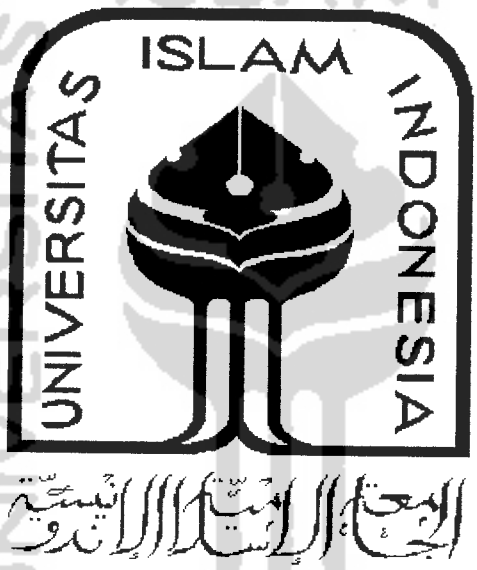
THE ANALYSIS OF THE FACTOR AFFECTING THE INDONESIAN SHRIMPS EXPORT TO JAPAN DURING 1982 – 2003

(Based on the simultaneous model between demand and supply)

A THESIS



By :

NAME : ANDHY SETIYAWAN WIDODO

STUDENT NUMBER : 99 313 025

STUDY PROGRAM : ECONOMICS DEPARTMENT

FACULTY OF ECONOMIC

ISLAMIC UNIVERSITY OF INDONESIA

YOGYAKARTA

2006

Analysis the Factor that Affecting the Indonesian Shrimps Export to Japan 1982 – 2003

(Based on simultaneous model between demand and supply)

A THESIS

Presented as Partial Fulfillment of the Requirements to Obtain the Bachelor Degree in Economic Department, Economics Faculty Islamic University of Indonesia

By :

NAME : ANDHY SETIYAWAN WIDODO

STUDENT NUMBER : 99 313 025

STUDY PROGRAM : ECONOMICS DEPARTMENT

FACULTY OF ECONOMIC

ISLAMIC UNIVERSITY OF INDONESIA

YOGYAKARTA

2006

NON PLAGIARISM STATEMENT

" Me as the writer of this thesis declare that I create this thesis by myself and none of its parts from copy of others writer's work without citation as it is mentioned in the *Guideline Book to Thesis Writing* about plagiarism. If in the future there is a proof that my statement is not true, me as the thesis writer will accept any consequences"

Yogyakarta, September 29th, 2006

Writer,

Andhy Setiyawan Widodo

APPROVAL

THE ANALYSIS OF THE FACTOR AFFECTING THE INDONESIAN SHRIMPS EXPORT TO JAPAN DURING 1982 – 2003

(Based on the simultaneous model between demand and supply)

By

Andhy Setiyawan Widodo

Student Number: 99 313 025

Economics Department

Yogyakarta, September 29th, 2006

Approved by

Content Advisor,

Priyonggo Suseno, SE., M.Sc. September 29th, 2006

Language Advisor,

Noor Qomaria Agustina, S.Pd. September 29th, 2006

LEGALIZATION

THE ANALYSIS OF THE FACTOR AFFECTING THE INDONESIAN SHRIMPS EXPORT TO JAPAN DURING 1982 – 2003
(Based on the simultaneous model between demand and supply)

A BACHELOR DEGREE THESIS

Andhy Setiyawan Widodo
Student Number: 99 313 025
Economics Department

Defended before the Board of Examiners
On October 11, 2006
and declared acceptable

Board of Examiners

Examiner 1:
Priyonggo Suseno, SE., M.Sc. .....

Examiner 2:
Agus Widarjono, Drs., MA. .....

Yogyakarta, October 11, 2006
International Program
Faculty of Economics
Islamic University of Indonesia
Dean

Asmai Ishak, Drs., M.Bus., Ph.D

Acknowledgement

Assalamu'alaikum Wr.Wb

The writer would thank to ALLAH SWT that give the strength, blessing and make easier so that the writer as a student of International Program, Economics Department, Faculty of Economics, Indonesian Islamic University can finish this thesis.

A thesis is one of the perquisites that must be done by every student of Economics Faculty, Indonesian Islamic University to fulfill the requirement to obtain bachelor degree in Economics Department of International Program of Faculty of Economics Indonesian Islamic University.

The researcher realizes that this thesis is still far from perfection, because of that, the researcher welcomes any kind of dialogues and constructive critics, so that this thesis can be one more step closer to perfection.

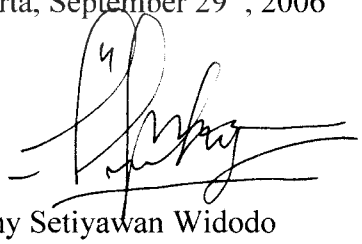
The writer also would like to thanks to everyone who has given some help in making this thesis successfully. They are:

1. To Mr. Priyonggo Suseno, Drs., MA for all patience, inspiration and support in guiding the researcher during the compilation process.
2. Mr. Asmai Ishak, Drs., M.bus., Ph.D, as the dean of Economic Faculty.
3. Mr. Akhsyim Afandi, Drs., MA, as the director of International Program.
4. Do not forget also thanks to Mrs. Noor Qomaria Agustina, S.Pd. .Was my language advisor.

5. My parents Soetiyono and Nunik Sukarni in loving me support and praying for me also thanks to my sister Santy and Deny also my brother Pungky that always support me to finish this thesis.
6. To my soul mate Dewi, those always pray for me and also give me strength and spirit to finish this thesis. She is my inspiration in everything. Thanks to Allah was creating her to me.
7. Thanks for my classmates Berty that always give support and help.
8. Thanks to my friends in boarding house; Bas-uky, Ray-mbez for disturbing when I am typing and never forget to remind me about eating party after I'm graduate from UII.
9. Thanks to my "Ja-dul" computer that helping me in keeping my thesis data.
10. Thanks to everybody in BPS, Campus Library etc. that support my thesis even though I don't know personally, I'll never forget all of you.

Wassalamu'alaikum Wr.Wb

Yogyakarta, September 29th, 2006



Andhy Setiyawan Widodo

MOTTO

IF YOU DREAM IT, PURSUE IT WITH ALL COST....

TO ACHIEVE GOALS OF LIFE, MAKE SURE DO IT WITH SERIOUSLY AND NEVER SAY GIVE UP IN THE MIDDLE....

PAIN IS A GOOD THING TO MADE US LEAVE CHILDISH AND BE A MAN....

WORKING AND MONEY IS AN IMPORTANT THINGS IN LIFE, BUT ISLAM AND ALLAH STILL THE MOST IMPORTANT THINGS IN EVERYTHING....

SEE IT, THINK IT, TRY IT, AND GET IT... FORGET ABOUT GREAT WALL IN FRONT OF US.

CONTENTS

CHAPTER VI DATA ANALYSIS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Andhy Setiyawan widodo (2006), "The Analysis of The Factors Affecting the Indonesian Shrimps Export to Japan During 1982 – 2003 (Based on the simultaneous model between demand and supply)". Economics Faculty, Economic Departement, International Program, Islamic University of Indonesia, Yogyakarta.

Industrialization failed in pushing economic growth rather than agriculture sector. Based on this, it is important to change the industrialization sector to agriculture sector as a top priority considering that Indonesia is still a country that produces raw materials and half finished products. Shrimp is the higher level of export contribution in agricultural export rather than others agricultural products. Even though fishery included in agricultural sector, its can beat coffee as major export agriculture.

In this research the writer appeared export shrimps to Japan as the main research because recently the export of shrimps has an important role supporting the economic growth. Japan as the main market for Indonesian shrimps export used as the research subject. The export of Indonesian shrimps to Japan increased year by year. In this research the writer want to know what factors that affect to the demand and supply of Indonesian shrimps export to Japan. Factors that include in this research are: price of shrimps, Japan GDP, exchange rate between countries, labor and land. This research will use time series data at 1982 – 2003 to find the regression result.

Based on the research, from the F test we can see that all variables simultaneously affect to the demand and supply of Indonesian shrimps export to Japan. For the demand R-squared value is 0. 628190. It means that the variation of the dependent variable can be explained by the independent variables about 0. 628190 or 62.8190%, while the rest 37.181% are explained by factors outside the model. For the supply R-squared value is 0. 281653. It means that the variation of the dependent variable can be explained by the independent variables about 0. 281653 or 28.1653 %, while the rest 71.8347% are explained by factors outside the model.

ABSTRAK

Andhy Setiyawan Widodo (2006), "Analisa Faktor-faktor yang mempengaruhi ekspor udang Indonesia ke Jepang 1982-2003 (berdasarkan uji model simultan antara permintaan dan penawaran." Jurusan Ekonomi Pembangunan, Fakultas Ekonomi, Program Internasional, Universitas Islam Indonesia, Yogyakarta.

Industrialisasi telah gagal dalam menyokong pertumbuhan ekonomi dibandingkan sektor agrikultur. Didasarkan dari hal ini, sangatlah penting untuk merubah orientasi dari sektor industrialisasi menjadi sektor agrikultur sebagai prioritas utama mengingat Indonesia masih sebagai Negara pemroduksi bahan-bahan mentah dan barang setengah jadi.Udang dipilih dalam penelitian ini karena udang sebagai penyumbang ekspor terbesar di agrikultur sektor dan berhasil mengalahkan kopi yang sebelumnya dijadikan tolok ukur ekspor agrikultur.

Dalam penelitian ini penulis mengambil udang sebagai bahan penelitian dikarenakan pada saat ini ekspor udang Indonesia memegang peranan penting dalam pertumbuhan ekonomi Indonesia. Jepang menjadi tujuan utama ekspor udang Indonesia yang ditunjukkan dengan peningkatan volume ekspor udang dari tahun ke tahun dijadikan alasan kenapa Jepang dipilih dalam penelitian ini.. Dalam penelitian ini penulis ingin mengetahui faktor apa saja yang dapat mempengaruhi permintaan udang Indonesia oleh Jepang. Faktor-faktor tersebut adalah; harga udang di pasar internasional, nilai tukar rupiah, pendapatan nasional (GDP) Jepang, jumlah tenaga kerja dan lahan di industri udang . Penelitian ini menggunakan data menurut runtun waktu (time series data) dari tahun 1982-2003 untuk mencari hasil regressi.

Bedasarkan penelitian, dari F Test menunjukkan semua variable secara simultan mempengaruhi permintaan dan penawaran udang ke Jepang. Pada permintaan, nilai R-squared adalah 0.628190. ini berarti variasi variabel dependen dapat menjelaskan variabel independen sebesar 62.8190%, sedangkan sisanya 37.181% dijelaskan oleh faktor-faktor lain. Sedangkan untuk nilai R-squared penawaran adalah 0.281653. ini berarti variasi variabel dependen dapat menjelaskan variabel independen sebesar 28.1653%, sedangkan sisanya 71.8347% dijelaskan oleh faktor-faktor lain.

CHAPTER I

INTRODUCTION

1.1. Background

Indonesia is a big country with a lot of natural resources and following the open market operation, the growth of Indonesian national economy actually has an immense correlation with the growth of global economics.

With the application of globalization in economy, the independency between one country to the others becomes higher. The economic cooperation between Indonesia and other countries can be shown from export and import of goods and services into gross national product (GNP) of the country. Except as the relationship indicator with foreign country, the main advantages of export is the increasing income of foreign exchange from international trading in which it is capable to increase the total income of Indonesian people In the middle of 1980's, the government is interesting to get more income from oil and gas export. At that time, the percentage of oil export had a good prospect and it is the reason why in this period a lot of foreign investors are interested to invest their money in Indonesia. The contribution of oil export foreign exchange was lesser and lesser because of the fluctuation in international oil price as well as the production of oil in Indonesia. This table shows the year when the export contribution from oil and gas begin to decline compared to the non oil and gas which is gradually increased in contributing the export income.

