million hectares and 92.34% of the plantation area is smallholder owned with the area average growth 7,4% per year. Cocoa is planted almost in of all Indonesia, with main area of production in South Sulawesi, South-east Sulawesi, Middle Sulawesi, North Sumatra, East Nusa Tenggara, East Java, East Kalimantan, North Maluku and Papua.

Growth of world production of cocoa bean is averaging at 5.8% per year. Whereas consumption grows 4.8% with an increasing trend. By the end of 2011, ICCO (International Cocoa Organization) estimates that the production of world cocoa will reach 4.05 million tons, whereas consumption

will reach 4.1 million tons. So, there will be consumption deficit around 50 thousand tons per year. It is estimated that the deficit would continuously take place in years hereinafter. Then, it is a good opportunity for Indonesia to increase export.

Indonesia cocoa bean has special feature, i.e. it is not easy to melt so it is suitable if used for blending. In line with the feature, Indonesian cocoa market opportunity is open both for export and also domestic consumption.

Based on Trade Research Development Agency at the Ministry of Trade, in 2007 Indonesia cocoa bean face some problems. The first problems is that most of the cocoa produced in Indonesia is bulk cocoa, not fine (*edel*) cocoa that has a better taste and aroma, such as produced by Ivory coast. Secondly, productivity of cocoa cultivated by smallholder is fluctuating around 628-822 kg/ha/year, which is.very low compared to its potential productivity of 1500 kg. Lastly, most cocoa produced by smallholders is unfermented indicating a low level of processing stage and quality. This causes the low price of cocoa bean at farm level and in the international market. This low quality also causes United States market imposing automatic detention and discriminative price on Indonesian cocoa bean. The discriminative price harms Indonesian cocoa bean because it can lessen foreign earning obtained.

Most of Indonesian cocoa produced is exported and only small part is consumed domestically. Product exported mostly (78.5%) is in the form of primary product and only small part (21.5%) is in the form of processing result. Indonesian cocoa bean export till now is destined to various states. Malaysia, United States, Singapore, Brazil, and Thailand are noted as main importer countries of Indonesian cocoa bean export. In the 1990s, United States is the main market for Indonesian cocoa bean exported. However starting last years, most of Indonesian cocoa bean is exported to Malaysia.

The decreasing export volume of Indonesia's cocoa bean to United States of America (USA) needs serious attention, because USA pertained as the second biggest consumer country in the world, after Holland. It is suspected that lowering volume exports to USA is caused by domination of

Ivory Coast cocoa bean market share that becomes even greater. In order to find out factors which affecting Indonesia's cocoa bean exported to USA, hence a study to analyze the determinant factors of Indonesian cocoa bean exports to the United States of America should be conducted.

1.2. Research Problems

Based on the data from Central Bureau of Statistics (BPS) from 2000-2001, volume of Indonesia's cocoa bean exports to USA tended to decrease. In 2000 the volume of export is 134,107.4 ton and continued to drop until 60,850.7 ton in 2003. After 2003, the volume of export increased until 107,630.5 ton in 2005. Although volume of export of Indonesia's cocoa bean had increased, it is still under the volume of export in 2000.

The decreasing volume of export of Indonesia's cocoa bean to USA produce some concerns, because USA is a big market for cocoa bean, i.e. as the second biggest importer country for world cocoa bean in the world. Moreover, Indonesia's cocoa bean faces some problems when entering USA market. Automatic detention and also discriminative price are imposed by USA to Cocoa bean from Indonesia.

1.3. Research Objectives

Based on the background and the problem statement, the objective of this thesis is trying to analyze determinant factors which influence Indonesia's cocoa bean exports to United States of America in the period of 1976-2006. This thesis will analyze determinant factors of Indonesia's cocoa bean exports from supply and demand side.

From the supply side analysis, the variables observed in the model are production, the relative price (export price of cocoa bean with domestic price), the volume of cocoa bean export on one year lag and also the imposition of automatic detention. From demand side, the variables included in the model are relative price (Indonesia's cocoa bean export price with Ivory Coast's cocoa bean export price), GDP of USA, the price of Indonesia's cocoa bean

export on one year lag, and also export volume of Ivory Coast cocoa bean to USA.

Based on the result of analysis, the policy recommendations for increasing Indonesia cocoa bean export to USA are proposed.

1.4. Research Coverage

To avoid broad of discussion and deviation from the purposes, the research coverage is limited to HS 180100 Cocoa bean, i.e. whole or broken, raw or roasted. This research only analyzes HS 180100 because volume export of cocoa bean is biggest than others cocoa product. Furthermore Indonesia has the opportunity to increase production of cocoa bean due to the large untapped potential farms.

The research is limited to the USA, because recently the volume of export to USA is decreasing. Whereas USA is a big market and places as the second biggest importer country of cocoa bean in the world. The determinant factors which will be analyze include Cocoa Bean Production, Relative Price (Price Export/Domestic Price), Cocoa Bean Export on One Year Lag, Dummy Automatic Detention, Relative price (Indonesia's Export Price /Ivory Coast Export Price), GDP real of USA, Price Export on One Year Lag, and Ivory Coast Cocoa Bean Export Volume to USA.

The data used in this research is time series data for years of observation from 1976-2006. This period is chosen because Automatic Detention is starting to be imposed in 1992. So with the chosen length of the period of time, the impact of Automatic Detention to Indonesia's cocoa bean export volume to USA can hopefully be captured.

1.5. Research Methodology

1.5.1. Source of Data

This thesis is using secondary data from some resources such as Central Bureau of Statistics (BPS), International Cocoa Organization (ICCO), Indonesian Cocoa Association (Asosiasi Kakao Indonesia,

Askindo), FAO Statistics, International Financial Statistics, UN-Comtrade, some government institution such as Ministry of Trade, Ministry of Industry, and Ministry of Agriculture, and also other sources which is related with the topic. The data is time series for years of observation from 1976 until 2006. The data uses Harmony System (HS) six digit (HS 180100) that is Cocoa bean, whole or broken, raw or roasted. The data which are collected in this research are:

1. Export volume of Indonesia's cocoa bean to USA
2. Indonesia's cocoa bean production
3. Export price of Indonesia's cocoa bean (value of export/volume of export)
4. Domestic price of Indonesia's cocoa bean
5. Ivory Coast export price of cocoa bean to USA
6. Real Gross Domestic Product of USA
7. The Ivory Coast cocoa bean export volume to USA

1.5.2. Analysis

This thesis is using econometric approach with the simultaneous equation model which consists of two equations (demand and supply of export). In econometric model, simultaneous equation is used when there is a complexity relationship and variables are related to each other. The estimation procedure to predict the econometric models in this thesis is by using Eviews 4.1 program. Due to the limitation in the quantification of various factors for some qualitative variables affecting cocoa beans, such us social conflict and the environmental issues of the cocoa commodity, the econometric models developed need qualitative assessment also

CHAPTER II
BARRIERS TO TRADE AND DETERMINANT OF DEMAND AND SUPPLY

2.1. Barriers to Trade

Based on theory, free trade maximizes world output and also benefits all nations. However, some countries impose restrictions to limit international trade. They impose restrictions in order to protect domestic industry. Barrier to trade is commonly divided into two types, they are tariff and non tariff barriers.

Based on Salvatore (2007) tariff is a tax or duty levied on the traded commodity as it crosses a national boundary. Tariffs are the oldest form of trade policy and have traditionally been used as a source of government income. Tariff can be ad valorem, specific, or compound. The ad valorem tariff is levied as a fixed percentage of the value of the traded commodity. The specific tariff is levied as a fixed sum per physical unit of the traded commodity. A compound tariff is a combination of ad valorem and specific tariff. Even though tariff is source of government income, the imposition of tariff leads to inefficiencies due to deadweight loss in economy.

Since tariff is not an effective instrument of trade protection anymore, countries is refer to other measures known as non tariff barrier. During the past two decades, these non tariff barriers (NTBs), or the new protectionism, have become more important than tariffs as obstructions to the flow of international trade and represent a major threat to the world trading system (Salvatore, 2007 p.291). Non tariff barrier which is used by government in order to interfere in trade takes forms like Quotas, Voluntary Export Restraints, Local Content Requirement, technical barriers in industry standard, health and safety requirement, and other trade policy instrument (export credit subsidies, national procurement, and administrative red-tape).

Based on Salvatore (2007), a quota is the most important non tariff trade barrier. It is a direct quantitative restriction on the amount of a

commodity allowed to be imported or exported. Import quota can be used to protect a domestic industry, to protect domestic agriculture, and/or for balance of payment reason.

There are several differences of import quota and import tariff. The first difference is with a given import quota, an increase in demand will result in a higher domestic price and greater domestic production than with an equivalent import tariff. Secondly, the quota involves the distribution of import licenses. If the government does not auction of these licenses in a competitive market, firms that receive them will reap monopoly profits. In that case, government must decide the basis for distributing licences among potential importers of the commodity. Finally, an import quota limits imports to the specified level with certainty, while the trade effect of an import tariff may be uncertain.

Voluntary Export Restraints (VERs) is the case where an importing country induced another nation to reduce its exports of a commodity "voluntarily", under the threat of higher all round trade restrictions, when these exports threaten an entire domestic industry. VERs were less effective in limiting imports than import quotas because the exporting nations agree only reluctantly to curb their export.

A local content requirement is a regulation that requires that some specified fraction of a final good be produced domestically (Krugman & Obstfeld, 2006 p. 193). From the domestic producer point of view, a local content requirement provides protection in the same way an import quota does. But from the point of view of firms that must buy locally, the effect is different. Local content does not place a strict limit on imports. It allows firms to import more, provided that they also buy more domestically.

The other non tariff barrier is technical barriers in industry standard. Countries have industrial standards, however, are developed countries that have in general higher industrial standards and this standard might obstruct imports from developing countries. The same condition happens with other non tariff barrier that is health and safety requirement. It is the supreme right of every country to have health standards to protect their citizen. Again, quite

often the standards set by developed countries are very high so that they cannot be fulfilled by most developing countries.

Lastly, other trade policy instrument to influence trade is export credit subsidies. This is like an export subsidy except that is takes the form of a subsidized loan to the buyer. Secondly is national procurement. Purchases by the government or strongly regulated firms can be directed toward domestically produced goods even when these goods are more expensive than imports. Lastly is red-tape barrier. Sometimes a government wants to restrict imports without doing so formally. Fortunately or unfortunately, it is easy to twist normal health, safety, and customs procedures so as to place substantial obstacles in the way of trade (Krugman & Obstfeld, 2006 p. 194)

2.2. Determinant of Demand and Supply

Supply is amounts of goods and services which are offered on the market in each price level. Demand is amounts of goods and services which is asked in each price level. Supply and demand will come into equilibrium to determine both the market price of a good and the total quantity produced. What the price and quantity will be depends on the particular characteristics of supply and demand. The variation of price and quantity over time depends on the ways in which supply and demand respond to other economic variables. The supply and demand model helps to understand why and how price and quantity changes. The supply demand model combines two main concepts that are a supply curve and a demand curve.

There are many factors that can determine demand of good. The factors are:

1. Its own price. If the price of good lower the demand for that good will increase. It is because a lower price may encourage consumers who have already been buying the good to consume larger quantities. It brings us to the law of demand, which is expressing if the price of its good rising, *ceteris paribus*, hence the demand for goods will decrease and vice versa.

2. The price of substitute and complementary goods. Goods are substitutes when an increase in the price of one leads to an increase in the quantity demanded of the other. If the price of its substitute good increases, *ceteris paribus*, hence the demands for that good will increase and vice versa. Goods are complements where an increase in the price of one leads to a decrease in the quantity demanded of other goods. If the price of its complement good increases, *ceteris paribus*, hence demands for that good will increase and vice versa.
3. Income. Income can express purchasing power. The increasing of level of income, purchasing power will increase, so the demand for good will increase.
4. Taste or habitually.
5. Population. If the population increases, *ceteris paribus*, the demand for that good will increase.
6. The expectation price in the future. If we expect the price of good will increase in the future, in current the demand for that good will increase.

Demand function is a demand which expressed in mathematical relationship with factors determining it. With demand function, hence we can know the relation between dependent variable and its independent variables. Based on the explanation above, the demand function is as follow:

$$Dx = f(Px, Py, Y, Ts, Pop, Pe)$$
$$\quad - \quad -/+ \; + \; + \; + \; +$$

where:

Dx : The demand for x good
Px : The price of x good
Py : The price of its substitution or complement good
Y : Income
Ts : Taste
Pop : Population
Pe : The expectation price

If the demand is determined by its factors, the supply also can determine by factors as follows:

1. Its price. If the price of a good increase, producer are willing to produce more. It is appropriate with the law of supply which express that the higher price of a goods, *ceteris paribus*, hence the more of supply of good by producer.
2. The cost of production. The increasing of cost of production, including wages, interest charges, and the cost of raw materials will lead producer decreasing their ouput.
3. Technology. Technological progress will lead the decreasing of cost of production, so it will lead the increasing of supply of good.
4. Government Policy.

Supply function is a supply which expressed in mathematical relationship with factors determining it. With supply function, hence we can know the relation between dependent variable and its independent variables. Based on the explanation above, the supply function is as follow:

$$Sx = f(Px, C, Tech, G)$$
$$\quad\quad + \quad - \quad + \quad -/+$$

where:

Sx : The supply for x good
Px : The price of x good
C : The cost of production
Tech : Technology
G : Government Policy

Based on the explanation above, the research of Indonesia's cocoa bean export to USA will be represented by two equations. The first equation is demand for export of Indonesia's cocoa bean which will be determined by export price, export price of Indonesia's competitor, income of USA which is measured by real GDP, export price on one year lag, and volume of export of the biggest competitor in USA. The second equation is supply of export of

Indonesia's cocoa bean which will be determined by export price, domestic price, production, export on one year lag, and non tariff barrier which is imposed by US FDA for Indonesia's cocoa bean, that is automatic detention.

CHAPTER III
COCOA IN THE WORLD ECONOMY

3.1. Cocoa in the World Market

There are many kinds of cocoa traded in the international market, such as bulk cocoa and fine cocoa. Since the price is not the same for all type, the International Cocoa Organization (ICCO) defines ICCO Indicator Price that represents the weighted average of cocoa prices.

3.1.1. Major Producing and Exporting Countries

Mostly produced in the tropical countries, cocoa is produced by many countries, spreading from African, South American, and Asian countries. Table 3.1 represents the ten cocoa biggest producing/exporting countries.

Table 3.1.
Cocoa Productions of Major Producing Countries

Country	Production (000 ton)					Growth
	2001/02	2002/03	2003/04	2004/05	2005/06	(% p.a)
Ivory Coast	1,265	1,352	1,407	1,276	1,320	1.08
Ghana	340	497	737	586	550	12.78
Indonesia	455	410	430	445	445	0.00
Nigeria	185	173	180	190	200	1.97
Cameroon	131	163	162	186	190	9.74
Brazil	124	160	163	171	170	8.29
Ecuador	81	86	117	116	116	9.50
Papua New Guinea	38	43	39	48	48	5.88
Malaysia	25	36	34	29	30	4.66
Rest of the World	225	251	270	282	289	6.42
World	2,868	3,170	3,539	3,328	3,358	4.02

Source: International Cocoa Organization, 2006

In the international market, Indonesia is the third largest producing and exporting countries, after Ivory Coast and Ghana. As largest producer country, Ivory Coast has market share of 38.3%: Ghana 20.2%; Indonesia 13.6%; Cameroon 5.1%; Brazil 4.4%; Nigeria 4.9%; and Ecuador 3.1% (see Figure 3.1).

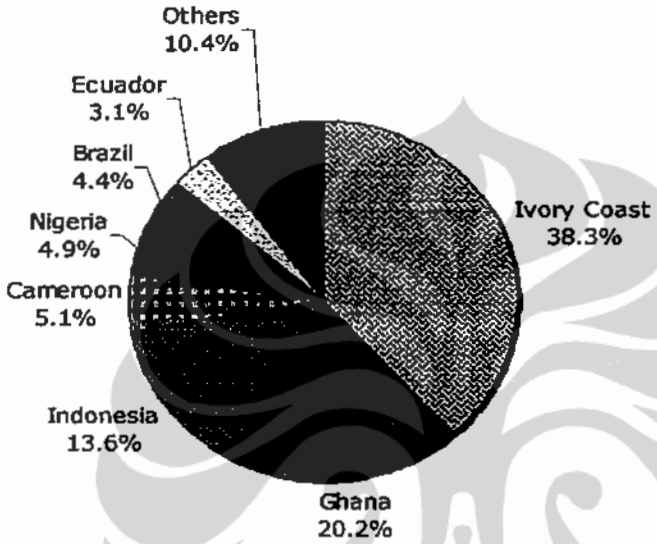


Figure 3.1
World Cocoa Supplier Classified by Countries
Source: International Cocoa Organization, 2006

3.1.2. Major Consuming and Importing Countries

Although cocoa is largely produced in developing countries, it is mostly consumed in industrialized countries. For cocoa, the buyers in the consuming countries are the processors and the chocolate manufacturers. A few multinational companies dominate both processing and chocolate manufacturing.

With around 3.4 million tons of world total consumption, the Netherlands is the biggest consuming countries, contributing to around 13.5 per cent of world cocoa consumption (Table 3.2). The use of cocoa bean in the Netherlands tends to increase in the last five year, from 418,000 tons in

2001/2002 to 460,000 tons in 2005/2006. The US as the second largest countries in downstream industries contributes to around 12.5% of the world cocoa use. In the last five years, US consumption has been stable with a marginal increase. Germany, France, and UK also play a significant role in the cocoa processing industries.

Table 3.2.
Cocoa Consumption of Major Consuming Countries

Country	Consumption (000 Ton)						
	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Netherland	436	452	418	450	445	460	460
USA	448	456	403	410	410	419	425
C'Ivoire	235	285	290	300	320	330	330
Germany	215	227	195	193	225	235	265
Brazil	202	195	173	196	207	209	215
Malaysia	112	115	125	150	203	235	235
France	142	145	139	145	150	150	150
UK	168	151	140	133	130	130	130
Indonesia	92	87	105	115	120	115	125
Others	909	949	899	972	1004	1033	1076
World	2958	3061	2886	3063	3214	3315	3411

Source: International Cocoa Organization, 2006

Amongst producing countries, Ivory Coast and Malaysia have developed their cocoa processing industries. Ivory Coast plays a significant role in the industries, contributing to around 10% of world total consumption, placing the country as the third largest consuming countries. Although its share is less than 10%, Malaysia has indicated a consistently increasing role in the last five years. In 2001/2002 Malaysia's share was just 3.6 per cent and almost double in 2005/2006. Malaysia is expected to increase its share in the future, supported by the government policies to promote its agricultural-based downstream industries.

Most of the major importing countries are European Countries. The Netherlands is the biggest importing countries, with total import varied around 500,000 tons per annum (Table 3.3). The Netherlands has contributed to more than 20% of world cocoa import in the last five years and the share tends to increase. The US as the second largest importing

countries constitutes to around 18% of world total import. However, US import tends to decline at -3.9% per annum in the last five year. In 2004/05, the US cocoa industries import more than 428,000 ton cocoa bean. Other EU countries, such as Germany, France, and United Kingdom as major consuming countries have import share less than 10%. Unlike the Netherlands, their imports tend to decline so that their share in the world market declining. Germany, for an example, has consistently declined its market share, from around 9.4% in 1999/00 to be around 6.9% in 2004/05. On the other hand, Malaysia as a new emerging cocoa processed centre has indicated a sharp import increase, leading to a significant import share from 3.9% to 9.0%.

Table 3.3.
Cocoa Imports of Major Importing Countries

Negara	Import (000 Ton)						Growth
	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	(% p.a)
Netherland	445	549	494	495	561	524	3.3
USA	521	355	397	323	489	428	-3.9
Germany	232	228	212	205	212	157	-7.5
France	149	157	143	139	155	118	-4.6
United Kingdom	137	151	107	127	139	105	-5.2
Malaysia	95	110	114	99	181	206	16.7
Estonia	62	59	66	57	69	41	-8.2
Spain	58	49	56	60	67	56	-0.9
Fed. Rusia	60	72	68	71	64	52	-2.7
Rest of the World	711	681	672	677	741	602	-3.3
World	2,470	2,409	2,329	2,254	2,678	2,288	-1.5

Source: International Cocoa Organization, 2006

3.2. The Role of International Cocoa Organization (ICCO)

The International Cocoa Organization (ICCO) was established in 1973 under the auspices of the United Nations to administer the provisions of the International Cocoa Agreement. The Agreements were concluded among the Governments of cocoa producing and cocoa consuming countries at conferences convened by the United Nations Conference on Trade and

Development (UNCTAD). The International Cocoa Agreement entrusted the ICCO with an explicit mandate to achieve a "sustainable world cocoa economy". For the ICCO, "sustainability" comprises dimensions of an economic, environmental and social nature, related to production and consumption of cocoa and chocolate. The concept thus encompasses all major areas of interest and concern in the world cocoa economy. The International Cocoa Agreement, 2001, also established a Consultative Board on the World Cocoa Economy. The Board consists exclusively of experts from the private sector, coming in equal numbers from cocoa producing and cocoa consuming countries.

The three priority areas for implementation of the current International Cocoa Agreement are:

1. Cocoa prices, farmers' incomes and export revenues.
   This priority area comprises all activities related to policies, programs and projects of direct and immediate relevance for cocoa prices, for cocoa farmer income and for the export revenues of the cocoa producing and exporting countries. This priority area refers to the "economic pillar" of a sustainable cocoa economy, aiming at increasing the income of cocoa farmers. This constitutes the major economic problem in the world cocoa economy.
2. Market Access, Market Information and Market Development.
   This priority area comprises all activities to secure, facilitate and improve the capability of origin countries to reach the final consumers more efficiently, in order to derive maximum economic benefit from producing and exporting cocoa bean and cocoa products
3. This priority area comprises all activities related to economic, social and environmentally sustainable cocoa production. This total sustainability should, supported by activities in the other two priority areas, result in a substantial improvement of the income position of cocoa farmers. The "economic pillar" of sustainable production should always, through improved resource use and increased productivity, greatly outweigh any possible costs of social and environmental sustainability.

The ICCO is, building on a long tradition, very active in the areas of statistics and market forecasting, as well as in the area of provision of information on the world cocoa economy. These activities are basic in enhancing the transparency of the world cocoa economy, an important condition for the efficient functioning of world markets for cocoa and cocoa products.

The International Cocoa Council is the controlling body of the International Cocoa Organization. It is composed of all the contracting parties to the International Cocoa Agreement, 2001. As at 30 September 2006, the Council consisted of 13 producer/exporter Members and 27 consumer/importer Members.

The International Cocoa Organization, have strategy to achieve a sustainable world cocoa economy to the fulfillment of the Millennium Development Goals. The International Cocoa Agreement, 2001, makes specific reference in Article 39 to the issue of sustainability and encourages its Members to *"give due consideration to sustainable management of cocoa in order to provide fair economic returns to all stakeholders in the cocoa economy"*. The ICCO Consultative Board on the World Cocoa Economy had, in the course of the cocoa year, completed a draft document on the concept, model and activities to achieve a sustainable world cocoa economy, for discussion among all stakeholders in the cocoa sector. The Council welcomed the work of the Board and encouraged the Board to implement the necessary next steps towards a sustainable world cocoa economy at the earliest opportunity.

3.3. Cocoa in the Indonesian Economy

Cocoa as crop of plantation is recognized in Indonesia since 1560, but has just become important commodity since 1951. Government of Indonesia starts give attention to and supports cocoa industry in 1975, after PTP VI can increase successfully the production of cocoa through usage of excellent seed Upper Amazon Interclonal Hybrid, which is the result of cross between klon and sabah. This annual tropical crop comes from South America. From South

America this crop disseminates to North America, African and Asian. Indonesian is one of the cocoa producing countries which has a good prospect to develop this commodity. It is reflected by the availability of human resources, the larger land which has not been utilized, and specific characteristic of the products which have hard butter with lower melting level compared to hard butter produced by other countries.

The main product of cocoa tree is cocoa bean, while shell and pulp are measured as its products. For consumption, cocoa bean has to be processed to be liquor or mess and transformed to cake and fat. The cake then can be processed into various intermediate products, such as paste, powder, concentrate, and essence. These intermediate products then are processed to produce a various final products like foods, beverages, drugs, cosmetic and chemical products. In the same way, fats can be processed into cocoa butter, oleo chemical, fatty acid, and vitamin.