Table 1.1
The Export Contribution
Of Oil & gas compared with non oil & gas in Total of export
During 1994-2003
(Billion US $)

Sector	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Oil&gas	9,669.3	10,464.4	11,721.8	11,622.5	7,872.1	9,792.2	14,366.6	12,636.3	12,112.7	13,651.4
%	24.2	23.1	23.5	21.8	16.2	20.2	23.1	22.4	21.2	22.4
Non oil&gas	30,360.0	34,953.6	38,093.0	41,821.1	40,975.5	38,873.2	47,757.4	43,684.6	45,046.1	47,406.8
%	75.8	76.9	76.5	78.2	83.8	79.8	76.9	77.6	78.8	77.6
Total	40,059.0	45,418.0	49,814.8	53,443.6	48,847.6	48,665.4	62,124.0	56,320.9	57,158.8	61,058.2

Source: Center Bureau of Statistic 2003

The graph shows the indication of the contribution of oil & gas become stable. However problems such as unstable of oil price, un-renewable goods, and the volume of oil which gradually become lower and the need of energy which is absolutely in high level made the government impose a new strategy by shifting the concentration in non oil & gas export as the motor of national economics growth. One of action to fix the real sector and increase the export is that the government imposes an agreement made in 1986 among the Ministers of Finance, Industry, and Trade. The agreement is the Minister Regulation No 135/KPB/V/1996, No 316/KMK.01/1986 and No 160/M/SK/V/1986 about the easiest role for non oil & gas export in Indonesia.

With the regional trade agreement where Indonesia was involved like AFTA (Asia Pacific Economic Corporation) and WTO (World Trade Organization), the government tried to impose the policy to increase Non oil & gas export by escalating efficiency and Indonesian quality product in order to be

able to compete in the international market as well as avoiding the dependency from the subsidy & protection in order to take part in CEPT (Common Effective Preferential Tariff) which will be imposed in the economic globalization. In order to increase the growth of the macro sector and the real sector, government put industrialization in the major priority. The categorization of the industrialization including non agricultural sector which became the leading sector meaning sector with a huge advantages and abilities in pushing the output accumulated with other sectors. Indonesia made industrialization as a basic national economics growth.

Table 1.2
Export Contribution
(Agriculture and non agriculture)
During 1997-2003
(Billion US $)

Sector	1997	1998	1999	2000	2001	2002	2003
agriculture	3,533.0	3,717.9	3,647.0	3,503.0	3,254.3	2,852.4	3,121.1
%	6.6	7.6	7.5	5.4	5.8	9.2	9.6
Non agriculture	49,910.6	45,129.7	45,018.4	58,621.0	53,065.7	28,436.5	29,429.6
%	93.4	92.4	92.5	94.6	94.2	90.8	90.4
Total	53,443.6	48,847.6	48,665.4	62,124.0	56,320.0	31,288.9	32,550.7

Source: Center Bureau of Statistic 2003

The non agriculture export in 2002 declined sharply from US $ 56,320.0 in 2001 to US $ 31,288.9 in 2002 and increased again even though only in small portion at the level of US $ 32,550.7. This condition made the government review what might be the cause. The percentage of non agriculture time by time goes down and vice versa with the agricultural sector which increased from 5.4% in 2000 to 9.6% in 2003. This condition was a good phenomenon for agriculture because the export value was in a stable condition. In the other hand,

industrialization failed in pushing other sectors better than agriculture sector. The total downward of non oil and gas value was caused by non agriculture sectors which were supported by industrialization. Although the decrease was not so sharp, but it shows that it has a transformation from industrialization to agriculture sector.

Based on this, it is important to change the industrialization sector to agriculture sector as a top priority considering that Indonesia is still a country that produces raw materials and half finished products. Industrialization can not run well without technology which requires high level of human resources whereas Indonesian is only rich in natural advantages there is natural resources and unskilled labors.

In the other hand the connections between all of the sectors are not strong enough and the majority of industrialization production usually use the row materials which are still imported and the market destination for the goods is mostly still in local market.

The top three exports commodity of non agriculture sectors is textile, plywood and dry skins. These three commodities do not pure belong to from industrialization. Textile belong to cotton, plywood is from tree, and dry skin is from the skins of farm animals likes cow, sheep etc. All of these row materials are included in sub sector of agriculture.

Considering the Indonesian condition which have abundant natural resources, it will be safer to develop the agriculture sector included the export of agriculture products.Agriculture row materials available in entire Indonesia land

and hopefully more valuable if followed with a good quality product. There is an agriculture commodity that has a good value in export goods:

Table 1.3
Top Four Indonesian Agricultural Exports
During 1996-2003
(Billion US $)

commodity	1996	1997	1998	1999	2000	2001	2002	2003
1.Shrimp	1,015.6	1,068.0	1,007.0	887.6	1,003.0	940.1	840.4	852.7
%	54.3	58.5	52.6	53.6	60.1	70.2	67.5	69.4
2.Coffee	588.8	503.5	615.8	488.8	339.9	203.5	218.8	250.9
%	31.5	27.6	32.1	29.5	20.4	15.2	17.6	20.4
3.Spice	157.7	230.2	184.1	187.7	218.1	100.0	88.0	92.8
%	8.4	12.6	9.6	11.3	13.1	7.5	7.0	7.6
4.Tea	109.3	84.4	108.4	92.0	108.1	94.7	98.0	91.8
%	5.8	4.6	5.7	5.6	6.5	7.1	7.8	7.5
Total	1,871.4	1,826.1	1,915.3	1,656.1	1,669.1	1,338.3	1,245.2	1,228.8

Source: Indonesian Export, Center Bureau of Statistic 2003

Shrimp is the higher level of export contribution in agricultural export rather than others agricultural products. Even though fishery included in agricultural sector, its can beat coffee as major export agriculture. From the table we can see that shrimp has big influences in total export income from agricultural sector and that's why it's really important to studying and research the shrimp export because the total shrimps export rise continually.

Most people who stay near beach work as a sailor and shrimp farmer. Islands like Kalimantan, Sumatra, and java is big suppliers of shrimp export.

Japan, as the highest shrimp importer from Indonesia, keeps on increasing their demand because shrimp is one of major foods consumed everyday. Even though some times there is fluctuation in demand, Japan still became the highest shrimp importer from Indonesia. This may become the opportunities for Indonesia to get more income by increasing the shrimp quality to fulfill Japanese needs for shrimp.

Based on this background, the writer wants to do research on the prospect of shrimp export as a major product in fishery and agriculture sector. Factors in demand side (price, Gross Domestic Product, Exchange rate, domestic inflation), and supply side (labor, capital, land, total productions) give the highest influence to the total Indonesian shrimp export to Japan. Therefore, the title that the writer undertakes is **"THE ANALYSIS OF THE FACTOR AFFECTING THE INDONESIAN SHRIMPS EXPORT TO JAPAN DURING (1982 – 2003) based on the simultaneously model between demand and supply research point of view.** This research try to find out which one of the two variables of demand and supply have more power to influence the total Japan shrimp import from Indonesia.

1.2 Identification of Problem

The main topic of this research is analyzing the factors influencing export shrimp from Indonesia to Japan. As we all know that nowadays the Indonesian government put effort to stimulate the local industries in order to increase the production. The government expecting the domestic product to be as competitive as foreign product, so it can be exported to foreign countries. The government

tries to increase the volume of export of the domestic product, because export can increase our national income; one of the indicator for a country's welfare. As a result, this research is to analyze kinds of factors that influence the export of shrimp from Indonesia to Japan.

1.3 Problem Formulation

Based on the study background above, there are some questions proposed for this research:

a. How does the price of shrimp industry influence the industrial shrimp export of Indonesia?

b. How does Rupiah exchange rate influence the industrial shrimp export of Indonesia?

c. How does the Gross Domestic Product of Japan influence the industrial shrimp export of Indonesia?

d. How does the labor of shrimp's production influence the industrial shrimp export of Indonesia?

e. How does land used in shrimps productions influence the industrial shrimp export of Indonesia?

f. How does the production of shrimp influence the Indonesia shrimp export to Japan?

1.4 Limitation of the Study

Research examines two countries, Indonesia and Japan and using simultaneous model approach. It is because those two countries have a big role in Indonesia shrimps export in international transaction especially in Japan. This study used the period during 1982 to 2003.

This research uses the data of the demand and supply side likes the shrimp price, the exchange rate, and the GDP of Japan for the period of 1982-2003, as well as labor, land and capital.

Based on this research, the model can be formed as follow:

Demand function: Qd = f (P, ER, GDPj)

Supply function: Qs = f (P, ER, Lb, Ld)

Where: Q = the volume of export shrimps (tons)

P = the price of shrimps (US $/kgs)

ER = the exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

$GDPj$ = The GDP of Japan (million Yen)

Lb = Total labor in shrimps production (people)

Ld = land in shrimps production (Ha)

1.5 Research Objectives

The purposes of this research are:

1. To analyze the factors influencing the shrimp export from Indonesia to Japan.

2. To apply the method of simultaneous model in order to find out which one from all variables most capable to influencing shrimp export to Japan.

1.6 Research Contribution

There are some advantages of this research that can be withdrawn by researcher or other participant. Beside it is one of the partial fulfillment to achieve the bachelor degree in economic department, researcher try to read just a little bit macroeconomic variables in Indonesia whether it is fit or contradict with some certain theory provided. This research is expected to be useful consideration to anticipate the Factors in demand side (Price, Japan Gross Domestic Product, Exchange rate) and supply side (Price, Exchange rate, labor, and land) fluctuation in determining the appropriate level of Indonesian shrimp export to Japan.

1.7 Variable Description

There are so many factors influencing the export of shrimp from Indonesia to Japan, but the writer decided to concern mainly in 7 variables. These problems are:

From demand side:

1. The price of Indonesian shrimp in the international market.
2. The exchange rate of Rupiah as our currency to Japan Yen (Rp/¥).
3. The GDP of Japan as the importer country.

From supply side:

4. The labor of Indonesian shrimp.
5. The exchange rate of Rupiah as our currency to Japan Yen (Rp/¥)
6. Land in producing shrimp (brackish water pound)
7. The price of Indonesian shrimp in the international market.

1.8 Data Gathering

The data used in this research is secondary data obtained from several institutions such as Indonesian Statistic, various issues published by Center Bureau of Statistic (BPS) and International Financial Statistic (IFS) published by International Monetary Fund (IMF) and any other reputable sources data. The data were taken in term of yearly time series data starting from 1982 to 2003 or in about 22 observations.

1.9 Systematic of the thesis

» Chapter 1

This chapter will show the research introduction of the thesis writing. The main content is about the problems background, problem identification, research contribution and also systematic of the thesis. It is used because the writer need to plans first about how many chapter and method which will be used.

» Chapter 2

This chapter describes the research subject in general. It analyzes various facts which are acquired from the general data which is understandable in macro side which have connection with

» Chapter 3

The third chapter is about research documentation consist of the research in the same scope which so far has been done before. So the writer will find out any weaknesses from the past research as a mean to explain the real connection between this research and the past research as well as to avoid the plagiarism.

» Chapter 4

There are 2 kinds of content about the theoretical background formalization hypothesis. First is about the theory which is used to approach the problems. Second is the formalization of hypothesis which was shown implicitly in the theoretical background. However, since the characteristic is not formal yet, any research to make it become standard formal of hypothesis is needed.

» Chapter 5

This chapter is about the research method. This chapter will show the method of the analysis as well as the data and its resources which are used in the research.

» Chapter 6

This chapter is about the data analysis and discussion. It will analyze all of the data that have been found. The researcher should give arguments and criticism about the research whether it conforms to the theory or not.

» Chapter 7

The conclusion and implication will be exposed in this chapter. After having some research and analysis of course, the researcher will find some explanations about the result and finding in the research. The researcher will be able to find out the fundamental nature between the theoretical implication and this research.

CHAPTER II

GENERAL SUBJECT OF RESEARCH

INDONESIAN SHRIMPS EXPORTS

2.1 The growth of Indonesian non oil exports

Before 1980's, Indonesian exports absolutely depend on oil exports. But, with the unstable oil's world price and the limitation of oil resources made government in year 1986 impose any kind of decision about the easy ways in trading in which dedicated for the increase of Indonesian non oil exports. Since that time, the oil contribution changed by non oil exports.

The non oil and gas commodities have recently become potential exports in Indonesia. They are classified as primary commodities and non primary commodities. The primary commodities consist of agriculture sector and mining sector, while the non primary commodities consist of products of manufacturing sector.

In Indonesia, industry can be classified based on commodity groups, scale of industry, and the distribution of the product. Meanwhile, generally industry is classified based on International Standard of Industrial Classification (ISIC). This classification uses a kind of group commodity approach which is divided into 9 categories:

Table 2.1

Group of Industries Based on ISIC Two Digit

Code	Group of Industry
31	Industries of food, beverage, and tobacco
32	Industries of textile, garment, and leather.
33	Industries of wood, commodity made from wood including household furnishing.
34	Industries of paper, chemical, crude oil, coal, rubber, and plastic.
35	Industries of chemical and commodity made from chemical, crude oil, coal, rubber and plastic.
36	Industries of non-metal excavated commodity excluding crude oil and coal.
37	Industries of metal commodity.
38	Industries of metal, machinery and the complement.
39	The others process industries.

Source: Dumairy, 1997

Food production is the largest export sector in Indonesia. One third of total Indonesian manufacturing exports consist of food products. The Indonesian primary export commodities in industrial sector are Industries of food, beverage,

and tobacco. The total value export from these commodities above in 1995 reached US$ 11 million, almost a half of total export industrial products.

The appreciation of industrial sector need to be focused and considered more when remind that the intensity Indonesian condition categorized in NRI (Natural Resources Intensive) and ULI (Unskilled labor Intensive). In this case, government needs to rebuild sector in which using available resources and also capable to support all what our intensity have. Industrialization where need to be support isn't compact capital industry with import raw materials and only having local market only, but suppose to be simple industry and oriented by market. Beside that also need to support natural resource industry in which have a high price and easy to sells, likes **shrimps** commodity.

2.2 the growth of Indonesian shrimps exports

Shrimps are a one of Indonesian export commodity in which included in fishery sub sector in agriculture commodity. Shrimps isn't classified in staple food item, but classified in luxury food item. As a food in which included in luxury food item, the growth of shrimps consumption generally influenced by the growth of economics condition and then capable to increase the luxury food item consumption.

The four highest countries as an Indonesian shrimps export destination is Japan, US, Hong Kong and Singapore. Singapore in this case just as a transit country, and then the shrimps will send to others countries. There is a table in which shown the high rate of Indonesian shrimp export.

Table 2.2
Indonesian shrimp Export
Based on country destination
During 1995-2003
(Billion US $)

Destination Country	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	889,193.0	773,212.0	698,820.4	636,139.2	517,688.6	611,380.0	565,569.2	506,326.0	473,314.0
%	86.2	76.7	94.9	92.4	90.2	91.1	89.3	87.3	85.9
Hong kong	30,680.6	21,039.7	4,236.0	4,774.2	6,944.1	6,851.1	6,271.3	6,138.7	6,017.8
%	2.97	2.1	0.006	0.007	1.2	1.02	0.01	1.06	1.09
Singapore	27,280.2	15,957	4,973.6	4,017.4	6,045.6	5,945.3	7,452.4	7,942.6	9,217.1
%	2.6	1.6	0.007	0.006	1.1	0.006	1.2	1.4	1.7
Malaysia	1,606.1	1,625.7	723.5	458.8	2,336.8	3,405.2	8,125.8	9,571.0	10,034.4
%	0.015	0.016	0.001	0.0007	0.004	0.005	1.3	1.7	1.8
Australia	2,879.9	2,454.8	469.0	424.6	452.3	925.8	1,410.1	2,744.9	2,064.1
%	0.027	0.024	0.0006	0.0006	0.0008	0.001	0.002	0.5	0.4
US	51,289.0	107,045.0	10,599.8	14,444.5	14,469.7	16,314.5	16,196.9	16,783.9	17,824.3
%	4.97	10.6	1.4	2.1	2.5	2.4	2.55	2.89	3.2
England	9,847.7	8,020.0	1,541.3	2,775.8	3,985.4	4,212.7	6,030.9	5,931.5	6,732.2
%	0.095	0.079	0.002	0.004	0.006	0.006	0.009	1.02	1.2
Holland	11,315.4	9,426.9	1,981.0	4,137.6	4,013.0	6,853.7	6,503.9	5,928.4	6,774.3
%	1.1	0.093	0.003	0.006	0.007	1.02	1.02	1.02	1.2
France	8,653.8	10,034.7	1,250.8	1,425.8	1,391.0	1,703.3	2,033.1	3,287.7	2,749.4
%	0.083	0.099	0.002	0.002	0.002	0.0025	0.003	0.56	0.49
Germany	3,983.1	5,105.0	617.0	621.2	774.0	1,361.0	1,635.2	1,781.1	2,019.0
%	0.039	0.05	0.0009	0.001	0.001	0.002	0.0026	0.3	0.36
Belgium	13,939.7	9,778.9	1,560.4	2,670.2	3,030.6	2,011.4	1,897.9	1,638.1	2,249.9
%	1.4	0.097	0.002	0.004	0.005	0.003	0.0029	0.28	0.4
Others	31,003.6	44,971.7	9,704.3	16,296.4	12,457.5	10,386.9	10,338.0	11,672.6	12,149.5
%	3.005	4.46	1.3	2.4	2.2	1.5	1.6	2.01	2.2
Total	1,031,669.0	1,008,472.0	736,477.1	688,185.7	573,588.6	671,350.0	633,464.7	579,746.5	551,145.7
%	100	100	100	100	100	100	100	100	100

Source: Indonesian Statistics, Center Bureau of Statistic 2003

Export to Japan facing the higher level in 1995 and 1996 which in 889,193 and 773,212 point made us know that the higher level shrimp export came before monetary crisis in 1997. After 1997 the total of shrimp export goes down and fluctuated, but it doesn't affecting that shrimp still as a higher level in contributing the export value.

Since a long time ago, the main destination countries of Indonesia export goes to Japan, The United States of America and Singapore. In 2003 it was export to Japan which increased compare to the last year (from 52,078.3 thousand tons to 53,200.1 thousand tons. The export to the USA decreased from 6,606.3 thousand tons to 6,523.1 thousand tons). From 1995 until 2003, the percentage never less than 70 % from the total agriculture export. Different with US and Singapore which position in second and third place which the percentage of export never more than 11 % from total agriculture export, export which goes to Japan relatively in stable amount. The changes of shrimp export to Japan absolutely affecting the total agriculture export that's why it needs to be more studied and researched in order to made our total agriculture export rise time by time by improving the shrimp productions.

2.3 The growth of Indonesian shrimps exports to Japan

Majority, Indonesian shrimps export goes to Japan is a Black tiger shrimps in size 31-34. The Japan demand for shrimps is a very situational condition; it has a moment where the demand really high and small. Generally, shrimps consumption relatively high when:

~ New year celebration in which on 1-15 January.

~ Graduate celebration on the end of February until first of March.

~ Official employee celebration on April first.

~ New student celebration on the end of March until April first.

~ Cherry Blossom festival happened on March until May.

~ Golden week on April 29th till May 5th.

~ Wedding season on March till June.

~ First mid year subsidy payable on July.

~ Buddhist Obon Festival on 12-16 August.

~ Spring season on November first.

~ Second mid year subsidy payable on December.

~ Natal celebration on 20-25 December.

~ New year preparation on 26-31 December.

All of this day actually has a high contribution for the total shrimp demanded by Japan people. There is a table shown the total shrimp demanded by Japan people:

Table 2.3
Indonesian shrimp Demand
During 1982-2003
(Ton)

Year	Quantity demanded (Ton)
1982	167,020.5
1983	170,263.9
1984	168,051.8
1985	175,168.0

1986	237,712.8
1987	275,408.6
1988	393,816.1
1989	389,140.4
1990	446,419.6
1991	481,220.6
1992	488,884.8
1993	630,008.0
1994	763,376.2
1995	889,193.1
1996	775,517.6
1997	698,820.4
1998	636,139.2
1999	517,688.6
2000	611,380.0
2001	565,569.2
2002	585,140.0
2003	598,452.0

Source: Indonesian Statistics, Center Bureau of Statistic 2003

Japan demand for shrimp from Indonesia decrease on 1997; its all actually caused by the increase of shrimp price, and the most important things is the weak of yen exchange rate against US Dollars. This condition also supported by Indonesian shrimp production in that time facing any disease in which attacking Indonesian shrimp cultivation. The disease succeeds in decreasing the shrimp export up to 11 percent.

2.4 The Indonesian price of shrimps growth

The shrimp price in Japan and in Indonesia is relatively stable, so different price in Japan increase continually with no high dispute. But in 1997, the shrimp price sharply increase because of Indonesian economy crisis made the Rupiah

exchange rate decrease from Rp 2,385 per US $ to Rp 4,650 per US $. The table shows the fluctuation of shrimp price in 1997:

Table 2.4
Indonesian shrimp Prices
During 1982-2003
(US $/kg's)

Year	Quantity supplied (Ton)	shrimp Prices (US $/kg's)
1982	167,020.5	7.71
1983	170,263.9	8.12
1984	168,051.8	7.78
1985	175,168.0	7.31
1986	237,712.8	9.02
1987	275,408.6	9.28
1988	393,816.1	9.75
1989	389,140.4	8.10
1990	446,419.6	7.72
1991	481,220.6	9.07
1992	488,884.8	8.56
1993	630,008.0	10.25
1994	763,376.2	11.93
1995	889,193.1	13.53
1996	775,517.6	11.67
1997	698,820.4	10.01
1998	636,139.2	7.19
1999	517,688.6	10.26
2000	611,380.0	11.31
2001	565,569.2	9.52
2002	585,140.0	8.65
2003	598,452.0	7.91

Source: Indonesian Statistics, Center Bureau of Statistic 2003

From the data above, it is shown that the demand of shrimp decreases in 1997 actually not caused by the shrimp prices. The significant decrease of price for more than 2 dollars in 1998 cannot increase the demand. On the contrary, it

sloped down. Japan imposed the policy to limit the shrimp import from Indonesia because there was shrimp disease in 1997.

2.5 The growth of Japan GDP

Table 2.5
Japan GDP
During 1982-2003
(Million Yen)

Year	Japan GDP (Million Yen)
1982	270.601
1983	281.767
1984	300.543
1985	320.419
1986	334.609
1987	348.425
1988	371.419
1989	396.197
1990	424.537
1991	451.297
1992	463.145
1993	465.972
1994	469.240
1995	482.930
1996	510.802
1997	521.862
1998	515.835
1999	511.837
2000	513.534
2001	505.304
2002	503.027
2003	511.644

Source: Indonesian Statistics, Center Bureau of Statistic 2003

Japan is an industrial country. Based on economics growth rate, Japan included in develop country with income per capita more than US $ 20,000. Japan national income increase every year where shown people prosperity rate time by time become stronger. In 1990, Japan income in 424,537 million yen in which at the third highest in the world after Swiss and Luxemburg. Japan facing recession caused yen appreciation against US$ in 1993.

The employees in Japan are still able to increase their salary elasticity following the increase of yen value which made the price in Japan increase highly. Japan Economy run with high production cost, but this condition cannot affect the trade between Indonesia and Japan. It is proven by the quantity of Indonesian Shrimp export to Japan gradually increased and Indonesia is still as the major shrimp exporter to Japan.

2.6 The exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

Since 1982, Indonesian exchange rate year by year goes down even not significantly. This condition happened because of the differences among Indonesian inflation level with others countries level, and this problem need to be solved in any appropriate action to make the Rupiah exchange rate better. In high inflation rate, the Rupiah exchange rate will decrease sharply; that's why government needs any correction by devaluation action. Till 1997, Indonesian government was doing devaluation action 4 times. They are in 1971, 1978, 1983 and 1986.

Table 2.6
Indonesian exchange rate against Japan Yen
During 1982-2003
(Rp/¥)

Year	Exchange Rate (Rp/¥)
1982	3.10
1983	4.35
1984	4.35
1985	5.65
1986	10.23
1987	13.50
1988	13.84
1989	12.66
1990	13.98
1991	15.62
1992	16.62
1993	18.96
1994	22.05
1995	22.50
1996	20.60
1997	43.00
1998	70.67
1999	71.20
2000	84.00
2001	79.83
2002	73.77
2003	79.53

Source: Yearly report of Central Bank 1982-2003

Devaluation is able to fix the trade level condition, mostly by increasing the export and reduce the import. Devaluation policy which was done in 1978 was not only capable in increasing the non-oil export by 55.1 %, but also increasing the import rate by 27 %. In 1983, Rupiah devaluation was capable in increasing

the export rate by 36.6% and reducing the import by 11.9%. While in 1986, the devaluation was capable in increasing the non oil rate by 41.2 % and increasing the import level by 13.1 %. This condition still can be accepted by government because the increase in import was relatively smaller than the increase of export which can fix the trade level.