3.3.1. Cocoa Plantation Area

The increasing of the world cocoa price since beginning of 1970 had awakened again the spirit of farmer to develop cocoa plantation on a large scale. During 40 years, the wide of Indonesia's cocoa plantation area experiences fast development. Based on Directorate General of Estate Ministry of Agriculture data, in 1976 cocoa plantation area has just reached 15,341 ha and in 2006 cocoa plantation area has become 1,320,820 ha. Beside that, the area distribution of cocoa plantation also increasingly grows. Plantation area spread over in Sulawesi (main centre), Sumatra, Maluku and Irian Jaya, Java, Nusa Tenggara, and Kalimantan.

South Sulawesi is a main producer of Indonesia cocoa, followed by Central Sulawesi, South-East Sulawesi, and West Sulawesi. From the four provinces, South Sulawesi is the province with highest growth reaching 8.6%. Beside those provinces, the highest growth of production is in Nangroe Aceh Darussalam, Lampung, and East Kalimatan with average of growth of 12.5%, 14.3% and 16.3% respectively. Detailed data shows that center of cocoa production is in North Kolaka, Parigi Mountong, Kolaka,

North Luwu, Mamuju, Polewali Mandar, Donggala, and Poso. These eight districts are major producer of cocoa contributing approximately 50% of Indonesia cocoa. The share of Indonesia's cocoa producer can be seen at Figure 3.2.

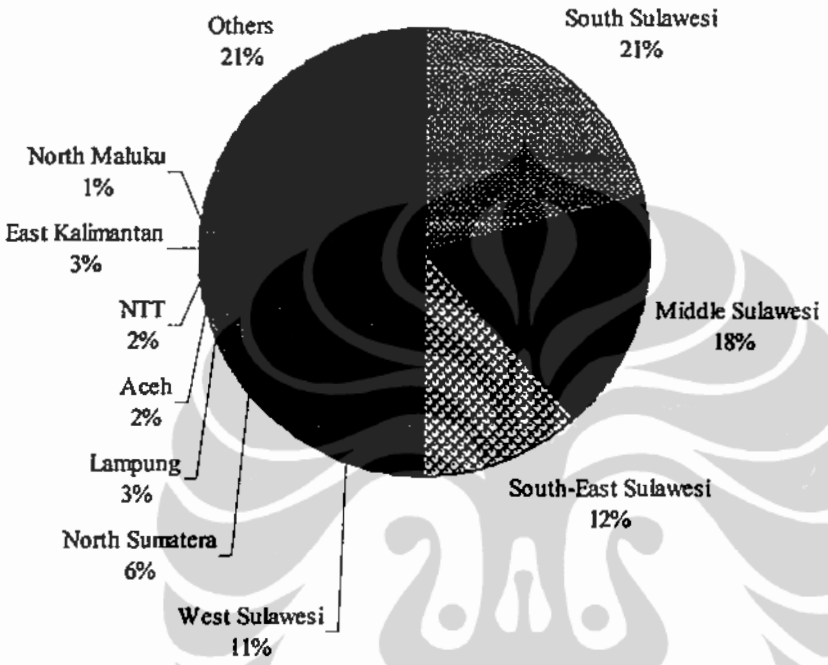


Figure 3.2.
Share of Indonesia's Cocoa Producer according To Province (2005)
Source: Directorate General Estate Crop Ministry of Agriculture, 2007

Producers of cocoa in Indonesia are distinguishable into three types of ownership. They are smallholders', government-owned estate, and private estate. Smallholders' is the most dominant producer; in 2006 they have been contributing to 92.33% of the total area in Indonesia. The area cultivated by smallholders' has also increased, from 641,133 ha in 2000 to 1,219,633 ha in 2006, indicating 11.47% average growth rate. However, the area cultivated by government and private experiences decrease. Government-owned estate decrease from 52,690 ha in 2000 to 48,930 ha in 2006 which indicating downdraft 0.10%, and private estate decrease from

56,094 ha in 2000 to 52,257 which indicating downturn 0.89% (see Table 3.4).

Table 3.4
Cocoa Plantation Area Classified by Ownership
2000 – 2006

Year	Smallholder (Ha)	Government (Ha)	Private (Ha)	Total (Ha)
2000	641,133	52,690	56,094	749,917
2001	710,044	55,291	56,114	821,449
2002	798,628	54,815	60,608	914,051
2003	861,099	49,913	53,211	964,223
2004	1,003,252	38,668	49,040	1,090,960
2005	1,081,102	38,295	47,649	1,167,046
2006	1,219633	48,930	52,257	1,320,820

Source : Directorate General Estate Crop, Ministry of Agriculture, 2007

3.3.2. Indonesia's Cocoa Production

Following the fast growth of cocoa area expansion and relatively high price in the last two decade, the production of Indonesian cocoa bean has also increased sharply. The total production in 1978 was around 5,496 tons; it sharply increased to 769,386 tons in 2006. In term of production, smallholders are also the biggest contributors of the total national production. In 2000 the smallholders' cocoa production is 363,628 tons, indicating 86.34% of the total national output. The production increased in the following years until 2006 which reached 702,207 tons. That was 91.27% of total national production.

The production of government-owned estate is 34,790 tons contributing to 8.26% of the national production. In the following years the production of government-owned estate decreased and reached only 25,494 tons in 2005, but increase again in 2006 despite its volume is lower than in

2000. In 2006 the production is 33,795 contributing 4.39% of total national production.

Production of the private estate in 2000 was 22,724 tons or contributing 5.39%, of the total production. It continuously increased in the following years with 33,384 tons in 2006. However its share decreased to only 4.33% of the total national production (see Table 3.5).

Table 3.5
Cocoa Production Classified by Ownership
2000 – 2006

Year	Smallholder	Government	Private	Total
	(Tons)	(Tons)	(Tons)	(Tons)
2000	363,628	34,790	22,724	421,142
2001	476,924	33,905	25,975	536,804
2002	511,379	34,083	25,693	571,155
2003	634,877	32,075	31,864	698,816
2004	636,783	25,830	29,091	691,704
2005	693,701	25,494	29,633	748,828
2006	702,207	33,795	33,384	769,386

Source : Directorate General Estate Crop, Ministry of Agriculture, 2007

In contrast to cocoa area development, the yield indicating crop productivity has been relatively low, without significant improvement in the last two decades. At the national level, the yield was around 800 Kg/ha/year, far below its potential of around 1500 kg/ha/year. Low input uses and low crop maintenance are two main factors causing this low productivity.

In general smallholder has the highest productivity (yield) than big estates (private and government-owned estate). The main factor behind this condition is that smallholder cocoa plantation grows bulk cocoa variety that has higher productivity than that of fine cocoa variety planted by big estates. However, the big estates use better technologies on crop maintenance such as pruning, pest and diseases control, and fertilizer use. Despite such

treatment their yields are lower because of the different cocoa variety planted (Trade Research and Development Agency Ministry of Trade, 2007).

The successfull area expansion and the product increase have given significant result to improve Indonesian cocoa market share in the world. Indonesia successfully places as the second biggest cocoa producer in the worlds after Ivory Coast in the year 2002, although returns to third position again after Ghana in the year 2003.

The shift of the Indonesia to the third position is because of the rapid raid of the pest's Cocoa Pod Bored (CPB). Widespread pest infestation, especially from the cocoa pod borer is a primary cause of poor cocoa bean quality. Over the past few years, increased CPB infestation and poor production practices of smallholder farmers in Indonesia have led to decreased cocoa bean yields and reduced quality. Based on Trade Research and Development Agency Ministry of Trade (2007), currently pest raid CPB is identified to reach 40% of the total cocoa area, especially in main centre of cocoa production estimated to cause damage around US$ 150 million every year. Beside that, the low productivity of cocoa crop is caused by dominant area which is still planted with low quality of bean seed, especially in smallholders' plantation and also the adoptions of cocoa seed which is not culturally appropiate.

Furthermore, the vicious pest raid of CPB is caused by cocoa seed resistant to pest CPB has not been found yet. Currently, the technology to control CPB pest have been obtained, but the application of such technology still faces various constraints. It is becomes a challenge to cocoa business actors to overcome the problems of pest CPB soon.

3.3.3. Cocoa Marketing System

Based on the type of producers, there are two types of cocoa bean marketing system. The first is estate companies that are private and government-owned estates companies. These estate companies market their products directly either to domestic cocoa-based industries or to the export

markets. The market mechanisms are basically based on the contract, auction, and spot market. Therefore, price determination is basically based on relatively competitive market mechanism. Secondly is associated to the cocoa produced by smallholders'. This marketing system has four main actors; they are cocoa farmer, local collector, local traders, and local exporter.

The farmers in the village level sell their cocoa bean to the collector at village or sub-district level. In a village cocoa producing center, there are many cocoa farmers and few collectors. For the small cocoa producers, they cannot market their product for several reasons. For the small farmers who need urgently cash money, they have to sell their product to the collectors who provide cash money. In the locations where transportation is a substantial problem, they have to sell to the collectors who come to their villages. For the small farmers that borrow cash money to collectors, they have to sell to them. Under this circumstance, bargaining position of farmers in determining prices is low so that price discount is to be expected. In other words, these farmers are generally price takers. This situation explains why farm-gate price of these small farmers is less than 89% of FOB price. Most cocoa farmers in Lampung, East Java, and Nanggroe Aceh Darussalam are examples of this marketing practice.

For the big or rich farmers in good infrastructure area, they market their products to collectors who offer higher prices. When the price is low, these farmers usually store their cocoa bean and wait for higher prices to sell. Cocoa farmers in South Sulawesi are good example of this marketing system. Under this situation, prices are basically determined on the basis of competitive market mechanism and farm-gate price is around 93% of FOB price.

Local collectors are usually cocoa farmers themselves or rural entrepreneurs with a motorbike (or sometimes a truck) who purchase cocoa bean directly from farmers. The scale of these purchases is small and turnover is rapid. Local traders purchase cocoa bean from local collectors or directly from farmers, and are usually engaged in a variety of other

businesses (e.g. general merchants, vehicle hire, etc.). These traders sell most of their cocoa bean to local exporters although a smaller amount flows to local processors. Collectors and traders do not need licenses or permits to operate so competition is severe with few barriers to entry.

Local exporters buy from collectors and traders who deliver bean to their storage facilities. Many of these local exporters have found it increasingly difficult to compete with the large-scale international exporters and have begun to sell to them rather than continue to export independently. Approximately 80% of Indonesian cocoa bean are sold by the five main multinational affiliate exporters in Sulawesi: EDF & Man, Olam, Cargill, ADM and Continaf. These firms have offices worldwide engaged in international commodity trading (USAID Report, 2006). These large-scale exporters purchase bulk bean from traders who deliver to their warehouses, sort and grade for quality, and sell to buyers (primarily to the USA, Malaysia, Singapore and Brazil) for processing.

3.3.4. Indonesia's Cocoa Industry

There are many cocoa based industries that have operated in Indonesia with total capacity of 293,000 tons per year. East Java, West Java, Banten, Jakarta, and North Sumatra are five cocoa processing centers in Indonesia. These five provinces have relatively had a good infrastructure, such as road, telecommunication facilities, and electricity. In addition, these five provinces are also the centers of the consumers of the final products. With these two advantages, it is not surprising that most of the industries and trading companies are located in these provinces.

In general, the development of cocoa-based industries in Indonesia has not developed as fast as the development of the cocoa plantation and production. In other words, the downstream industries of cocoa have not shown a promising trend. With total capacity of 293.000 tons/year, the actual use is around 40% (Trade Research and Development Agency, Ministry of Trade, 2007 p. 23).

Unlike rice and sugar, cocoa-based industries can be considered as less distorted market. In other words, there are no strong government policies on the industries, especially in the last 10 years. Most government policies applied on cocoa industries are national policies that are applied for all products.

Three main barriers are identified to inhibit the development of the cocoa-based industries. The first inhibiting factor is that business climate is not conducive enough to promote the industries. Value added tax amounting to 10% and low tariff import for cocoa processed products are two critical factors, amongst others, related to the business climate. Indonesia imposes import tax for processed cocoa products with rate around 3-5%. Processed-cocoa industries perceive that the tax rate is too low that inhibit the development of processed cocoa industries in Indonesia. Most countries impose tariff escalation meaning that the higher the degree of processing, the higher the tax. For Indonesia, this common import tariff mode is not applied; the import tax rate for cocoa bean is similar to that of processed products.