2.7 Total labor in shrimp production

Since a long time ago, Indonesian people earn their living on fishery sector. Shrimp fisherman and breeder is one of all kind breeders which have better standard living. Year by year, the total labor where embrace in shrimp production increase. The increase of demand and price from the data showed that since 1982 to 2003, the total labor is actually increased and never decreased in value. The total labor increase is never less than 4 thousand peoples; it shows to us that shrimp production is a good work force and actually helping government by reducing the unemployment.

Table 2.7
Labor
During 1982-2003
(Person)

Year	Labor (person)
1982	188,655
1983	197,041
1984	211,348
1985	214,287
1986	219,708

1987	238,023
1988	243,667
1989	250,991
1990	252,105
1991	268,183
1992	277,835
1993	291,939
1994	309,279
1995	324,909
1996	340,914
1997	359,852
1998	372,824
1999	445,304
2000	310,528
2001	338,269
2002	415,074
2003	467,380

Source: Processing, Indonesian Statistics, Center Bureau of Statistic 2003

By 20 years, the total labor was increased in 278,725 people. It means that only by 20 years, the shrimps total labor increase more than 147.7 %. What a significant value people really have a good expectation in this shrimp business. The data above was actually based on all the people who work in shrimp productions. There are people as a ship crewman and fishpond crew.

2.8 Land in shrimps production

Geographically, Indonesia is a perfect place to produce shrimp. Indonesian shrimp production categorized into three; there are sea shrimp productions, common water work shrimp production and shrimp cultivation production. The majority Indonesian shrimp production still came from sea water work. On 1989, sea fishery production contributes more than 54.45 % from total Indonesian

shrimp production and then decrease in the next two years become 48.33 % on 1991. In the years followed, the shrimp production increase anymore with 50 %, whereas shrimp cultivation contributes on 1998-1997 about 45 %.

After year 1997, the growth of shrimp cultivation becoming better, it can bc shown in shrimp cultivation contribute into total shrimp production increase. In 1983 shrimp cultivation contribute 13 % and its contribution increased to 18 % in 1983, 24.43 % in 1986, and become 45.1 % in 1991. In the contrary, sea shrimp production goes down year by year in contributing the total Indonesian shrimp production. Begin in 1978, it contributes 79 % and goes down become 68 % in 1986, and in 90's became 50 %.

The shift of shrimp production orientation from sea shrimp to shrimp cultivation actually based on raising agricultural production export program (PROTEKAN) 2003. The main goal of PROTEKAN 2003 is to achieve fisherman farmer to be more progressive, prosperous, equitable and autonomous.

Table 2.8
Land
During 1982-2003
(Ha)

Year	Land (Ha)
1982	21,741
1983	242,308
1984	225,197
1985	238,868
1986	241,445
1987	263,162
1988	268,743

1989	269,887
1990	268,326
1991	290,933
1992	304,506
1993	331,761
1994	326,908
1995	332,365
1996	344,759
1997	363,135
1998	406,973
1999	419,282
2000	436,211
2001	449,954
2002	458,012
2003	481,066

Source: Processing, Indonesian Statistics, Center Bureau of Statistic 2003

CHAPTER III

REVIEW OF RELATED LITERATURE

3.1 Theoretical Review

3.1.1 Gellwyn Jusuf and Rokhmin Dahuri (march 1999)

Background[1]

Monetary and economic crisis has induced every aspect of development in Indonesia. Visually, the impacts created by the crisis such as declining economic activities and decreasing communities' buying-power, have raised some social problems throughout the country. Mixture between economic crisis and social problems then triggers a new crisis, which is political crisis. This crisis itself gives additional burden into the more-than-enough difficult social and economic condition of people in Indonesia. The extend and severity of the crisis is so vigorous which affected almost all of status and level of communities in Indonesia. Only small group of people seems unaffected by the crisis.

This occurrence could happen because economic grouping in Indonesia is structured like a standing pyramid, where the top of it was board by only a few people who have high income, whereas the bottom was extensively contained by almost all of the groups that have much lower income. That is why the lower their position within the pyramid, the

[1] THE IMPACT OF THE ECONOMIC CRISIS ON INDONESIA'S FISHERY SECTOR Gellwyn Jusuf and Rokhmin Dahuri
March 1999

impact would feel more devastating on the sectoral basis almost all development sectors have been affected by the crisis. However, the effect and intensity are different from one sector to another. As we all know, economic crisis was triggered by continuously decreasing value of our currency against US dollar. As the consequence, the price of input goods/materials especially the imported one, in production process has increased dramatically. On the other hand, the weakening of Rupiah has opened opportunity because our export commodities are relatively cheaper, thus more competitive in the international market.

However, this opportunity could only be applicable to commodities which have high content of local production input factors or low imported-good content. Those kinds of commodities originally come from resources base industries, such as agriculture and fisheries. Shrimp and tuna or skipjack have for long been the primadonna (in fisheries sub sector) for non oil and gas export commodities of Indonesia. Now, they become more important commodities than ever. In the globalization era as today, global market has becoming more integrated and free.

Flow of commodities from one country to another or one region to other will be driven by demand and supported by efficiency in production process and economic system within a country. Therefore, it is our principal challenge to find the way to increases efficiency and to produce more competitive commodities for global, as well as domestic market. Indonesia's Agricultural (including fishery) commodities have potential

and opportunity to compete in the global market. Evidently, Gross National Product (GNP) during 1997-1998 shown that agriculture is the only sector that still shown positive development, although the value is only 0.22 percent (Kompas, January 1998).

Therefore, given its deserved attention and political will from the government, the fishery sub sector could become a locomotive for economic development in Indonesia during the economic crisis as well as in the future. This statement is based on four major reasons. First, fisheries resources potential in Indonesia, either from ocean waters fishing or fresh water/marine aquaculture was still believed under sustainable exploitation level. It means that this sector could still be developed to raise its contribution for national development. Second, its contribution to agriculture sector has been showing increasing trend from time to time. During REPELITA VI, statistical data shown that fishery sector has grown approximately 5.2 % per year (Directorate General of Fishery, 1998).

Whereas for the next five years development plan (1999-2003), this sector was projected to grow at 6 % per year. Third, world fish increasing demand was depend on supply from capture fisheries that has a tendency to decline over time. Coupling with climatologically and suitable location constraints to develop extensive culture fisheries within developed countries; Indonesia has a real chance to cater those demands. Fourth, fisheries resources have been known as a healthy food. With the increasing health awareness around the world, demand for fish

commodities will be over increasing. Based on those above arguments and faced with the economic crisis in progress, this paper provide an impact analysis of economic crisis for fishery sub sector, both in macro and micro framework. This analysis was based on structural and behavior changes within fishery commodities market both in domestic and global market. It then suggests strategies for economically sustainable fisheries development of Indonesia.

The market of fishery products

Conventionally, market for fishery products can be distinguished into domestic market and export oriented market. Domestic market is aimed at absorb is fisheries products by in-country demands and consumers, whereas export market was intended to cater abroad consumers. One important contribution from fishery sub sector to the in-country consumers was providing inexpensive high quality animal protein sources.

Domestic market is a potential market because unlike other agriculture products, which have inelastic demands condition, fishery products have high elasticity value toward demands (E=1.4) (Directorate General of Fishery, 1998). Total domestic fish consumption during 1992-1997 has increased 4.48% per annum; meanwhile consumption per capita increased 2.8% per year. In 1997 it was reported that total fish consumption was reaching 3,932,341 kilograms, and consumption per capita was 19.57 kg. Projection for 1999-2003 stated that total fish

consumption could grow 4.32% per year and per capita consumption increase 2.84%. If domestic fish consumption is to increased to a level like Japan, which is 100 kg per capita per year, the domestic market for fishery products is high, therefore a big incentive to be developed.

Fisheries export products could be categorized into food commodities, which grew at 7.78% per year during 1992-1997, and nonfood commodities, at 24.78% per year. However, in a closer look, export volume for food commodities is more dominant. In 1997, food commodities contributed 89.63% from total export volume of fisheries products. Data shown that export value during those period has increased 10.27% per year, 10.52% per year for food commodities value and 6.67% per year for non-food commodities value.

The growth of export value for food commodities is higher than its volume growth. It means that value (price) per unit commodities has risen, vice versa with the non-food commodities. Based on 1997 data, export volume of food commodities consisted of shrimp (15.29%), tuna/skipjack (16.55%), other fishes (50.93%) and non-fish. However, in terms of export value, shrimp contributes 52.7%, tuna/skipjack 13.2% and other fishes 23.9%. This confirmed that shrimp and tuna/skipjack were still significant products/commodities for obtaining much needed hard currency by the government. Other facts also shown that although export volume of shrimp was decreased by 0.6% per year during 1992- 1997, but its value

was increased 7.32% per year. Those all above indicate that shrimp and tuna/skipjack will still be important export commodities from Indonesia.

The impacts of crisis on the economy

Market demands are dominant factor to encourage business people to undertake economic activities. The tumbling of Rupiah exchange rate toward US Dollar has increased import commodities prices. In effect, production cost for products with high import contained- material has also risen significantly. This misfortune happened to fishery sub-sector too. For fishing industries (commercial fisheries), most of components and spare parts for its boats, even the fishing vessel itself, still relies heavily on imported goods. Whereas, fishes captured in Indonesia waters are multiple species in nature.

Each species has its own specialized market demand and therefore its prices. Consequently, different type of fishing has received different impact from the crisis. For the big pelagic fishing industries that aimed to catch tuna/skipjack as export oriented product, increased of production cost (spare parts, maintenance, fuel, etc) was well balanced by their highly increased earning value. In facts, these industries were experiencing high profit within short period of time. These industries then become very attractive for investment. As illustration, one export-oriented company in East Indonesia dares to guaranty fisherman in their area to receive at least Rp 500.000,- per month, as long as they promised to sale their catch (tuna/skipjack) to that company. Such a high profit condition was not

enjoyed by other fishing activities that have not aimed to catch/produce export-oriented goods.

However, almost all marine fisheries commodities sold for domestic market, such as Saridine, white pomfret, Indian Mackerel (Rastriliger sp.), and squids, have also gained price. For example, the authors found out that alone the North Coast of West Java (from Cirebon to Jakarta), the price of some marine fishes including Sardine, Indian Mackerel (Rastriliger sp.), white pomfret, Pony Fishes (Peperek), squid, and Rajungan, has increased in the range of two hundred to five hundred percent during the crisis. Increased price for these commodities were triggered more by substitution demand for other animal protein such as meat, eggs and chicken which have been increased more steeply. Moreover, some species have potential to become export oriented products, such as hairtail fishes (layur). Usually hairtail fishes were only consumed by local market, but in mid 1998, some exporters began to buy this species for export market.

Its price was increased from Rp 2.000,-/kg to Rp 6.000,-/kg for export quality products. Dualism impact affecting fishery sectors also happened to fish culture activities. Shrimp prices as an export commodities rise very high. It was reached Rp 100.000, - to Rp 120.000,-/kg for size of 30 at one time. Even though production cost for shrimp culture was also rise (medicine and food) but the selling price was rise even more than enough to give attractive profit. This situation was not

accompanied by fresh water culture activities. Production cost increased, especially for food-pellet, was not followed by appropriate price increased.

Many fish farmers in Cianjur, Sukabumi and Bogor went bankrupt. This is happened to carp (gold fish) culture as well as catfish culture. Recently, when exchange rate between Rupiah and US Dollar reach stability (momentarily) level of Rp 8.000-Rp 8.500, some fish farmers start to begin their activity again. Their problems now are how to get the increased capital needed to start. Statistic figures on investment in Indonesia per 30 November 1998 have shown continuous declined during 1994 to 1998. From the table above, decreased value in domestic investment was higher than foreign investment. This condition will not support internal recapitalization for fishery sub sector to be able to catch business opportunities which are still high. Presidential Decree No. 96/1998 on List of Prohibition Activities for Foreign Investment put fresh water culture on the list. While in Presidential Decree No. 99/1998 on List of Activities for Small Scale Investment, categorized fishery sub sector as activities for small scale investment and for middle-big scale investment it has to cooperate with the small scale investor.

Fishing effort for Indian Mackerel (kembung), Flying fishes (ikan layang), trevalies (selar), shrimp, groupers, squids, sea cucumber, jelly fishes, ornamental fishes (fresh water and sea water) has been reserved for small scale investor. To develop those activities and remediate capital scarcity, government launched some credit schemes with low interest rate.

Those credit schemes are credit for primary cooperative members (KKPA) with maximum value of 50 million and interest rate of 16%/annum; credit for cooperative with maximum value of 350 million and interest rate of 16%; and credit for small and micro entrepreneur (KPKM) (Mulyati, 1998). As a business incentive, market and profit were significant factor, but social condition and technology also play important part in it. Cases of shrimp ponds being ravaged by mobs were discouragement for potential investor as well as on-going activities.

To mitigate and remediate this situation, we have to find some mechanisms to be able to distribute part of the profit earned by the investor to the surrounding communities. Technological factor is also important to notice because some fishery activities classified as a capital intensive activities. Capital intensive activity means high opportunity cost and raises the business risk. Meanwhile, export-oriented products either originated from catch or culture activities have to incline to international codes, such as environmentally sound production and code of conduct for responsible fishing. In sum, Indonesia has to seriously consider all of that aspect if we want to increase fishery products competitiveness in the global market. In the aquaculture sector, especially for brackish water, technology development will eventually extend potential area for aquaculture which comes from unproductive marginal land, wasteland and used pond without the necessity to convert mangrove forests or other productive land. For instance, biocret technology makes shrimp culture in sandy area feasible.

With such technologies, mangrove conversion rates could be slowed down which will be a good news for sustaining the development itself. As mentioned earlier, impact of economic crisis for fishery sub sector has dualism in nature. One side shown positive impacts while the other side shown negative impacts. From macro economic point of view, export earning target was well achieved. The 1997 data even shown that although export volume target was only achieved 86.20% (738,300 ton) but the value has already reach 104.06%. (US$ 1,970 million). Hence form this side; the crisis has had a positive impact. However, we still have to remember that those earning still originated from conventional products such as shrimp, tuna and skipjack.

Whereas products from crustacean, mollusc, coelenterate, echinodermata and algae (seaweed) have not been developed optimally. In the future, demands for products originated from those kinds of fishery such as marine biotechnological products (food supplement, medicine, cosmetics and bioremediation) will surely be increased. These potentials need to receive serious attention and support from the government for its development. Seaweed farmers from Gili Air, West Lombok and Gerupuk Beach, East Lombok and Nusa Penida Island, Bali have enjoyed a price hike for their products. Dried seaweed price was increased fourfold from Rp 900/kg to Rp 3,500-Rp 4,000. - In 1998. But that happened because of our currency weaknesses against US Dollar, not because we succeed in added the value of the commodity. Information from the Directorate

General of Fishery (1998) states that export markets for our products were Europe (33%), Japan (30%) and United States (17%). It means that if Japan has economic contraction for example, then perhaps they will reduce their consumption on our products. That is why we need to anticipate by diversifying our market abroad.

For the export-oriented-products entrepreneurs, both in catch and culture fisheries, the crisis has really gift fortune for their well being. However we have to aware about how those fortune be distributed within fishery sub sector as a whole. It is important to notice that most fishers still work in artisanal fisheries with their outboard motor and limited fishing areas, which can not catch prime commodities such as tuna and skipjack. Also most shrimp-farmers were micro scale investor that can not provide enough capital to buy some production factors (food, etc). Coupled with increasing price for food, their economic condition was worsening. The analysis has shown that even in the economic crisis, fishery sub sector is still giving positive contribution for hard currency earning. It means that, country wise fishery sub sector gives significant contribution but most people who work in fishery sub sector were also getting worse economically. That is why we need to find the way to increased sectoral contribution but at the same time also lift up the well being of all people involved. It is important to remember that even before the crisis swept Indonesia, the poorest community in Indonesia was those who work in fisheries.

The impact of crisis on the sustainability of fisheries resources

The nature of operational unit within fishery sub sector is exploiting the resources. Therefore the crisis could trigger much bigger and intensive exploitation efforts. This is true for both export oriented fishing and artisanal fishing, although the reason could be different. Export oriented fishing is triggered by attractive price, while artisanal and traditional is triggered more by daily necessity to live. This in turn will increased pressures on fisheries resources and aquatic environment. In aquaculture, high shrimp price is suspected to trigger much higher mangrove conversion rates.

This action eventually leads to environmental disaster as well as threaten the sustainability of the fisheries activity itself. Failure of shrimp ponds throughout the North Java coastal areas and diminishing mangrove forest in Nusa Kambangan Island were small examples that need not to be repeated. Technology development in aquaculture has to focus not only for increasing product and lowering cost, but also for increasing potential areas and environmental friendly procedures. With that, aquaculture does not have to always convert mangrove forest or other productive land but can use abandoned/old pond, wasteland or other marginal and unproductive area. The technology also has to deal with various diseases inflicting fish and shrimp culture. Elevated numbers and intensity of diseases is suspected as the negative excess from environmental changes and manipulative food technology. Institutionally, profit incentive that

triggered shrimp pond development will in time triggered inappropriate land use allocation.

As we understand, land use is a very sensitive issue because of its closeness with many social problems. In capture fisheries, Indonesia has to follow certain civil codes from international regimes that indicated the needs to employ responsible fishing and not using destructive fishing technology. In anticipation, it is suggested to create a commission for fishery scientific stock assessment which is be coordinated with the Board of National Planning and Development (BAPPENAS) to support the code of conduct for responsible fisheries in Indonesia. For example, even though trawler is the most effective fishing method to catch shrimp, but its free operation could creates unfortunate social problems. Therefore, it needs precise fishing ground mapping to continuously review the appropriateness of its employment area and the economic scale of effort.

Conclusion

From analysis above, it concludes that impact of economic crisis to fishery sub sector has dualism in nature. Export oriented fishery received very high positive impacts because its products become more competitive, but domestic oriented fishery received moderate positive impacts. However, freshwater aquaculture, industry particularly those which use high input of supplemental food (pellet) like "common carp" aquaculture, received negative impacts, because increased of cost production was not followed by substantial selling price. On the other hand, with the increase

of other animal protein sources such as eggs, meat, or chicken, fish products have potential to substitute their position. Even though export oriented entrepreneurs enjoyed significant improvement in their well being, other players in this sector were economically getting worse.

Therefore, this sector needs to launch programs that able to empower those groups of unfortunate. From environmental point of view, this crisis could trigger over exploitation and increase pressures for both coastal and marine resources and land use, with different reasoning. It therefore needs to be anticipated early on the difficulty to plan and execute an appropriate land use if this situation is still happening. An economically sustainable fisheries development requires the management which enforces that the level of fisheries development should not exceed the carrying capacity of a given coastal/marine area.

3.1.2 Quoting from Yana van der Meulen Rodgers (1994)

Indonesia's remarkable macroeconomic and trade performance in the 1970s and 1980s has motivated comparison with the high performance Asian tigers and has provided strong evidence for economic reform contributions to export led growth (Balossa, 1988, and Lee and Naya 1988). Gradual policy reform in finance, industry, and trade toward greater market orientation worked to diversify Indonesia's structural financing of economic growth through non-oil exports and private sector investment.[2]

[2] Yana van der Meulen Rodgers; "Indonesia's Macroeconomic and Trade Performance", *www.hiid.harvard.edu*

Being led by high foreign borrowing and the 1973 and 1979 oil booms, Indonesia experienced strong economic growth and export performances during the primary boom period from 1970 to 1981. Although the real annual GDP growth average is 8 percent, Indonesia lagged behind its regional neighbors in the transition from primary commodity exporter to manufactured goods exporter. During the Economic Retrenchment Period from 1982 to 1985, Indonesia's real annual GDP growth dropped to 4 percent and current account deficits worsened as the oil price declined and debt service costs increased. In the Non-Oil Recovery Period from 1986 to 1990 as the oil price stagnated, Indonesia's non-oil export sector surpassed oil in foreign exchange earnings, and average real GDP growth rose over 6 percent per year.

Indonesia's real manufacturing export growth of at least 28 percent per year during the 1980s rivaled its regional neighbors. Oil's contribution to total export earnings dropped from 82 to 39 percent between 1982 and 1989. Star performers, particularly plywood, textiles, and garments, responded favorably to the government's price and investment incentives. However, several natural resource export flows ended abruptly following restrictive trade policy to encourage domestic manufacturing production.

During the 1970s Indonesia lagged behind its neighbors in the transition from primary commodity exporter to manufactured goods exporter. In 1979, Indonesia manufacturing exports constituted less than 2 percent of total exports is much lower than the figures for Korea,

Malaysia, the Philippines, and Thailand. However, the sharp oil price declined between 1982 and 1986, from approximately 35 to 12 dollars per barrel, led the oil and gas export share to fall almost 30 percentage points from a peak 82 percent. Non-oil exports fueled the export recovery after 1986.

Real non-oil export growth of 17 percent per year and real manufacture export growth of 31 percent per year from 1986 to 1990 outperformed most neighbors. By 1990, Indonesian manufactured exports share of total export revenues had raised to over one third, and non-oil exports had surpassed oil exports as the main contributor to export earnings. In 1985, plywood, textiles, and garments had emerged as the leading manufactured exports. Real plywood earnings rose at least 23 percent per year during the 1980s, leading Indonesia to rank as the world's largest plywood exporter by value. However, plywood's rising export share had stabilized by the late 1980s as textiles, garments, and footwear, grew more rapidly.

Large exchange rate devaluations in 1978, 1983, and 1986 improved domestic price incentives and had a significant impact on manufactured exports (Rodgers, 1993). By 1990 Indonesia's real effective exchange rate index exceeded the next closest competitor by a factor of two (Intal, 1992). Increased domestic and multinational investment following improvements in the investment climate also made a significant contribution to Indonesia's manufactured export growth. To further

stimulate manufactured exports, Indonesian firms broadened their export markets in Japan and the U.S to include other Asian countries, particularly Korea, Hong Kong, and Taiwan.

3.1.3 Quoting from Prema-Chandra Athukorala and Bambang H. Santosa (1996)

The linkages analysis due to Hirschman (1958) was widely used as a planning tool in developing countries during the import substitution era (1950s and 1960s). The key premise of Hirschman's policy advocacy is under the existing domestic demand conditions, a country can maximize developmental gains from limited invertible resources by directing investment flows towards key sectors. A key sector was defined as a sector which has maximum linkages with the rest of the economy in terms of potential sales to other sectors (*forward linkages*) or purchase from other sectors (*backward linkages*).

By the mid 1970s, there was sample evidence that import substitution policies had largely failed. Consequently an increasing number of countries have since then been opening up their economics and integrating them into the international economic system. Policy makers in developing countries often place emphasis on inter-sectoral input linkages in determining sectoral priorities in export development policy,

particularly in designing export promotion schemes and in screening and monitoring export oriented foreign direct investment. [3]

The use of linkages as a policy criterion in the context of export oriented industrialization suffers from two fundamental limitations. First, it runs counter to the conventional factor proportions considerations. Second, it overlooks the nature of market potential for manufactured exports from developing countries. When these two considerations are appropriately taken into account, there are strong grounds for the alternative view that attempts to forge linkages through direct policy intervention can be both ineffective and counterproductive.

In an open economy, the factor intensity of production depends not only upon the technology which underlies the structure of foreign trade. This is because participation in international trade provides the economy with the opportunity to specialize in products in which it has comparative advantage. The importation of intermediate inputs for export production, therefore, involves an implicit substitution of labor for relatively capital intensive intermediate products in the production process. Resource allocation consideration derived from the principle of comparative advantage seems to make a strong case for the development of footloose (loosely linked) export industries in a labor abundant economy (Riedel 1975 and 1977).

---

[3] Prema-Chandra Athukorala and Bambang H. Santosa; "Gains From Export Growth: Do Linkages Matters?";*www.econpapers.hhs.se*.

In analyzing market opportunities for exports from developing countries, it is useful to distinguish between four different product categories of manufactures: (1) resource based manufacturing activities which involves further local processing of material previously in raw state; (2) light (labor intensive) consumer goods, (3) component production and assembly (4) mature technology final products. A resource rich country (like Indonesia) has considerable room for the expansion of exports in the first category. However, quite apart from the obvious limits which would eventually be set by the resource endowment, there are other constraints on export success in this arena (Helleiner 1973, p.25).

Since the late 1960's production activities in the latter area have shown phenomenal growth as a new aspect of modern world trade. This phenomenon has been the outcome of the growing ability of modern industry to 'slice up the value chain' of goods traditionally viewed as skill capital, or technology-intensive and shift the labor-intensive slices to low locations (Krugman 1995).

Based on the export experience of Indonesia during 1985-1995, this policy emphasis is unwarranted. Import intensity and linkages of most of the dynamic product areas are largely determined by factors beyond the control of the individual exporting nations. Emphasis on linkages can therefore be both ineffective and counterproductive. In the context of the ongoing process of internationalization of production, industries characterized by high import intensity and hence low domestic input

linkages have the potential to make a greater contribution to employment expansion and growth of net export earnings.