The second barrier is technological barrier. Many firms in Indonesia have not had the new technologies on coca downstream industries. Buying these new technologies needs a substantial investment costs that could be unaffordable for investors. The third barrier which is actually the main barriers is market barriers. The markets of the cocoa downstream industries mostly dominated and controlled by only some multi-national and trans-national corporations, such as Nestle, Ceres, and Unilever. These corporations have created so strong market barriers such that new comer industries hardly penetrate the markets. Using very sophisticated promotion and system of distribution, these corporations leave almost no room for the new comers. Under this circumstance, the development of cocoa based industries in Indonesia, beyond those corporations, have been very slow and tend to be stagnant.

3.3.5. Indonesia's Cocoa Bean Exports

Performance of Indonesian cocoa bean exports is relatively good. In 2006, Indonesia cocoa bean export volume is 609,035 tons and the export value reaches US$ 852,778 thousand. Indonesia cocoa export has experienced a significant decrease in 2001 and 2003, but by 2004 cocoa exports performances returns to increase, either from volume and also value of export. Moreover volume and value of exports reached during 2006 has gone beyond volume and export value in 2002 (see Table 3.6).

Table 3.6.
Volume and Value of Indonesian Cocoa Bean Export

Year	Export	
	Volume (tons)	Value (000 US$)
2000	424,089	341,860
2001	392,072	389,262
2002	465,622	701,034
2003	355,726	621,022
2004	366,855	546,560
2005	463,632	664,338
2006	609,035	852,778

Source : Directorate General Estate Crop, Ministry of Agriculture, 2007

The increasing of Indonesia export is also because Indonesian cocoa bean has competitive advantage in global market. Indonesia's cocoa bean is free from pesticide compared to cocoa bean from Ivory Coast and Ghana. Furthermore Indonesia's cocoa bean has high melting point compared to other cocoa bean as a special characteristic. It means that it is not easy for these cocoa bean to melt even at a temperature of 34-35 degree Celsius. The cocoa fat is still solid. This characteristic is very useful in making chocolate bar, candies and cakes.

Indonesia's cocoa bean is exported to many countries in the world. The main destination of Indonesian cocoa bean exports is United States of America (USA) and Malaysia. Based on Comtrade data, in 2005 Indonesia cocoa bean exports volume to both countries reaches US$ 328,911 thousand (70.3 % from Indonesia total export). By the last five years, export volume of Indonesia cocoa bean to Malaysia tends to increase. But on the contrary exports to USA tend to decrease. This exports decrease is expected because of the existence of quality problems of Indonesia cocoa bean. Based on Jasman (2006), Indonesia cocoa bean buyer from USA starts reducing the volume purchased as result of the rising dirt rate until 4 % and number of bean 110/100 grams from initially 105/100 grams. The low of quality of Indonesia cocoa bean also causes USA to implement automatic detention.

USA is the big consumer country of cocoa bean in the world. Based on Comtrade data, in 2006 value of cocoa bean import of USA is US$ 779,619,963 and the volume of cocoa bean import reaches 473,645.333 tons. USA import cocoa bean from many countries. Indonesia is the second biggest exporter of cocoa bean after Ivory Coast. In 2006 Ivory Coast has share of 53.6% of total cocoa bean import in USA, while Indonesia only 25.88%. So, in USA market, Ivory Coast is the biggest competitor for Indonesia.

The decreasing of export volume to USA needs special attention, because USA is the second biggest consumer of cocoa in the world after Holland. Market opportunity which is still open wide must be exploited to increase Indonesia cocoa bean export volume. For that purpose, determinant factors of Indonesia cocoa bean exports to USA need to be analyzed. Moreover, it is important to know the quality standard which is required by USA market. The share of Indonesia's cocoa bean in USA and standard quality of cocoa will be explained in the next section in this chapter.

3.4. Standard Quality of Cocoa

For cocoa food and beverage industry, quality of cocoa bean is absolute requirement. Therefore, producers or exporters of cocoa bean should

pay close attention to the quality in order to increase their bargaining position and obtain sufficient profit.

Requirement of quality which is arranged in commerce covers characteristic physical and contamination or level of hygiene. Physical characteristic is most important requirement because concerning yield which will be enjoyed by buyer. This physical character easy to be measured with procedure and equipments which are agreed by international institution. Therefore quality control based on this physical characteristic can be controlled easily by consumer. On the contrary, another requirement is special agreement between exporters and consumer (buyer). If this requirement can be fulfilled, hence exporter will get higher cocoa bean selling price (premium).

Some physical characteristic of cocoa bean which is covered in standard quality of cocoa is water content, the size of bean, and shell content. Water content is an important physical characteristic and will be closely examined by buyer. Besides having an effect to its yield, water content has an effect to cocoa bean strength to damage especially when they are put in warehouse and transportated. Cocoa bean which have high water content are very susceptible to mushroom raid and insect. Both condition is not favorable by consumer because tend to damage the taste and aroma which irrepairable in the next process. Quality standard of export of cocoa bean in water content is 6 - 7 %. If the water content value is high, cocoa bean is not good to be stored in a long time. On the contrary, if the water content is too low, cocoa bean tends to become fragile.

Contamination of strange object in cocoa bean must be avoided because it can generate serious problem. Mix of strange object in cocoa bean is considered to be serious problems, especially for USA's consumer, such as a contamination by insect. This contamination generally happened at warehouse. Egg or larva of insect which is not seen before, rounds into insect at the time of cocoa bean kept in warehouse. This contamination is also happened during transportation. Therefore, USA consumer till now still imposing automatic detention, that is an automatic detention policy to all ships which transporting Indonesian cocoa bean. Cocoa bean load may be

unloaded from ship if fumigation process had done. It is hardly harms Indonesia because all cost from applying this policy becomes Indonesia's exporter responsibility.

Imposition of automatic detention by US Food and Drug Administration (FDA) is caused by the FDA's fear of pest in Indonesian cocoa. It is because delivery of Indonesia cocoa to USA requires 40 days, so during the time insect eggs will become life insect when cocoa bean arrives at USA port. During that time, the pest has reached 1 cycle. The low of Indonesian cocoa bean quality causes Indonesian lower competitiveness with Ivory Coast cocoa bean. Besides have good quality of cocoa bean, the delivery process of Ivory Coast cocoa bean to USA only needs 14 days, so cocoa bean not too long stayed in fickle condition

Detention of cocoa bean at U.S. ports in complying to phyto-sanitary conditions of the FDA has increased the cost to exporters which may reduce the price they can pay to their suppliers. Since 1992, cocoa bean exports to the U.S from Indonesia are automatically detained without inspection at the port of entry by the FDA due to the presence of live insects. Some exporters claim that the additional time required to fumigate and pass FDA inspection at U.S. ports increases the cost, and decreases the competitiveness, of Indonesian cocoa bean export.

Beside Indonesia cocoa is assessed to contain pest and dirt, the imposisiton of automatic detention by US-FDA is also because Indonesia cocoa is unfermented. Fermentation means to facilitate releases mucus matter from surface of bean shell and yields bean with good quality and aroma. Besides yielding resistant bean to pest and mushroom during storage, fermentation can yields bean with bright color and cleanness. The process of Indonesian cocoa bean is still being traditional (85% national production cocoa bean is not fermentated), so it causes Indonesian cocoa bean is recognized to have the low quality.

Besides the imposition of automatic detention by USA, the lower quality also may lead to the lower price of Indonesian cocoa bean in the international market. Based on Diratpahgar (2008) the price of Indonesia

cocoa bean in New York Exchange Price is hit by discount US$ 70/ton. While Ivory Coast cocoa bean gets premium price US$ 200/ton, because of its good quality. This is causing the accumulation of price gap between Indonesia cocoa bean and Ivory Coast that could reach approximatelly US$ 300/ton.

Automatic detention can be taken off if during five times export successively pursuant to US-FDA. US-FDA had informed this notification since 16 years ago (1992), but till now the result of effort to improve the quality have not been felt. Recently, various efforts to improve the quality of cocoa bean has been done, like the revitalization program of plantation, control of disease pest, usage of certified institutions, and also assistance on further cocoa processing.

But in fact, cocoa with any quality has its own buyer. Therefore there is no price incentive for cocoa to produce good quality for traditional producers. This condition doesn't push farmer to produce cocoa with good quality (fermented cocoa). The problems in cocoa exports which had happened since 1992 is that exports to USA requires serious efforts, consistent and integration from cocoa stakeholders. It is very important in order to increase Indonesia cocoa image in international market.

3.4.1. National Standard Quality of Cocoa

The national quality standard for cocoa bean was developed since 1976, but for export purposes the quality control system did not start until 1986. Based on Decision of the Head of the National Standardization Council dated 2 May 1992, the national quality standard for cocoa bean was enhanced into Indonesian National Standard No. 01-2323-1991. Since then, in response to the developments in consumer demand and producer capacity, the quality standard for cocoa bean has been revised at least once every five years, the last in SNI 01-2323-2002. In this SNI, quality of cocoa bean has classified into three, there are quality 1, quality 2 and quality 3. Besides subdividing of the quality, cocoa bean in general must meet requirement as presented in Table 3.7.

Table 3.7.
Quality Standard for Indonesia's Cocoa Bean

Type	Unit	Condition
Living insects	-	None
Water content	% b/b	Maximum 7,5
Bean exuding smoke odor, abnormal odor or strange odor	-	None
Broken bean, bean chips, or skin chips	% b/b	Maximum 2
Foreign particle	% b/b	Maximum 0,2
Bean uniformity	% b/b	(>95)

Source: National Standardization Council, 2006

In its implementation, the quality standard policy set is not properly obeyed. Although there is an obligation to do quality control for cocoa bean which will be exported, but in reality quality of cocoa bean still low. Quality of cocoa bean which is surveyed by surveyor does not fulfill all the standard of quality specified. There is still around 40-50% of cocoa bean which does not fulfill the standard of quality. This indicates that the stakeholders (farmer, trader and exporter) have not ready for fulfilling standard of quality which is specified by SNI. So if the requirement of quality control is followed tightly, it will improve our export performance. Based on this condition hence government should issue policy that cocoa bean which does not meet the quality standard of SNI will not be exported.

3.4.2. USA Standard Quality of Cocoa

Legal fundament from most all regulations of food in USA is The Federal Food, Drug and Cosmetic Act (FFDCA) which released by US Food and Drug Administration (FDA). FDA ensures that food product either domestic and also import safe, cleanness, healthy, nutritious and given label in precise. US-FDA initiative in arrange international cocoa standard by performing a meeting between producers and consumers several times in 1969 in Paris. The meeting agrees on specifying of International Cocoa

Standard. This standard has been adopted by most all cocoa producer countries in world especially which is exporting cocoa bean to USA. In order to entry into USA market, cocoa bean must fulfill 3 (three) criterion:

1. Up to standard of cleanness/sanitary (mushroom, insect, dirt, and garbage).
2. Free of other chemical element and contamination.
3. Doesn't contain pesticide residue prohibited or contained pesticide residue enabled but higher than level of tolerance.

At the time when cocoa bean will enter into USA, it is investigated in dock to know existence of life insect, and if there, goods will be arrested. Fumigation to cocoa bean as according to FDA method will be done. If delivery is investigated farther by FDA, hence cocoa bean must in test to determine physical defect every bean which caused by insect, mushroom or other cause. Result of this test is shown as % bean refused based on the amounts and type of physical defect. Other testing is also done to determines contamination in general by mouse, insect, mushroom, foreign objects and also by other cause. Delivery of cocoa bean which inappropriate to standard can be refused and be returned, or be repaired as according to FDA requirement.

Cocoa bean which is containing pesticide residue besides in the listing of tolerance assumed break the standard if imported to USA, although usage of the pesticide is agreed in the country of origin. Cocoa bean which is containing certain residue will get the mitten to enter USA market. Now have been listed 11 (eleventh) pesticides which save to be applied for cocoa bean. New tolerance specified for cocoa bean is as follows (Table 3.8).