3.1.4 Quoting by Theo H. Jonker Hiroshi Ito Hiroji Fujishima (2002)

The composition of shrimp imports changed notably over the years. Although the total volume of shrimp imports decreased, the quantity of imported processed and prepared shrimp increased significantly, and it will continue to grow in the future. The shares of cultured and natural shrimp also changed. The share of cultured shrimp in all imported frozen shrimp rapidly increased from 0.9 percent in 1982 [4]to 45.6 percent in 2001. From 1993–2002, the five major supplying countries to Japan have remained the same, namely, China, India, Indonesia, Thailand, and Vietnam. Although Thailand lost its position as second largest exporter to Japan (because the country exports more to the US now),

Japanese buyers expect a continuous and growing supply of processed shrimp from Thailand because of its great potential in food processing. About 70 percent of the imported shrimp go to the restaurant and catering market, and the other 30 percent is sold by supermarkets for home consumption. In the particular supply chain for the restaurant and catering industry, the wholesaler specializing in shrimp distribution has the pivotal role. The demand for processed and prepared shrimp is increasing in the restaurant and catering market. As for the distribution of processed

[4] The World Bank Agriculture and Rural Development Discussion Paper Food Safety and Quality Standards in Japan *Compliance of Suppliers from Developing Countries Theo H. Jonker Hiroshi Ito Hiroji Fujishima* Internet www.worldbank.org E-mail ard@worldbank.orgAll rights reserved.

and prepared shrimp, the supermarket chain has the dominant role in the supply chain. Supermarket chains have less severe quality control requirements for shell-on shrimp than for processed and prepared shrimp.

Import development

Shrimp is the largest import group - both in volume and in value - in the category of imported fisheries products to Japan. The imports of all types of shrimp in 2002 totaled to 294,046 MT or 320,374 million yen (US$2.7Billions), which was approximately 19 percent of the total value of imported fisheries products. Japan is the second largest shrimp buyer in the world, after the US. According to the FAO, Japan and the US accounted for 49 percent of the total world import of shrimp in 1999. Table 2 shows the shrimp imports by the major buying countries.

Table 3.1.

Import of shrimp by countries, 1999

Country	*Volume (MT)*
US	279,912
Japan	517,688
Spain	92,380
France	57,544
Canada	51,667
Denmark	49,096
Italy	36,941

UK	30,570
Belgium	22,918
Hong Kong	19,609

Source: Shrimp Data Book by Ryuken Research Institute 2002.

Before 1963, shrimp imports were restricted by an import quota system, but after the liberalization, imports increased continuously along with the growth of the Japanese economy. In 1994 imports reached the highest level, 319,621 MT. Afterwards, they decreased to 280,000–290,000MT in recent years. A significant change in the composition of shrimp imports can be noted. Although the total volume of shrimp imports decreased, the volume of imported, frozen, peeled, tail-on shrimp, which are processed in such a way that they are ready for cooking (e.g., for tempura or for fried shrimp, called *fry* in Japanese), almost tripled from 1994 to 2001, reaching a volume of 30,226 MT in 2001. In addition, the imported amount of prepared shrimp with bread crumbs increased substantially from 4,558 MT in 1993 to 27,678 MT in 2002.

The increase of ready-to-cook or prepared convenience foods is an international trend, and the amount of prepared shrimp products will continue to grow in the future. The implication is that the safety requirements for raw material and processing in developing countries will be higher.

Supplying countries

Japanese imports of frozen shrimp from the top 10 supplying countries. The supplying countries are concentrated in Asia. From 1993 to 2002, the five major supplying countries to Japan have not changed. They are Indonesia, China, India, Thailand, and Vietnam. The ranking of these five countries has changed over the years, and the most outstanding change is Thailand's position. Thailand was the second largest exporter to Japan until 1995. However, gradually, the Thais have shifted their export to the US. The first reason was that the Japanese buyers have very precise quality requirements, yet the price they were willing to pay was not commensurate. The second reason was a problem with shrimp that smelled moldy (muddy), which will be explained in chapter 5 ("Problems and Experiences with Suppliers"). The problem was solved quickly, but it shifted the focus of Thai exporters on the US market, whose consumers are not so sensitive to this smell.

Table 3.2.

Top 10 of supplying countries of frozen shrimp to Japan

By volume *(1000 MT)*, selected years

Rank 1993 1996 1999 2002

Country	*Volume*	*Country*	*Volume*	*Country*	*Volume*	*Country*	*Volume*
1 Indonesia	60.1	Indonesia	64.1	India	52.8	Indonesia	53.6
2Thailand	51.5	India	55.5	Indonesia	50.6	Vietnam	41.5
3 India	36.8	Thailand	33.4	Vietnam	30.3	India	34.8
4 China	30.2	Vietnam	28.2	Thailand	19.3	China	19.6
5 Vietnam	28.8	China	16.3	China	13.5	Thailand	19.0
6 Philippines	17.5	Greenland	13.9	Canada	10.6	Canada	9.4
7 Greenland	17.2	Canada	8.9	Greenland	10.4	Russia	9.0
8 Australia	7.2	Philippines	8.7	Philippines	7.9	Argentina	8.8
9 Canada	6.2	Australia	6.6	Russia	5.8	Greenland	8.5
10 Bangladesh	4.4	Iceland	6.5	Australia	5.8	Philippines	8.0
Subtotal	259.9		242.3		206.9		212.2
Other countries	40.6		46.5		40.4		36.6
Total	300.5		288.8		247.3		248.8

Source: Shrimp Data Book, Ryuken Research Institute 2002.

The US overtook Japan as the main importer of Thai frozen shrimp (peeled and shell-on) in 1992. Since then, the US has continuously

expanded its imports from Thailand. In 2002 the US imported 115,105 MT compared to Japan's import of 18,987 MT. Table 6 provides a comparison of the frozen shrimp imports of Japan and the US from Thailand and the other major supplying countries.

Market and consumption

Currently, small-scale fishing companies in the coastal areas of Japan produce limited amounts of shrimp for the domestic market. During the 1960s and 1970s, however, offshore trawlers in the East China Sea caught significant quantities of Taisho shrimp (white type). The peak was in the 1960s with 50,000 to 60,000 MT per year. China also was actively involved in this fishing. As a result of over-fishing by both countries, in the latter half of the 1980s, the shrimp almost disappeared. Taisho shrimp is the most useful shrimp for *fry* (large size of 8 to 12 pieces per lb., headless) and for tempura (small size of 21 to 25 pieces per lb).

Taisho shrimp were the main source of shrimp consumption in Japan, especially for use in restaurants. In 1998 the consumption of shrimp, excluding lobster, per capita was estimated at 2,360g, compared to 1,920g per capita for the US. Japanese consumers are keen consumers of shrimp. Shrimp demand can be divided into two categories according to use: home consumption and consumption outside the home (*gaishoku*), that is, restaurants, hotels, catering industry, canteens, and lunchboxes. In terms of quantity, the ratio of home consumption to consumption outside the home is approximately 30:70.5 this ratio shows that the shrimp market

in Japan depends much more on the demand of the restaurant and catering industries than of home consumption.

The expenditures for *gaishoku* as a percentage of total food expenditures show a continuous growth (appendix 2). This growth is related to the increase in the number of working women. The expenditure for shrimp as a percentage of total food expenditures shows a decline, which may be caused by economic uncertainty, that is, shrimp are relatively luxurious food products and are considered an expensive ingredient for cooking at home. The peak home consumption was in the period of rapid economic growth from 1985–95, and declined after 1995. Calculated as follows: the consumption of shrimp in 1998 was 2,478g per household consisting of 3.31 persons on average. It means that consumption per capita was 747g, which was approximately 32% of the above-mentioned total per capita consumption in Japan (2,360g).

Problems and Experiences with Suppliers

The problems with imports and the experiences with the suppliers from developing countries are discussed in this chapter. They will be described separately for the selected products: shrimp. The analysis of the experiences of the Japanese private sector with the different supplying countries in complying with standards shows the strengths and weaknesses of the different countries. The final section touches on some factors that explain differences in performance in complying with standards.

Key problems

The infractions of shrimp products against the government sanitary standards from April 2000–April 2003 found in sampling inspections as part of the import procedure. The frequency of infractions during these 3 years by country of origin is as follows: 9 cases for China, 5 cases for Thailand, 4 for Indonesia, and 1 case each for India, Madagascar, Malaysia, and Vietnam. However, considering the large total of imported shrimp (almost 250,000 MT/year), 22 cases of infractions in 3 years are not many.

Notwithstanding Indonesia's aim to increase the export of shrimp to the US market, the Indonesian supply to Japan has remained stable since 1970. There is a good relationship between the two governments, and since Indonesia has a relatively well-developed industrial infrastructure, significant Japanese investments have taken place in the shrimp business. The production of processed shrimp (peeled tail-on Black Tiger) and of preserved shrimp with breadcrumbs has increased.

The reputation of Indonesian shrimp products is comparatively high in Japan. Significant problems have never occurred, except a few incidents in which the residues of antibiotics exceeded the regulatory limits. One large Japanese retail chain that is importing peeled tail-on shrimp directly from Indonesian factories uses only raw material shrimp grown without any antibiotics at all in culture ponds. Nearly all Japanese buyers are satisfied with the quick response of Indonesian suppliers to

solve problems whenever they happen. Furthermore, the Japanese buyers appreciate the food safety control system and the tracking and tracing system, although there are differences in the systems adopted by each supplier. Importers point out that the sense of hygiene among Indonesian laborers generally is not high, so the compliance with the food safety and quality standards of the production manual depends primarily on the skills of managers and foremen. Indonesia's recent political instability causes increasing worry among shrimp importers.

3.2 Conclusions

From related research, there is nothing about research in variables in which influencing the shrimp Japan import. Almost all related research only find out all kind of shrimp of Japan needs, volume, standard needs and etc. There is needed more research to find out about all kind variables in which having a good contribution in order to increase the Indonesian shrimp production and capability in export at high amount and actually in a better quality. All of related research said that shrimp is one of a good export prospect, but they didn't try to find out how to make the shrimp export increase. They just analyze what was happened in export and Japan needs in shrimp import.

There is an Table that shown the detailed of literature study review

Table 3.4

Literature Conclusion

Title	Year	Researcher	Objectives	Result
The impact of the economics crisis on Indonesian fishery sector	1999	Gellwyn Jusuf and Rokhmin Dahuri	The Indonesian shrimp export in monetary crisis	From analysis, it concludes that impact of economic crisis to fishery sub sector has dualism in nature. Export oriented fishery likes shrimp received very high positive impacts because its products become more competitive, but domestic oriented fishery received moderate positive impacts. However, Even though export oriented entrepreneurs enjoyed significant improvement in their well being, other players in this sector were economically getting worse.
Indonesia's Macroeconomic and Trade Performance	1994,2000	Yana van der Meulen Rodgers	The trade relationship between Indonesia and Japan	Large exchange rate devaluations in 1978, 1983, and 1986 improved domestic price incentives and had a significant impact on fishery exports. By 1990 Indonesia's real effective exchange rate index exceeded the next

				closest competitor by a factor of two. Increased domestic and multinational investment following improvements in the investment climate also made a significant contribution to Indonesia's fishery export growth. To further stimulate manufactured exports, Indonesian firms broadened their export markets in Japan.
; "Gains From Export Growth: Do Linkages Matters?	1996-2005	Prema-Chandra Athukorala and Bambang H. Santosa	The major things that affecting the import intensifity	Import intensity and linkages of most of the dynamic product areas are largerly determined by factors beyond the control of the individual exporting nations. Emphasis on linkages can therefore be both ineffective and counterproductive. In the context of the ongoing process of internationalisation of production, industries characterized by high import intensity and hence low domestic input linkages have the potential to make a greater contribution to employment expansion and

				growth of net export earnings.
The World Bank Agriculture and Rural Development Discussion Paper Food Safety and Quality Standards in Japan *Compliance of Suppliers from Developing Countries*	2002	Theo H. Jonker Hiroshi Ito Hiroji Fujishima	The quality standard in Japan that Compliance of Suppliers from Developing Countries such as Indonesia	The reputation of Indonesian shrimp products is comparatively high in Japan. Significant problems have never occurred, except a few incidents in which the residues of antibiotics exceeded the regulatory limits. One large Japanese retail chain that is importing peeled tail-on shrimp directly from Indonesian factories uses only raw material shrimp grown without any antibiotics at all in culture ponds. Nearly all Japanese buyers are satisfied with the quick response of Indonesian suppliers to solve problems whenever they happen. Furthermore, the Japanese buyers appreciate the food safety control system and the tracking and tracing system, although there are differences in the systems adopted by each supplier. Importers point out that the sense of

				hygiene among Indonesian laborers generally is not high, so the compliance with the food safety and quality standards of the production manual depends primarily on the skills of managers and foremen. Indonesia's recent political instability causes increasing worry among shrimp importers.

CHAPTER IV

THEORITICAL STUDY AND HYPOTHESIS

4.1 Theoretical Framework

4.1.1 International Trade Theory

International Trade is the exchange of goods and services among residents of different countries. Countries cannot live alone anymore effectively than individuals can. Each country tends to specialize in the production of those commodities it can produce more cheaply than other countries and then exchange its surplus for the surpluses of other countries. (Chacholiades. M; 1995:7).

In the beginning, international trade appeared because of the difference of taste and consumption from each country. In the other side the difference of endowment factors like quality, quantity and composition among the countries also make the difference in the demand of goods and services among them.

In this modern era, the economist scientists believe that international trade appears because the difference in the consumption among countries. A country can produce goods more efficiently but still depends on the other country in the trading of other goods that can be produced domestically but have expensive price.

4.1.2 Absolute Advantage theory

The absolute advantage theory is declared by Adam Smith. He is a classical economist. This theory criticized from the *mercantilism theory*. According to Smith, mercantilist failed to draw distinction between wealth and treasure. It is already known that mercantilism it is neglected success when it can draw back the optimum metals (gold and silver). But we forget that the big part from large amount of the treasure is to finance large armies and navies and their activities in war and peace.

The main thought of Absolute advantage is the specialization and efficiency in producing goods. A country that has specialization in one product will allocate their resource to specialize in products that have high profits and also are potential export goods. On the other hand when a country specializes in one product, they will import products that can not be produce domestically. Specializing in one product will give absolute advantage benefit to the country in the international trade.

But although absolute advantage theory has many benefits, it also has a weakness. This theory doesn't analyze the condition of a country if the country doesn't have absolute advantage. Or may be this absolute advantage is only possessed by one country. Based on this assumption, this theory is far from the reality.

4.1.3 Comparative Advantage Theory

This theory was declared by David Ricardo as the new idea from absolute advantage theory by Adam Smith. This theory mention that even though a country is less efficient (not have absolute advantage) than other country in producing commodity, international trade can still be done. A country that has a specialization on certain products exports the commodity that has small absolute advantage loss (commodity that has comparative benefit) and then imports the commodity that has greater absolute advantage loss (this commodity has comparative loss).

Comparative advantage has an exception, it happens when the value of absolute advantage loss by a country in both products is same. If this happens, trade would not occur and comparative advantage is not accepted.

4.1.4 Hecksher – Ohlin Theory

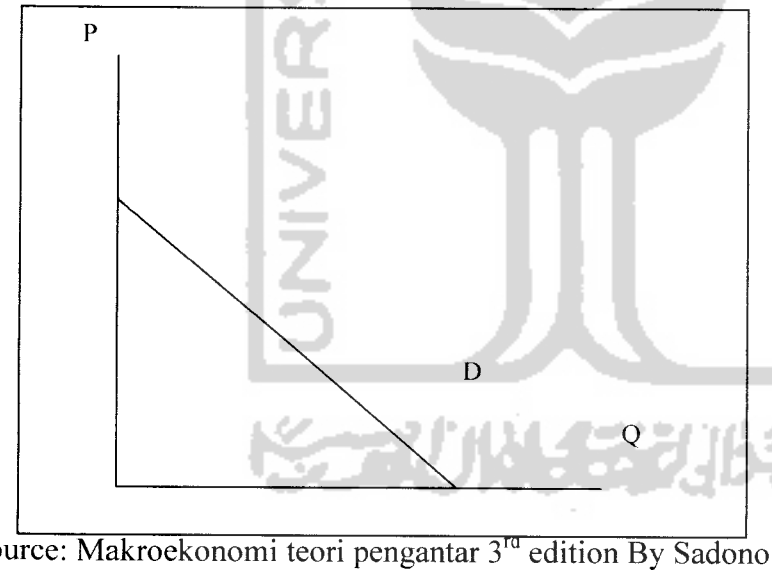
According to Eli Hecksher and Bertil Ohlin international trade is moved by the difference of production factors among the countries. This theory said that every country has different certain production factors. The differences on the production factors create differences in price for the same commodity in every country. Hechsher – Ohlin also explains about trading pattern, they explain about when a country wants to produce it will use the greater production factor so it can reduce the price of the related goods.

4.1.5 Demand Theory

This theory explained about the feature relationship between quantity of demand and price of related good. According to Samuelson (1995:39) laws of demand is *when the price of a commodity is raised (and other things are held constant), buyers tend to buy less of the commodity. Similarly, when the price is lowered, other things being equal, quantity demand increases.*

Graph 4.1

Demand curves



Source: Makroekonomi teori pengantar 3rd edition By Sadono Sukirno

Demand concept is used to indicate the willingness of a buyer in the market. Demand function is indicating the relationship between demand quantities of goods with all of affected production factors (Lincoln, 1991).

There are two reasons why quantity demand will decrease when the price tends to rise.

a. Substitution effect

When the price of related good increases, the consumer will substitute with another similar good that have cheaper price. For example, when the price of rice increases consumers will substitute it with wheat that have cheaper price.

b. Income effect

When the price of related good increases, the consumer will feel poorer because the increase is not followed by the increase in their income. When this happens consumer will tend to decrease their consumption. For example, when the price of gasoline increases, consumers will decrease their consumption.

4.1.5.1 Change in Demand

The amount of some product that all customers wish to buy in a given time period is influenced by the following important variables (Richard G. Lipsey, 1996: 70):

1. Products Own Price

   A basic economic hypothesis is that the price of a product and the quantity that will be demanded are related negatively, other things being equal. That is, the lower the price, the higher the quantity

demanded, and the higher the price, the lower the quantity demanded. (Alfred Marshall (1842-1924)) these fundamental concepts are called "Law of Demand." For example, the case of demand for copper related to the prices of copper, when the prices of copper increase the quantity demand for copper will decrease.

2. Average Consumer Income

   If consumers have higher income than the average, they can be expected to purchase more of most products even though the prices of the product remain the same. For example, in the case of demand for copper related to the income, when the National income or GDP is increasing the quantity demand for copper will also increase.

3. Other Price

   It means that in other product prices or substitutes, a rise in the prices of products substitute will make the demanded for the product become increasing. It will make the demand curve shift to the right. For example, when the price of oil is the substitution product for the gas, when the price of oil is

increasing, the demand for gas is increasing or vice versa.

4. Taste

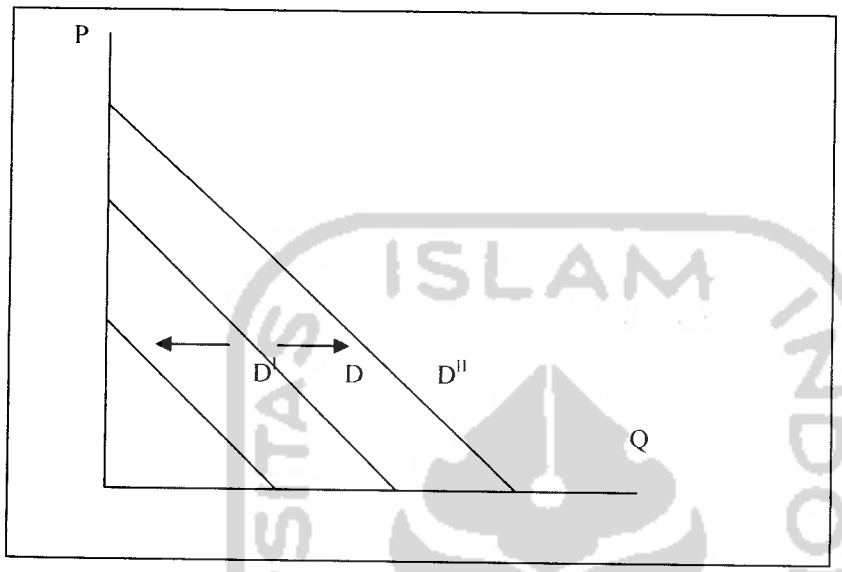
   Tastes have an effect on people's desire to purchase. A change in the taste maybe long-lasting or short-lasting, a change in the taste in favor of a product shift the demand curve to the right. For example is between demand for rice and wheat. In Indonesia demand of rice is higher than demand of wheat, because Indonesian people tend to eat rice than wheat. It reverse with western people, their demand of wheat is higher than rice. Because western people prefer eat wheat better than rice.

5. Population

   An increase in population will shift the demand curves for most products to the right, indicating that more products will be bought at each price. For example, case in electricity. When the population is higher, it will increase the demand for electricity since more people need more electricity in their daily lives.

Graph 4.2

Change in Demand



Source: Makroekonomi teori pengantar 3rd edition By Sadono Sukirno

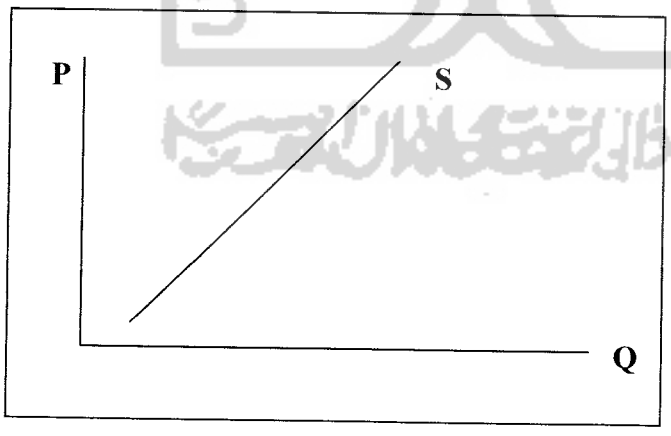
From the graph above it can be seen, for the example if the price of good increases, there is a movement along the demand curve and a change in the quantity of the good being demanded. If the demand curve D arises in the price of a good, it produces a decrease in the demand and a fall in the price of the good produces an increase in demand. The arrows on demand curve D^{II} represent the movement along the demand curve. If some other factors on the demand change, which increase the quantity that people plan to buy, there is a shift in the demand curve to the right (from D to D^{II}) and an increase in demand. If some other factors on the demand change, which reduces the

quantity that people plan to, buy, there is a shift in the demand curve to the left (from D to D^{I}) and a decrease in demand. (Samuelson, Microeconomics Seventeenth Edition, 1995)

4.1.6 Supply Theory

This theory explained about the feature relationship between quantities of supplied and price of related good. According to Samuelson (1995:39) laws of supply is *when ceteris paribus involved, then if the price (P) of goods increase, so the quantity (Q) produced or supplied also increase and vice versa.*

Graph 4.3
Demand curves



Source: Makroekonomi teori pengantar 3rd edition By Sadono Sukirno

Demand concept is used to indicate the willingness of a supplier in the market. Supply function is indicating the relationship between supply quantities of goods with all of affected production factors.

There are three factor in which influencing the shape of supply curve.

a. Less addition result law effect

   To produce goods and services, factory need production factors, there is: labor, land, capital, technology and skills. In the short run, land, capital, technology and skill can be constant and only labor factor in which changeable. The short run production influenced by Less addition result law effect in which if labor increase, the marginal production created by increase in labor is less than the production in additional labor

b. Unemployment rate and increase of salary rate

   There is any negative relationship between Unemployment rate and increase of salary rate. In a high level of unemployment, the increase of salary rate growth in slow and vise versa.

4.1.6.1 Change in Supply

The shift of supply curve can be called shift to upper/left side and lower/right side. The supply curve shift can be affecting by:

1. Increase in raw materials

If the raw materials increase made the production cost increase automatically. The increase of production cost will make producers offers some kind production in a higher price level.

2. Increase in labor salary

   What means in increase of labor salary is the increase in which in every level of the use of new labor. If there is no increase of productivity will made increase in production cost, so the same output (the same riil national income) only will offers by company if there is any high level of prices.