Table 3.8.
USA Pesticide Tolerance for Cocoa Bean

Reference No	Chemical	Tolerance (ppm)
40 CFR 180.123	Inorganic Bromide (F)	50*
40 CFR 180.127	Piperonyl Butoxide (I)	8*
40 CFR 180.128	Pyrethrins (I)	1*
40 CFR 180.130	Hydrogen Cyanide (I)	25*
40 CFR 180.215	Naled (I)	0.5
40 CFR 180.225	Aluminum Phosphide (F)	0.1
40 CFR 180.235	Dichlorvos (I)	0.5*
40 CFR 180.275	Chlorothalonil (F)	0.05
40 CFR 180.349	Fenamiphos (N/I)	0.02
40 CFR 180.375	Magnesium Phosphide (F) (phosphine residues)	0.1
40 CFR 180.364	Glyphosate (H)	0.2
Tolerance Revoked :	BHC (and Lindane) (I)	0.5
	DDT, TDE, DDE (I) (cocoa bean)	1

Post Harvest Application

FA = Food Additive Tolerance
F = Fumigant
Fg = Fungicide
I = Insecticide
N = Nematocide

Source: Agriculture Department, 2007

CHAPTER IV
RESEARCH METHODOLOGY

4.1. Empirical Study

4.1.1. Morris Goldstein and Mohsin S. Khan (1978)

The purpose of this study is to investigate the price responsiveness of both export demand and export supply using quarterly data on the aggregate exports of eight industrial countries (Belgium, France Germany, Italy, Japan, the Netherlands, the United Kingdom, and the United States) for the period 1955-1970. Two models of export demand and supply are introduced and these models are then estimated simultaneously.

Two versions of basic model of export quantity and price determination are considered. The first model is equilibrium model, which have simplifying assumption that there are no lags in the system so that the adjustment of export quantities and prices to their respective equilibrium values is instantaneous. It means that all adjustment takes place within a one-quarter period. The second model is disequilibrium model, which have assumption and admit the possibility that adjustment of actual to equilibrium values may take place with some delay. Therefore, in the disequilibrium model, excess demand and supply are allowed to emerge and to affect the prices and quantities of exports.

In equilibrium model, the world demand and supply for an individual country's exports is specified in log linear form as follows:

$$\text{Log } X_t^d = \alpha_0 + \alpha_1 \log(PX/PXW)_t + \alpha_2 \log YW_t$$

$$\text{Log } PX_t = b_0 + b_1 \log X_t^s + b_2 \log Y^*_t + b_3 \log P_t$$

where: X^d= quantity of exports demanded; PX= price of exports; PXW= weighted average of the export prices of the country's trading partners; YW= weighted average of the real incomes of the country's trading partners; X^s= quantity of exports supplied; PX= price of exports; P = domestic price index; Y* = logarithm of an index of domestic capacity.

While disequilibrium model is as follows:

$$\text{Log } X_t = c_0 + c_1 \log(PX/PXW)_t + c_2 \log YW_t + c_3 \log X_{t-1}$$

$$\text{Log } PX_t = d_0 + d_1 \log X_t^S + d_2 \log P_t + d_3 \log Y_t^* + d_4 \log PX_{t-1}$$

Goldstein and Khan use linier Full Information Maximum Likelihood (FIML) in equilibrium model except for Japan that use Two Stage Least Square (TSLS). For disequilibrium model they use FIML for all cases. The Result of regression shows that variable export price and income have significant effect to demand of export. In general, the price elasticity is bigger than one which is shown that the bit increasing of price can cause decreasing demand of export. Supply of export has significant and positive effect to export price, whereas domestic capacity have significant and negative effect. Its mean that ever greater domestic capacity, the price of goods will be cheaper.

In disequilibrium model we can see that variable export price have significant and negative effect to export demand, whereas variable real income has significant and positive effect. It means ever greater real income in a country, the demand of export is greater too. Lag export demand have significant effect to demand of export. If demand of export t-1 increase, so demand of export in this period is also increase. For supply function, domestic price has significant and positive effect, whereas production capacity has negative effect to export price.

The Goldstein Khan disequilibrium model is appropriate to be applied in cocoa bean export model, but in cocoa bean case there is need some modifications. The modifications are:

1. One variable is added in the supply of export model. The variable is dummy for automatic detention. Dummy for automatic detention enters into the model because there is an assumption that the decreasing of Indonesia's cocoa bean exported to USA is caused by the imposition of automatic detention by USA. Dummy for automatic detention will be quantified by 1 and 0. 1 is for the presence of automatic detention (1992-2006), and 0 for the absence of automatic detention (1976-1991).

2. The supply of export of Goldstein Kahn model uses export price on one year lag as a variable. Due to the inability of Indonesia to determine cocoa bean price because of the lower quality and an *ijon* practice in Indonesia's cocoa bean, so in this research supply of cocoa bean export model does not use export price on one year lag as a variable. Because Indonesia is just a price taker in world cocoa bean market and it is expected that the trend to import cocoa bean is affected by price on one year lag. So variable export price in one year lag will be added in the demand for export of cocoa bean model. Export price on one year lag can affect demand for export, because if the price of export on one year lag is competitive hence there is trend for destination country to increase demand in current year, and vice versa.
3. The demand for export of Goldstein Kahn model uses quantity of export on one year lag as a variable. But in the cocoa bean case, this research uses the variable in the supply of export model. The reason to add such variable to supply of export model is because it is expected that the supply of export of Indonesia cocoa bean is affected by cocoa bean export on one year lag. It is because in supply of export there is a trend to learn the situation that happened in previous year. If volume of export in previous year is high, hence there is a trend to supply more amounts in current year, and vice versa.
4. In the demand for export of cocoa bean model, the volume of export of biggest competitor (Ivory Coast) to USA is added to the model. It is because there is a logical prediction that a decreasing of Indonesia's cocoa bean export to USA because of the increasing of Ivory Coast cocoa bean export in USA.

4.1.2. Others Study

Beside Goldstein and Kahn model, there are other models that can be used to estimate the demand and supply of export model with different variables. The models are:

1. Cristian Moran (1988)

Moran did a research on manufacturing export in 15 developing countries. He used the model as follows:

$$\text{Log } X_t^s = \alpha_0 + \alpha_1 \log(PX/PT)_t + \alpha_2 \log(PH/PT)_t + \alpha_3 \log Y_t^*$$

$$\text{Log } X_t^d = \beta_0 + \beta_1 \log(PX/PX^w)_t + \beta_2 \log Y_t^w$$

where: X^d = demand of export of manufacturing industry; X^s = supply of export; PX = price index of export manufacturing industry; PT = domestic price tradable goods; PH = price index of domestic production; PX^w = world price index of manufacturing industry; Y^w = index of manufacturing industry demand in foreign.

The results suggest that prices, domestic productive capacity, and external economic activity are critical determinants of manufactured exports from developing countries. Although all parameter is according to the assumption expected, the regression result from supply function shows that variable price does not have significant effect. It possibly is caused by imperfect data. From the demand function, all variable have significant effect.

The Moran model cannot be applied in the research of cocoa bean exports, because he did the research on manufacturing exports which consist of many goods. So he uses price index of export manufacturing industry and domestic price tradable goods. For the research with one commodity, it cannot be applied.

2. Paul L. Faris (1971)

This research examines the factors affecting U. S. cattle hide exports in the period of 1956-1969. A simultaneous system is implied in which joint solution of a demand equation and a supply equation is necessary to estimate U. S. export supply and demand relationships. Two-stage least squares (2SLS) and three- stage least squares (3SLS) procedures were used to estimate the parameters of the postulated demand and supply relations.

The model consisted of two functional relations and the equilibrium identity, as follows:

(1) Demand: Ed=f(P, Sf, T, E1)

(2) Supply: Es=f(P, Sd, Dd, T, E2)

(3) Equilibrium identity: Ed= Es

where the endogenous variables: Ed=export demand for U. S. cattle hides, Es= export supply of U. S. cattle hides, P = price of cattle hides

The exogenous variables: Sf= production of cattle hides abroad, Sd= production of cattle hides in the United States, Dd= purchasing power in the United States, T= time, and E1 and E2= error terms for equations (1) and (2) respectively.

Result from regression shows that the signs of the coefficients in the demand and supply equations were all consistent with expectations. The growing foreign market for U.S. cattle hides was reflected in the positive coefficient of the time variable in both demand and supply equations. In the demand equation foreign hide production and price were both inversely associated with U. S. exports. In the supply equations exports were strongly associated with U.S. cattle slaughter. Exports were inversely associated with U.S. purchasing power and positively associated with price. The coefficients for the price variable indicated that quantities available for export were not strongly associated with price.

The Faris model is good; all coefficients in the demand and supply equations were consistent with expectations, but the model rather hard to be applied in the research of cocoa bean. It is because of the difficulty to get production data of cocoa bean of USA in 30 years (1976-2006).

4.2. Model Specifications

In order to fulfill the condition where there is complexity relationship between variables affecting exports, so exports of Indonesia's cocoa bean to United States of America (USA) is constructed in simultaneous equation model. Simultaneous equation modeling is tools for examining the complexity of economic questions in which the dependent variable both influences and is influenced by one or more of the independent variables contained in the model.

The models which will be developed in this research will be classified into two equation models, i.e. supply of export of Indonesia's cocoa bean and demand for export of Indonesia's cocoa bean. In the predetermined variable of the model, beside containing quantitative variable the model also contains dummy variable. Dummy variable is variables that are essentially qualitative, or nominal scale, in nature. One way to quantify the attributes is by constructing artificial variables that take on values of 1 or 0, 1 indicating the presence (or possession) of that attribute and 0 indicating the absence of that attribute.

Two equations which will be developed are in the form of log linear equation. Log model has advantage compared to linear model; that is the coefficient of slope is the rate of change of endogenous variable (in percent) if there is changes in predetermined variable (in percent). Therefore, coefficient of slope is elasticity measure of endogenous variable to the predetermined variable.

The first equation is the supply of export of Indonesia's cocoa bean. This supply of export is determined by the Indonesia's production of cocoa bean, relative price of cocoa bean (export price and domestic price), Indonesia's export of cocoa bean on one year lag, and dummy automatic

detention. The research estimates that the Indonesia's production of cocoa bean, relative price of cocoa bean, and Indonesia's export of cocoa bean on one year lag have positive effects to the supply of export of Indonesia's cocoa bean. Ever greater cocoa bean production hence ever greater also the supply of export. The increasing of relative price which indicates that export price higher than domestic price will increase the supply of export, likewise with the Indonesia's export of cocoa bean on one year lag is also will increase the supply of export. On the other hand, the imposition of automatic detention will decrease the supply of export. The equation (1) of supply of export of Indonesia's cocoa bean is as follow:

$$CBX^s_t = \beta_{10} + \beta_{11}CBP_t + \beta_{12}(PE/PD)_t + \beta_{13}CBX_{t-1} + \beta_{14}DAD + e_1 \ldots.(1)$$
$$\qquad\qquad (+) \qquad (+) \qquad (+) \qquad (-)$$

where:

CBX^s = Supply of Export of Indonesia's Cocoa Bean (tons)

CBP = Indonesia's Production of Cocoa Bean (tons)

PE = Export Price of Indonesia's Cocoa Bean (US$/tons)

PD = Domestic Price of Indonesia's Cocoa Bean (US$/tons)

QBX_{t-1} = Indonesia's Export of Cocoa Bean on One Year Lag (tons)

DAD = Dummy Automatic Detention

The second equation is the demand for export of Indonesia's cocoa bean. This dependent variable is affected by the relative price of Indonesia's cocoa bean (Indonesia's export price and Ivory Coast export price to USA), the real gross domestic product of USA, export price of Indonesia's cocoa bean on one year lag, and export volume of the biggest competitor to USA. Ivory Coast is the biggest competitor of Indonesia's cocoa bean in USA market, so export of Ivory Coast cocoa bean will be included in the model. This research estimates that the relative price have negative effect. More expensive Indonesia's cocoa bean than Ivory Coast cocoa bean in USA will decreasing demand for export of Indonesia's cocoa bean. Likewise, the export price of cocoa bean on one year lags and the export volume of Ivory Coast

cocoa bean to USA have negative effect to demand of Indonesia's cocoa bean. On the contrary, GDPUS has positive effect to demand of export. The equation (2) of demand for export of Indonesia's cocoa bean is as follow:

$$CBX^d_t = \beta_{20} + \beta_{21}(PE/PIC)_t + \beta_{22}GDPUS_t + \beta_{23}PE_{t-1} + \beta_{24}VEIC + e_2 \quad (2)$$
$$(-) \qquad (+) \qquad (-) \qquad (-)$$

where:

CBX^d = Demand for export of Indonesia's Cocoa Bean (tons)

PE = Export Price of Indonesia's Cocoa Bean (US$/tons)

PIC = Biggest Competitor (Ivory Coast) Export Price of Cocoa Bean to USA (US$/tons)

GDPUS = The Real GDP of USA (billion US$)

PE_{t-1} = Export price of Indonesia's Cocoa Bean on One year lag (US$/tons)

VEIC = Export of Ivory Coast Cocoa Bean to USA (tons)

Both supply and demand models of export which have been explained is simultaneous equations model because both equations will work together to determine price and quantity of cocoa bean in market. In supply and demand for export models, we can determine the endogenous variables and predetermined variable.

Endogenous Variables

1. CBX : Export of Indonesia's Cocoa Bean (tons)
2. PE : Export Price of Indonesia's Cocoa Bean (US$/tons)

Predetermined Variable

1. CBP : Production of Indonesia's Cocoa Bean (tons)
2. PD : Domestic Price of Indonesia's Cocoa Bean (US$/tons)
3. QBX_{t-1} : Indonesia's export of Cocoa Bean on One Year Lag (tons)

4. PIC : Ivory Coast Export Price of Cocoa Bean to USA (US$/tons)
5. GDPUS : The Real GDP of USA (billion US$)
6. PE_{t-1} : Export price of Indonesia's Cocoa Bean on One Year Lag (US$/tons)
7. VEIC : Export of Ivory Coast to USA (tons)
8. DAD : Dummy Automatic Detention

Identification problem relates to whether we can estimate coefficient of structural equation from coefficient of reduced form that is equation which applied to obtained structural equation. With identification method, we will be able to quickly determine whether a simultaneous equation can be estimated or not.

There are three possibilities happened to simultaneous equations that is unidentified, identified, and over identified. In supply and demand for export of Indonesia's cocoa bean, in order for equation to be identified, there is a rule:

$$(K - k) \geq (m - 1)$$

where:

K = number of predetermined variable in the models
k = number of predetermined variable in the certain models
m = number of endogenous variable in the certain models

From that rule, it can be conclude if the results $(K - k) < (m - 1)$ hence the model is unidentified, and then if the results $(K - k) = (m - 1)$ hence the model is identified, while, if the result $(K - k) > (m - 1)$ hence the model is over identified. In table 4.1, we can see that the model of supply and demand for export of Indonesia's cocoa bean is over identified.

Table 4
Identification the Model of Supply and Demand for Export
Of Indonesia's Cocoa Bean

No	Models	K – k	m – 1	Conclusion
1.	The supply of export of Indonesia's cocoa bean	4	1	Over identified
2.	The demand for export of Indonesia's cocoa bean	4	1	Over identified

Based on the result identification of the model of supply and demand for export of Indonesia's cocoa bean above, which is over identified, hence the estimation method applied in this research is 2SLS methods. Estimation process will be done by using Eviews 4.1 program.

4.3. Heteroscedasticity and Autocorrelation Test

One of the important assumptions of the classical linear regression model is that the variance of each disturbance term u_i, conditional on the chosen values of the explanatory variables, is some constant number equal to σ^2. This is the assumption of homoscedasticity. Heteroscedasticity lead estimator not has minimum variance again (no longer best), but it still linear and unbiased. Because of the estimator not has minimum variance, hence confidence interval will be unnecessarily larger. As a result, the t and F tests are likely to give us inaccurate result.

In this research, detection of heteroscedasticity use White's General Heteroscedasticity test. The null hypothesis is there is no heteroscedasticity. White test is based on the sample size (n) times the R-square which is follows the chi-squared distribution with degree of freedom (df) equal to the number of regressor (excluding the constant term) in the auxiliary regression. If the chi-square value ($n.R^2$) obtained exceeds the critical chi-square value at the chosen level of significant, the conclusion is there is heteroscedasticity. In this research, heteroscedasticity test will be used White Heteroscedasticity test (no cross term).

Autocorrelation is a correlation between members of series of observations ordered in time. With the relevance of OLS assumption, autocorrelation is a correlation between error terms. In the regression context, classical linear regression model assumes that the disturbance term relating to any observation is not influenced by the disturbance term relating to any other observation.

The presence of autocorrelation is like heteroscedasticity, there is still yield linear and unbiased estimator, but the estimator not has minimum variance again (no longer best). Because variant is not a minimum, hence standard errors of OLS no longer can be believed. As a result, t-test and also F-test no longer valid, and if applied, are likely to give seriously misleading conclusions about the statistical significance of the estimated regression coefficient.

In this research, autocorrelation detect with Bruesch-Godfrey (BG) test that is in general which known as Lagrange Multiplier (LM) test. Null hypothesis is there is no autocorrelation. There is no autocorrelation if (n-p)*Rsquare < chi square (df = p) where p is the length of lagged. In this research, the length of lag will use criteria which have been told by Akaike and Schwarz.

Remedial measure of autocorrelation use is depending on the characteristic of correlation between residual, or equally how the autocorrelation structure form is. There are two types of autocorrelation remedial measure, if the autocorrelation or coefficient model AR(1) is known and if the autocorrelation is not known. If AR(1) is known, the remedial is use Generalized difference equation. If AR(1) not known, the remedial measure of autocorrelation could use First Difference Method and also Cochrane-Orcutt.

CHAPTER V
THE RESULT OF MODEL ESTIMATION AND ANALYSIS

5.1. The Result of Model Estimation

The econometric model used to analyze cocoa commodity in this research is the simultaneous equation models. The model consist of two equations; namely supply of export for Indonesia' cocoa bean and demand for export of Indonesia's cocoa bean. The data used in this research is time series data for years of observation from 1976 until 2006.

The analysis done in this research is started by identifying equation based on the order condition. Result from the identification process indicates that the supply and demand for export of Indonesia's cocoa bean model is over identified (K-k>m-1). This condition hence requires that Two Stage Least Square (2SLS) methods is used to estimate the simultaneous model.

To analyze relationship between predetermined variables (exogenous and lagged dependent variable) with endogenous variable in the equations, economic analysis is required by checking the sign and level of significant of each parameter which can explain the relationship between predetermined variables with endogenous variable. Because the supply and demand for export of Indonesia's cocoa bean is in logarithm form, hence coefficient yielded express export elasticity coefficient to each predetermined variables.

Furthermore, to ensure that model yield an estimation which is best linier and unbiased, diagnostic test is done to know whether autocorrelation and heteroscedasticity problems exist.

5.1.1. The Result of the Supply of Export Estimation

In this research, the supply of export of Indonesia's cocoa bean represents the amount of Indonesia's export supply to United States of America. The result of model estimation for this equation is as follows (Table 5.1).

Table 5.1.
The Result of the Supply of Export Estimation

Dependent variable: Log CBX_t^s			
Regressor	Coefficient	t-Statistic	Probability
Constant	-4.6672	-2.1344	0.0428
Log CBP_t	0.7471	2.6759	0.0130
Log $(PE/PD)_t$	1.1331	0.6665	0.5112
Log CBX_{t-1}	0.5909	2.9819	0.0063
DAD	-0.6175	-0.6652	0.5120
$R^2 = 0.9589$			

The result of the supply of export estimation of Indonesia's cocoa bean to USA, is checked by using diagnostic test. The test includes heteroscedasticity, and autocorrelation test.

In this research, test for heteroscedasticity is done by white method. The chi-square value ($n.R^2$) obtained is 6.8845 and less than the critical chi-square value at the level of significant at α 5% with df 8 which is 15.5073. It means that there is no heteroscedasticity.

Autocorrelation test for the supply of export of Indonesia's cocoa bean to USA model is done by Bruesch-Godfrey Serial Correlation LM test with lags up to 2 (second order) based on the criteria which have been used by Akaike and Schwarz. Probability value of Obs*R-squared obtained is 0.9195 and it exceeds the level of significant at α 5%. It is means that the supply of export of Indonesia's cocoa bean to USA model does not contain autocorrelation problem.

5.1.2. The Result of the Demand for Export Estimation

In this research, the demand for export of Indonesia's cocoa bean represents the amount of Indonesia's export demand in United States of America market. The result of model estimation for this equation is as follows (Table 5.2).

Table 5.2.
The Result of the Demand for Export Estimation

Dependent variable: Log CBX_t^d			
Regressor	Coefficient	t-Statistic	Probability
Constant	-28.5473	-2.7013	0.0122
Log $(PE/PIC)_t$	-1.3608	-1.1151	0.2754
Log $GDPUS_t$	6.1092	4.1240	0.0004
Log PE_{t-1}	-2.3393	-5.0361	0.0000
Log VEIC	-0.0062	-0.0118	0.9906
$R^2 = 0.9345$			

For the result of the demand for export estimation of Indonesia's Cocoa Bean to USA will be checked by using diagnostic test which includes heteroscedasticity and autocorrelation tests.

The result shows that the demand for export of Indonesia's cocoa bean to USA does not have heteroscedasticity problem. We can conclude that from the probability value that is 0.4708 and exceeds the level of significant at α 5%.

Autocorrelation test for the demand for export of Indonesia's cocoa bean to USA model is also performed by Bruesch-Godfrey Serial Correlation LM test with lags up to 2 (second order) based on the criteria developed by Akaike and Schwarz. Probability value of Obs*R-squared obtained is 0.0158 and less than level of significant at α 5%. It means that the demand for export of Indonesia's cocoa bean to USA model has autocorrelation problem.

Based on the result of diagnostic test for the demand for export of Indonesia's cocoa bean to USA model, we know that there is autocorrelation problem in the model. This condition is supported by the type of data used in this research, namely time series data. The time series data has high probability to have serial correlation problem. It is because time series data often shows the same trend in the residual term. Based on Widarjono (2005)

autocorrelation problem will yield an estimation which is linear and unbiased estimator, but the estimator does not have minimum variance (no longer best). As a result, t-test and also F-test no longer valid, and if applied, are likely to give seriously misleading conclusions about the statistical significance of the estimated regression coefficient. Because of the autocorrelation problem, a treatment to the demand for export of Indonesia's cocoa bean to USA model will be performed. The treatment is by adding lag variable AR(1) (Auto Regressive).

The result of the demand for export estimation of Indonesia's Cocoa Bean to USA model which has been treated is as follows (Table 5.3).

Table 5.3
The Result of the Demand for Export Estimation with Autocorrelation Problem Treated

Dependent variable: Log CBX_t^d			
Regressor	Coefficient	t-Statistic	Probability
Constant	-37.7401	-2.7053	0.0126
Log $(PE/PIC)_t$	-0.3649	-0.3025	0.7650
Log $GDPUS_t$	7.0103	4.5427	0.0001
Log PE_{t-1}	-1.8961	-3.0293	0.0060
Log VEIC	-0.1631	-0.3969	0.6951
AR(1)	0.6073	3.4109	0.0024
$R^2 = 0.9532$			

The treated demand for export of Indonesia's cocoa bean to USA is checked by using diagnostic test again to ensure that the model is free from heteroscedasticity, autocorrelation, and normality problems.

The result shows that the demand for export of Indonesia's cocoa bean to USA does not have heteroscedasticity problem. We can conclude that from the probability value that is 0.2125 and exceeds the level of significant at α 5%.

Autocorrelation test show the probability value of Obs*R-squared obtained is 0.8444 and exceeds the level of significant at α 5%. It is means that the treated demand for export of Indonesia's cocoa bean to USA model does not have autocorrelation problem.

5.2. The Analysis of Model Estimation

The results of simultaneous equation model estimation in general have the signs and coefficient which conform to the economic theory and previous research. Some variables in the equations give the satisfying result based on the statistical criteria that is generally used. On the contrary there are variables which are not significant, but it is supported by the previous research.

5.2.1. The Analysis of the Supply of Export of Indonesia's Cocoa Bean Model

The result of the supply of export estimation of Indonesia's cocoa bean model shows that the R^2 value is 0.9589. It can be interpreted that existing explanatory variables such as the cocoa bean production, relative price of export price with domestic price, cocoa bean export on one year lag, and dummy automatic detention can explain the variations of supply of export Indonesia's cocoa bean to USA 96 per cent. While of the rest 4 per cent can be explained by the other factors outside the variables above.

Then, the result of model estimation shows that two explanatory variables that are cocoa bean production and cocoa bean export on one year lag are statistically significant at 5 per cent level of confidence. On the other hand two variables are not significant based on statistical criteria. They are relative price of export price with domestic price and dummy automatic detention.

The cocoa bean production statistically influences the supply of export of Indonesia's cocoa bean to USA. The positive coefficient value of cocoa bean production is 0.7471 indicating that if the cocoa bean production increases by 1 per cent, *ceteris paribus*, hence the supply of export for Indonesia cocoa bean to USA is expected to increase by 0.7471 per cent.

Although cocoa bean production significantly influences export supply, but coefficient value of cocoa bean production shows that the supply of export of Indonesia cocoa bean to USA is inelastic to the changes of cocoa bean production. It means, although Indonesian production increase, consumer of cocoa in USA will not change their buying habits.

The cocoa bean export on one year lag shows a significant influence to the supply of export for Indonesia cocoa bean to USA. The coefficient value of the cocoa bean export on one year lag which has positive sign of 0.5909 is indicating that if the cocoa bean export on one year lag increases by 1 per cent, *ceteris paribus*, it will also increase the supply of export of Indonesia cocoa bean to USA by 0.5909 per cent. Coefficient value of cocoa bean export on one year lag indicates that the supply of export of Indonesia cocoa bean to USA is inelastic to the variation of cocoa bean export on one year lag.

The relative price (export price with domestic price) does not significantly influences the supply of export of Indonesia's cocoa bean to USA. This condition is because most of Indonesia's cocoa bean production is exported, based on BPS data in 2006 total cocoa bean production in Indonesia is 769,386 tons and at least 79 per cent of total production or 609,035 tons is exported. This condition shows that national cacao industry in Indonesia not well developed yet. The development of cocoa processed industries in Indonesia has not developed as fast as the development of the cocoa plantation and production. Because of that, the decreasing relative price not significant affected to the increasing of domestic consumption of cocoa bean. The positive sign of coefficient of this variable is appropriate with economic theory. The effect of relative price which is not significant is suitable with the result of Goldstein and Kahn (1978) estimation model.

The same condition applies to dummy at automatic detention which does not have an effect. It means that if there is a presence of automatic detention, supply of export of Indonesia cocoa bean to USA is not significantly affected. This condition can be explained by the following arguments:

1. USA is a big market of cocoa bean. USA is the second biggest importer country for Indonesia's cacao bean, and also the second biggest importer country for world cacao bean in the world. So USA market can absorb large volume of export for Indonesia's cacao bean.
2. USA accepts whatever quality of cocoa bean from Indonesia, so although have cheaper price, Indonesia's exporter could still export to USA
3. Because of the lower quality, Indonesia's cocoa bean are less marketed widely. Indonesia can not export to countries which have high quality standard like European Union.
4. There is an existence of trend of *ijon* practice applied by USA importer which exploits collector agencies in cacao center of produce like in South-East Sulawesi and Centre Sulawesi. The collector agencies have beforehand pays for next yield, so the quality of cocoa bean is not considered anymore but mostly for pays payment soon which has been received by farmer.

5.2.2. The Analysis of the Demand for Export Estimation of Indonesia's Cocoa Bean Model

The result of the demand for export estimation of Indonesia's cocoa bean model before autocorrelation treatment shows that the R^2 value is 0.9345. After the treatment, the R^2 value obtained increases and becomes 0.9532. So, the treatment for autocorrelation problem could increase R^2 value. It means the existing explanatory variables such as relative price of Indonesia's export price with Ivory Coast export price, real gross domestic product of USA, export price on one year lag, and also export volume of Ivory coast cocoa bean to USA could explain the variations of supply of export Indonesia's cocoa bean to USA by 95 per cent. While of the rest at 5 per cent can be explained by the other factors outside the variables above.

The demand for export shows that two explanatory variables that are gross domestic product of USA and export price of cocoa bean on one year lag are statistically significant at 5 per cent level of confidence. On the

contrary two variables are not significant based on statistical criteria. They are relative price of Indonesia's export price with Ivory Coast's export price and export volume of Ivory Coast to USA.

The gross domestic product of USA statistically influences the demand for export of Indonesia's cocoa bean to USA. The positive coefficient value of gross domestic product of USA is 7.0103 indicating that if the gross domestic product of USA increases by 1 per cent, *ceteris paribus*, hence the demand for export for Indonesia cocoa bean to USA is expected will increase by 7.0103 per cent. The coefficient shows that the demand of export of Indonesia cocoa bean to USA is very elastic to the changes of gross domestic product of USA. If USA gross domestic product increase, meaning that the welfare of people in USA increase, the consumer of cocoa in USA will change their buying habits by more consuming cocoa. Cocoa is containing nutrition which is good for health and there is high concern of health in developed country like USA.

The export price on one year lag really influences the demand for export for Indonesia cocoa bean to USA. The coefficient value of the export price on one year lag is -1.8961 indicating that if the export prices on one year lag increases by 1 per cent, *ceteris paribus*, it will decrease the demand for export of Indonesia cocoa bean to USA by 1.8961 per cent. Coefficient value of the export price on one year lag indicates that the demand for export of Indonesia cocoa bean to USA is elastic to the variation of export price on one year lag. It means, if export price on one year lag is cheaper, so consumer cocoa bean in USA will increase their demand.

Variable of the relative price (Indonesia's export price with Ivory Coast's export price) does not significantly influence the demand for export of Indonesia's cocoa bean to USA. It means the decreasing volume of demand of export in USA is not affected by relative price of Indonesia's cocoa bean with the price of biggest competitor in USA market that is Ivory Coast. Although it has not significantly affected the demand for export, the negative sign of the coefficient is appropriate with economic theory. The same condition happens to variable export volume of Ivory Coast cocoa

bean to USA which does not have significant effect. The negative sign of the coefficient is also suitable with hypothesis, but from the result of estimation is known that the decreasing demand for export of Indonesia's cocoa bean in USA is not caused by the increasing volume of export of Ivory Coast cocoa bean. It is not suitable with hypothesis that the increasing export volume of Ivory Coast cocoa bean to USA will have significant effect to the decreasing of demand of export of Indonesia's cocoa bean. This condition is expected because Indonesia as the largest producer of bulk bean cocoa which has high melting point and also free from pesticide currently occupies a strong position with few competitors in this segment.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

6.1. Conclusion

Based on the research on determinant factors of Indonesia's cocoa bean supply and demand for export to United States of America, there are some conclusion can be made:

1. Cocoa is a commodity which is very important in Indonesian economy. Besides providing job and income for many people, cocoa also gives contribution to foreign earning as the third biggest export revenue in plantation sector after CPO and Rubber.
2. During 40 years, the Indonesia's cocoa plantation area experiences fast development. Following the fast growth of cocoa area expansion and relatively high price in the last two decades, the production of Indonesian cocoa bean has also increased sharply. In contrast to cocoa area development, the productivity has been relatively low and without significant improvement in the last two decades. Low input uses and low crop maintenance are two main factors causing this low productivity. As the largest producer of bulk bean which have high melting point and also free from pesticide, Indonesia currently occupies a strong position with few competitors in this segment. Thus, the major challenge is to improve local cocoa productivity and also increased quality of cocoa bean.
3. The successful plantation area expansion and the product increase has improved Indonesian cocoa market share in the world. In the international market, Indonesia is the third largest producing and exporting countries, after Ivory Coast and Ghana. In the last five years, export volume of Indonesia cocoa bean to Malaysia tends to increase; on the contrary exports to USA tend to decrease. The problem experienced by Indonesia in USA is the imposition of automatic detention by FDA and also discriminative price because of the low quality of cocoa bean. The additional time required to fumigate and pass FDA inspection at USA

ports increases the cost, and decreases the competitiveness, of Indonesian cocoa bean imports.

4. Quality is a critical concern that must be addressed in USA market. Current marketing structure of the value chain (and global demand for low quality/low price bean) does not provide adequate incentives to improve quality. Without incentives for exporters, intermediaries, or farmers to invest in quality improvements they continue to be driven by volume-based transactions. With improved bean quality it may open opportunities to increase global trade of Indonesian cocoa.
5. The result of estimating simultaneous equation model in general has the sign and coefficient which is suitable with the economic theory and previous research. The result of the supply of export for Indonesia's cocoa bean model estimation shows that two explanatory variables that are cocoa bean production and cocoa bean export on lagged one year are statistically significant at 5 per cent level of confidence. On the other hand two variables are not significant based on statistical criteria; they are relative price of export price with domestic price and dummy automatic detention. Coefficient value of cocoa bean production and cocoa bean export on lagged one year shows that the supply of export of Indonesia cocoa bean to USA is inelastic to the changes of two variables. Automatic detention is not statistically significant, it means the presence of automatic detention, does not affect the supply of export of Indonesia cocoa bean to USA is not significant affected.
6. The result of the demand for export estimation for Indonesia's cocoa bean model shows that two explanatory variables namely gross domestic product of USA and export price of cocoa bean on one year lag are statistically significant at 5 per cent level of confidence. On the contrary two variables are not significant based on statistical criteria; they are relative price of Indonesia's export price with Ivory Coast's export price and export volume of Ivory Coast to USA. The coefficients show that the demand of export of Indonesia cocoa bean to USA is very elastic to the

changes of gross domestic product of USA and export price on one year lag.

6.2. Recommendation

Based on the research findings some recommendation can be stated as follows:

1. The model result shows that production plays a positive impact to the supply of export. Therefore, an increase in production should be pursued. Due to the availability of large area in Indonesia that is suitable for cocoa plantation, it is big opportunity for Indonesia to increase production by expanding cocoa plantation. So Indonesia must concern to allocate the potential land which not been cultivated optimally.
2. Although the result of model estimation shows that automatic detention is not significantly affect Indonesia cocoa bean export supply, the presence of automatic detention will lead to lower price of Indonesia's cocoa bean. Because of the lower price, Indonesia foreign earning will not be optimal. If this non tariff barrier can be avoided by increasing cocoa bean quality, then Indonesia may get higher price and foreign earning too. Furthermore farmers' income will increase. Automatic can be taken off if during five times export successively pursuant to US-FDA. In order to comply with the FDA standard, serious effort to improve the quality of cocoa bean is needed. The way to achieve this purpose is by applying tight quality standard system of SNI. The products failed from SNI tests should be rejected by exporters and grinding industry for raw material use. Beside that, the socialization of the advantages of fermented cocoa is crucial, because with fermented cocoa bean, Indonesia will have higher cocoa quality and can exports to other destination countries like EU. In this line, collaboration between government, farmers, and business agents is necessary.

LIST OF REFERENCES

Agribisnis Indonesia Online. (2005). *Standar dan Persyaratan Komoditi Kakao Amerika Serikat*. Ministry of Agriculture, Jakarta.

Diratpahgar.(2008). *Sekali lagi tentang Pengenaan Automatic Detention pada Biji Kakao Indonesia di Pasar Amerika*. Directorate General Estate Crop, Ministry of Agriculture, Jakarta.

Directorate General of Estate Crops. (2007). *Statistik Perkebunan: Kakao (Estate Crop Statistics: Cocoa)*. Ministry of Agriculture, Jakarta.

Embassy of Indonesia. (2005). *Nasib Biji Kakao Indonesia di Pier 84 Philadelphia-AS*. Washington, D.C.

Farris Paul L. (1971). Export Supply and Demand for U. S. Cattle Hides. *American Journal of Agricultural Economics*, Vol. 53, No. 4, pp. 643-646.

Goenadi, Didiek H., DR. Ir. MSc., et al. (2005). *Prospek dan Arah Pengembangan Agribisnis Kakao di Indonesia*, Badan Penelitian dan Pengembangan Pertanian, Ministry of Agriculture, Jakarta.

Goldstein, Morris and Khan Mohsin S. (1978). *The Supply and Demand for Exports: A Simultaneous Approach*. The Review of Economics and Statistics, Vol. 60, No. 2, pp. 275-286

Gujarati, Damodar N. (2003). *Basic Econometrics* (4rd ed.). New York: Mc Graw Hill.

Information and Data Center. (2007). *Gambaran Sekilas Industri Kakao*. Ministry of Industry, Jakarta.

International Cocoa Organization. (2007). *International Cocoa Organization Annual Report 2005/2006*. www.icco.org.

Jasman. (2006). *Malaysia, China, Jerman Mulai Tinggalkan Kakao RI*. Bisnis Indonesia.

Krugman, Paul L., and Obstfeld, Maurice. (2006). *International Economics, Theory and Policy* (7th ed.). Boston: Addison Wesley.

Ministry of Agriculture. (2007). Profil Perdagangan Internasional untuk Komoditas Kakao. *Buletin Pemasaran Internasional, Direktorat Pemasaran Internasional*, Direktorat Jenderal Pengolahan dan Pemasaran Hasil Pertanian, Jakarta.

Nachrowi, D. Nachrowi. (2006). *Pendekatan Populer dan Praktis Ekonometrika Untuk Analisis Ekonomi dan Keuangan*, Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia, Jakarta.

Panlibuton, Henry, and Lusby, Frank. (2006). *Indonesia Cocoa Bean Value Chain Case Study*, USAID.

Pindyck, Robert S., and Rubinfeld, Daniel L. (2005). *Microeconomics* (6th ed.). New Jersey: Prentice Hall.

Pindyck, Robert S., and Rubinfeld, Daniel L. (1998). *Econometric Models and Economic Forecast* (6th ed.). Singapore: Mc Graw Hill.

Salvatore, Dominick. (2007). *International Economics* (9th ed.). New Jersey: Wiley.

Suryani, Dinie, and Zulfebriansyah (2007). Komoditas Kakao:Potret dan Peluang Pembiayaan, *Economic Review*, No. 210.

Trade Research and Development Agency. (2007). *Commodity Profile Series Indonesian Cocoa*. Ministry of Trade, Jakarta.

Widarjono, Agus. (2005). *Ekonometrika: Teori dan Aplikasi Untuk Ekonomi dan Bisnis* (1st ed.). Yogyakarta: Penerbit Ekonisia Fakultas Ekonomi UII.

www.depdag.go.id
www.deptan.go.id
www.icco.org

Annex 1
The Result of the Supply of Export Estimation

Dependent Variable: LOG(CBX)
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:35
Sample(adjusted): 1977 2006
Included observations: 30 after adjusting endpoints
Instrument list: C LOG(CBP) LOG(PD) LOG(CBX(-1)) LOG(PE(-1)) LOG(PIC) LOG(GDPUS) LOG(VEIC) DAD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.667176	2.186606	-2.134439	0.0428
LOG(CBP)	0.747124	0.279198	2.675966	0.0130
LOG(PE/PD)	1.133113	1.699998	0.666538	0.5112
LOG(CBX(-1))	0.590928	0.198170	2.981925	0.0063
DAD	-0.617524	0.928363	-0.665175	0.5120
R-squared	0.958986	Mean dependent var		9.121188
Adjusted R-squared	0.952424	S.D. dependent var		2.723601
S.E. of regression	0.594070	Sum squared resid		8.822988
F-statistic	146.2310	Durbin-Watson stat		1.924612
Prob(F-statistic)	0.000000			

Annex 2

The Result of Heteroscedasticity and Autocorrelation Test for Supply of Export Estimation

White Heteroskedasticity Test:

F-statistic	0.936050	Probability	0.499198
Obs*R-squared	6.884566	Probability	0.440997

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/31/08 Time: 11:21
Sample: 1977 2006
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.745976	10.63001	0.446470	0.6596
LOG(CBP)	-1.195832	2.216184	-0.539588	0.5949
(LOG(CBP))^2	0.046522	0.093492	0.497600	0.6237
LOG(PE/PD)	-0.393357	1.107712	-0.355108	0.7259
(LOG(PE/PD))^2	0.230487	2.163435	0.106537	0.9161
LOG(CBX(-1))	0.676591	0.707959	0.955693	0.3496
(LOG(CBX(-1)))^2	-0.029683	0.039638	-0.748866	0.4619
DAD	-0.663186	0.613439	-1.081096	0.2914
R-squared	0.229486	Mean dependent var		0.294100
Adjusted R-squared	-0.015678	S.D. dependent var		0.488883
S.E. of regression	0.492700	Akaike info criterion		1.645346
Sum squared resid	5.340573	Schwarz criterion		2.018999
Log likelihood	-16.68019	F-statistic		0.936050
Durbin-Watson stat	2.148813	Prob(F-statistic)		0.499198

Breusch-Godfrey Serial Correlation LM Test:

Obs*R-squared	0.167794	Probability	0.919526

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:20
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.991934	4.312198	-0.230030	0.8201
LOG(CBP)	0.177620	0.717486	0.247558	0.8067
LOG(PE/PD)	0.041251	1.791510	0.023026	0.9818
LOG(CBX(-1))	-0.130701	0.519031	-0.251818	0.8034
DAD	0.158508	1.113738	0.142321	0.8881
RESID(-1)	0.160162	0.524637	0.305281	0.7629
RESID(-2)	0.002306	0.282829	0.008153	0.9936
R-squared	0.005593	Mean dependent var		-1.69E-15
Adjusted R-squared	-0.253817	S.D. dependent var		0.551580
S.E. of regression	0.617627	Akaike info criterion		2.075098
Sum squared resid	8.773640	Schwarz criterion		2.402044
Log likelihood	-24.12647	F-statistic		0.021561
Durbin-Watson stat	1.995426	Prob(F-statistic)		0.999946

Annex 3
The Result of the Demand for Export Estimation

Dependent Variable: LOG(CBX)
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:42
Sample(adjusted): 1977 2006
Included observations: 30 after adjusting endpoints
Instrument list: C LOG(CBP) LOG(PD) LOG(CBX(-1)) LOG(PE(-1)) LOG(PIC) LOG(GDPUS) LOG(VEIC) DAD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-28.54730	10.56806	-2.701282	0.0122
LOG(PE/PIC)	-1.360859	1.220358	-1.115131	0.2754
LOG(GDPUS)	6.109220	1.481364	4.124052	0.0004
LOG(PE(-1))	-2.339308	0.464511	-5.036066	0.0000
LOG(VEIC)	-0.006176	0.520334	-0.011868	0.9906

R-squared	0.934513	Mean dependent var	9.121188
Adjusted R-squared	0.924035	S.D. dependent var	2.723601
S.E. of regression	0.750672	Sum squared resid	14.08770
F-statistic	89.94310	Durbin-Watson stat	0.926257
Prob(F-statistic)	0.000000		

Annex 4

The Result of the Heteroscedasticity and Autocorrelation Test for Demand for Export Estimation

White Heteroskedasticity Test:

F-statistic	0.894746	Probability	0.538013
Obs*R-squared	7.626228	Probability	0.470806

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/31/08 Time: 11:44
Sample: 1977 2006
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-413.6801	176.0708	-2.349510	0.0287
LOG(PE/PIC)	0.762670	0.563220	1.354124	0.1901
(LOG(PE/PIC))^2	1.456534	0.992248	1.467913	0.1569
LOG(GDPUS)	102.5291	45.13341	2.271690	0.0337
(LOG(GDPUS))^2	-5.755743	2.530672	-2.274393	0.0336
LOG(PE(-1))	-5.889492	6.801675	-0.865888	0.3963
(LOG(PE(-1)))^2	0.428778	0.476035	0.900728	0.3779
LOG(VEIC)	-4.184552	9.609353	-0.435467	0.6677
(LOG(VEIC))^2	0.197438	0.415602	0.475065	0.6396

R-squared	0.254208	Mean dependent var	0.469590
Adjusted R-squared	-0.029904	S.D. dependent var	0.443331
S.E. of regression	0.449911	Akaike info criterion	1.483791
Sum squared resid	4.250819	Schwarz criterion	1.904151
Log likelihood	-13.25687	F-statistic	0.894746
Durbin-Watson stat	1.915754	Prob(F-statistic)	0.538013

Breusch-Godfrey Serial Correlation LM Test:

Obs*R-squared	8.289218	Probability	0.015850

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:45
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.753548	9.402235	0.080146	0.9368
LOG(PE/PIC)	-0.031436	1.083866	-0.029004	0.9771
LOG(GDPUS)	0.195524	1.315963	0.148578	0.8832
LOG(PE(-1))	-0.066445	0.417419	-0.159181	0.8749
LOG(VEIC)	-0.175414	0.465340	-0.376959	0.7097
RESID(-1)	0.584292	0.210402	2.777026	0.0107
RESID(-2)	-0.110678	0.210273	-0.526353	0.6037

R-squared	0.276307	Mean dependent var	-1.08E-14
Adjusted R-squared	0.087518	S.D. dependent var	0.696981
S.E. of regression	0.665784	Akaike info criterion	2.225260
Sum squared resid	10.19517	Schwarz criterion	2.552206
Log likelihood	-26.37890	F-statistic	1.463574
Durbin-Watson stat	1.990054	Prob(F-statistic)	0.234461

Annex 5

The Result of the Demand for Export Estimation with Autocorrelation Problem Treated for Demand for Export Estimation

Dependent Variable: LOG(CBX)
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:50
Sample(adjusted): 1978 2006
Included observations: 29 after adjusting endpoints
Convergence achieved after 16 iterations
Instrument list: C LOG(CBP) LOG(PD) LOG(CBX(-1)) LOG(PE(-1)) LOG(PIC) LOG(GDPUS) LOG(VEIC) DAD
Lagged dependent variable & regressors added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-37.74008	13.95048	-2.705289	0.0126
LOG(PE/PIC)	-0.364916	1.206268	-0.302516	0.7650
LOG(GDPUS)	7.010259	1.543180	4.542735	0.0001
LOG(PE(-1))	-1.896116	0.625926	-3.029297	0.0060
LOG(VEIC)	-0.163117	0.410971	-0.396905	0.6951
AR(1)	0.607312	0.178046	3.410981	0.0024
R-squared	0.953175	Mean dependent var		9.288053
Adjusted R-squared	0.942996	S.D. dependent var		2.611089
S.E. of regression	0.623411	Sum squared resid		8.938738
F-statistic	93.69183	Durbin-Watson stat		1.851985
Prob(F-statistic)	0.000000			
Inverted AR Roots	.61			

Annex 6
The Result of the Heteroscedasticity Test for
the Treated Demand for Export Estimation

White Heteroskedasticity Test:

F-statistic	1.486515	Probability	0.223732
Obs*R-squared	10.81369	Probability	0.212481

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/31/08 Time: 11:54
Sample: 1978 2006
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-378.4417	157.3070	-2.405752	0.0259
LOG(PE/PIC)	-3.368822	2.195318	-1.534548	0.1406
(LOG(PE/PIC))^2	-5.311452	3.155469	-1.683253	0.1079
LOG(GDPUS)	94.58728	40.31261	2.346345	0.0294
(LOG(GDPUS))^2	-5.372403	2.260058	-2.377108	0.0275
LOG(PE(-1))	-4.931375	6.342365	-0.777529	0.4459
(LOG(PE(-1)))^2	0.357874	0.443100	0.807661	0.4288
LOG(VEIC)	-4.187019	8.617609	-0.485868	0.6323
(LOG(VEIC))^2	0.206717	0.372603	0.554792	0.5852

R-squared	0.372886	Mean dependent var	0.308232
Adjusted R-squared	0.122040	S.D. dependent var	0.428706
S.E. of regression	0.401695	Akaike info criterion	1.262879
Sum squared resid	3.227177	Schwarz criterion	1.687212
Log likelihood	-9.311742	F-statistic	1.486515
Durbin-Watson stat	1.900867	Prob(F-statistic)	0.223732

Annex 7
The Result of the Autocorrelation Test
for the Treated Demand for Export Estimation

Breusch-Godfrey Serial Correlation LM Test:			
Obs*R-squared	0.338197	Probability	0.844426

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 10/31/08 Time: 11:55
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.661843	14.75295	0.044862	0.9646
LOG(PE/PIC)	-0.116811	1.287240	-0.090745	0.9286
LOG(GDPUS)	-0.011134	1.655754	-0.006724	0.9947
LOG(PE(-1))	-0.097481	0.680041	-0.143346	0.8874
LOG(VEIC)	0.009081	0.441073	0.020589	0.9838
AR(1)	-0.084176	0.511338	-0.164620	0.8708
RESID(-1)	0.144555	0.541012	0.267194	0.7919
RESID(-2)	-0.040726	0.377475	-0.107891	0.9151

R-squared	0.011662	Mean dependent var	4.31E-12
Adjusted R-squared	-0.317784	S.D. dependent var	0.565014
S.E. of regression	0.648606	Akaike info criterion	2.200969
Sum squared resid	8.834495	Schwarz criterion	2.578154
Log likelihood	-23.91405	F-statistic	0.035399
Durbin-Watson stat	1.981910	Prob(F-statistic)	0.999926