3. The growth of technology

   The growth of technology capable to made some kind of output created in a lower prices. Or in the same level of cost capable to produce more output

4. Infrastructure growth

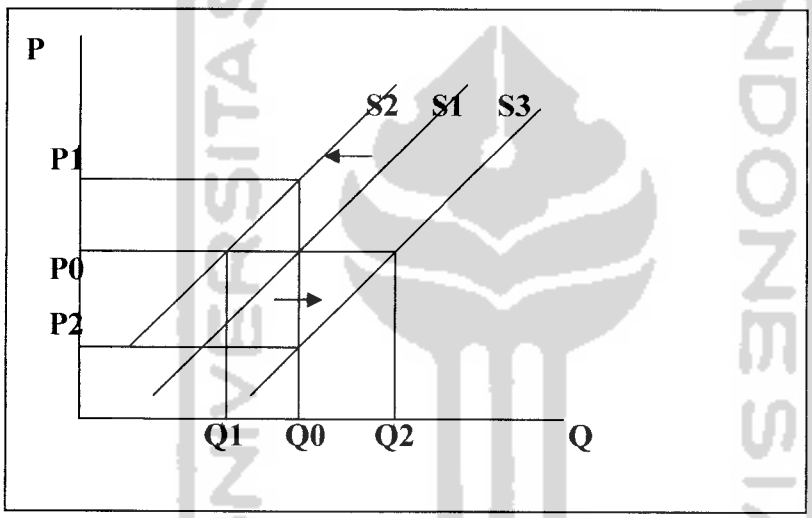
   Major infrastructure in developing the economy activity and efficiency is high-way, sea harbor, industry area and etc. Better infrastructure will reduce variable cost in production

5. Tax, work license, and government administration

To create a new workforce needed work license and need to be renewable time by time. They are also need to pay tax for government.

Graph 4.4

Change in Supply



Source: Makroekonomi teori pengantar 3rd edition By Sadono Sukirno

From the graph above it can be seen, for the example if the price of good increases, there is a movement along the supply curve and a change in the quantity of the good being demanded. If the supply curve S arises in the price of a good, it produces are increase in supply and a fall in the price of the good produces an decrease in supply. The arrows on supply curve represent the movement along the supply curve. If some other factors on the supply change, which increase the quantity that people plan to buy,

there is a shift in the supply curve to the right (from Q0 to Q2) and an increase in supply. If some other factors on the supply change, which reduces the quantity that people plan to buy, there is a shift in the supply curve to the left (from Q to Q1) and a decrease in supply. (Samuelson, Microeconomics Seventeenth Edition, 1995)

4.1.6.2. Import and Export: supply and demand Side

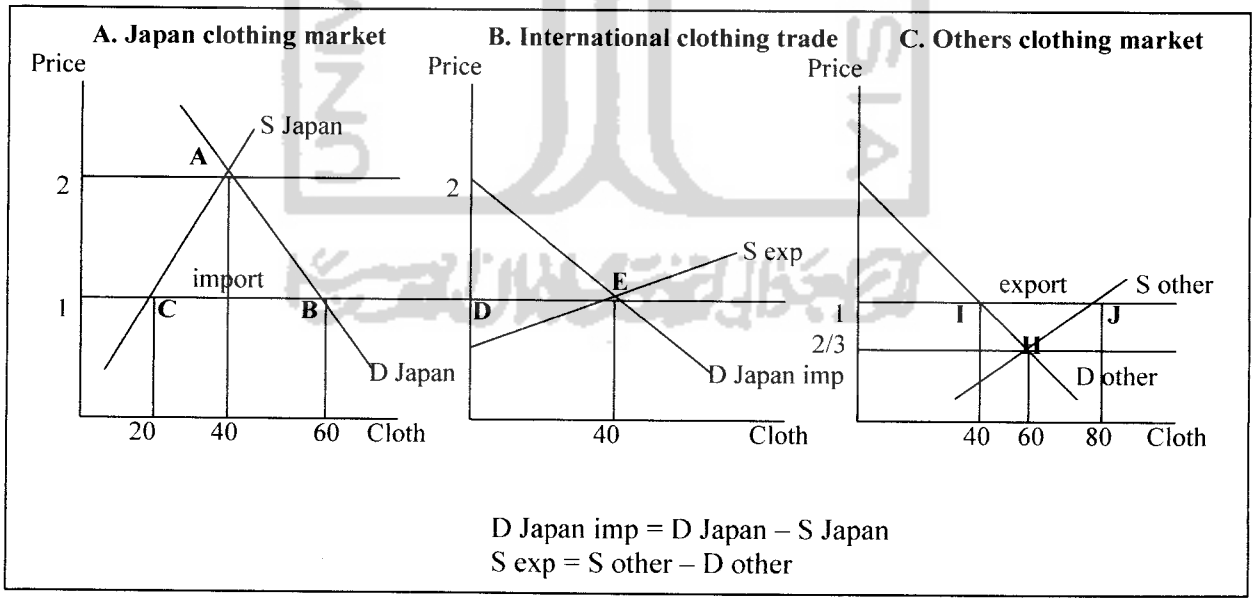
In international trade, supply and demand have strong connection. It is proven in the market mechanism where both supply and demand together determine the quantity of goods to purchased or sold and also determine the relative price of the goods. Demand in the market is determined by the consumers taste and income. Taste and income can obstruct the reaction between quantity of demand and change in cost. (Lindert, Peter H; 1994: 46)

By doing international trade both countries can get benefits. It is shown on the indifference curve that by trading both countries can achieve maximum satisfaction. The difference in taste is profitable in trade because the producer can also produce different kinds of goods. According to Lindert (1994) if some countries have different taste with another country but not in the production ability, so trading among countries can develop international specialization on consumption but not in the production.

In the case of the Japan government about their clothing production, Japan clothing companies will sell clothes by 2 quarts wheat per yard (as show in point A) but in other countries it is known that cloth is sold by 2/3 quart per yard as show in point H). It means that Japan should import cloth from other country because it is cheaper. Thus, when both countries make international trading both countries will get benefits from the trade. The graph below provides a better description:

Graph 4.5

Affect of Japan production trade, consumption and price of related good that showed by demand and supply curve



From graph, it is seen that if the Japan government doesn't make international trade because of several reasons, so Japan market and

the other country market will apply different price. In Japan, clothing would have price on 2 quarts wheat per yard and in other country clothing would have 2/3 quarts wheat per yard. With international trade both countries can get advantages, buyers in Japan and sellers in the other country will look for opportunity by doing international trade. Buyers in Japan will get advantages that they can get cheaper clothing because in the other country cloth price is only 2/3 per yard. Sellers in other country will also get advantages because their products will be sold with higher price in Japan. Both parties will tend to search the best and equal profit between each other and they will begin the transaction to trade their merchandise.

4.2 Hypothesis Formulation

The research investigated whether the independent variables of this research affect Indonesian shrimp export to Japan. The hypotheses in this research are:

a. Price of shrimp (P) in demand.

   According the demand theory, the price of shrimp is has negative sign. It means that when the price of shrimp increases the shrimp demand from the imported country decreases.

b. Price of shrimp (P) in supply.

According the supply theory, the price of shrimp is has positive sign. It means that when the price of shrimp increases the shrimp supply from the exported country increases.

c. Exchange rate (ER) in demand.

According the demand theory, the exchange rate is has negative sign. It means that according to the theory, when the value of Rupiah to Yen is increase it makes price of shrimp became expensive. So the demand of Indonesian shrimp exports decreases.

d. Exchange rate (ER) in supply.

According the supply theory, the exchange rate is has positive sign. It means that according to the theory, when the value of Rupiah to Yen is increase it makes price of shrimp became expensive. So the supply of Indonesian shrimp exports increases.

e. Japan GDP (GDPj).

According the demand and supply theory, the Japan GDP is has positive sign. It means that according to the theory when the Japan GDP increases, it also increases the demand of the shrimp exported from Indonesia.

d. Labor in shrimps production (Lb)

According the supply theory, the labor is has positive sign. It means that according to the theory, when the value of labor is increase it makes increase in shrimp produces and of course the supply to export increase too.

e. Land in shrimps production (Ld)

According the supply theory, the land is has positive sign. It means that according to the theory, when the value of labor is increase it makes increase in shrimp produces and of course the supply to export increase too.

CHAPTER V

RESEARCH METHOD

5.1 Research design

5.1.1 The nature of simultaneous equation models

There are situations where there is a two way flow of influence among economics variables. That is one economics variables affect another economic variable and is in turn affected by them. A simultaneous model actually needed when there is any influence and influence between dependent and independent variables. For examples in demand and supply model, we may write the empirical demand and supply functions as:

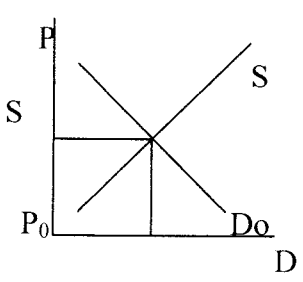
Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \mu_{1t} \quad \alpha_1 < 0$

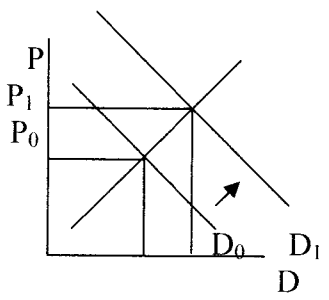
Supply *function* $Q_t^s = \beta_0 + \beta_1 P_t + \mu_{2t} \quad \beta_1 > 0$

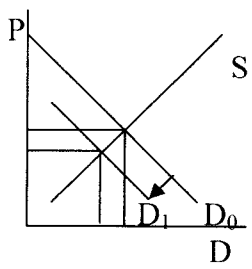
$Q_t^d = Q_t^s$

Where = Q^d = quantity demanded

Q^s = Quantity supplied t = time







It's not difficult to see that P and Q joint the dependent variables. If μ_{1t} changes because of changes in other variables affecting Q_t^d the demand curve shift upward if μ_{1t} is positive and downward if μ_{1t} is negative. As the figure shows, a shift in the demand curve changes both P and Q. Similarly, a change in μ_{2t} will shift the supply curve, again affecting both P and Q.

5.1.2 The identification problem

By the identification problem we mean weather numerical estimates of the parameters of a structural equation can be obtained from the estimated reduced form coefficient. If this can be done, then it can be said that the particular equation is *identified.* If this cannot be done, than it can be said that the equation under consideration is *unidentified, or under identified.*

An identified equation may be either exactly just identified or over identified. It's said to be exactly identified if unique numerical values of the structural parameters can be obtained. It's said to e over identified if more than one numerical value can be obtained for some of the parameters of the structural equations. The circumstances under which each of these cases occurs will be shown in the following discussion.

A) Under identification

Lets back to the demand and supply model above, there are

Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \mu_{1t} \quad \alpha_1 < 0$

Supply *function* $Q_t^s = \beta_0 + \beta_1 P_t + \mu_{2t} \quad \beta_1 > 0$

$$Q_t^d = Q_t^s$$

Where Q^d = quantity demanded

Q^s = Quantity supplied

t = time

In this simultaneous model, there are any 2 endogen variables and there are no exogenous variables. Because of all of the variables are endogen variables so the demand and supply function can't be identified. With the information only price and quantity without any other information, we cannot estimating that both function because we cannot exactly sure that we really estimating demand function or supply function.

B) Just identification

Lets back to the demand and supply model above and we include one more independent variables in both functions (exchange rate), there are

Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \alpha_2 ER_t + \mu_{1t} \quad \alpha_1 < 0$

Supply *function* $Q_t^s = \beta_0 + \beta_1 P_t + \mu_{2t} \quad \beta_1 > 0$

$$Q_t^d = Q_t^s$$

Where ER = exchange rate

In this simultaneous model, there are any 2 endogen variables and there is one exogenous variable. Because of not all of the variables are endogen variables so the demand and supply

function can be identified. With one more information of exogenous, we can estimate that both function because we can exactly sure that we really estimating demand function.

C) Over identification

Lets back to the demand and supply model above and we include one more independent variables (GDP and Labor), there are

Demand function Qtd $= \alpha_0 + \alpha_1 P_t + \alpha_2 ER_t + \alpha_3 GDP_t + \mu_{1t}$ $\alpha_1 < 0$

Su*pply function* $Q_t^s = \beta_0 + \beta_1 P_t + \beta_2 Lb_t + \mu_{2t}$ $\beta_1 > 0$

$Q_t^d = Q_t^s$

Where GDP = Gross Domestic Product

Lb = Labor

In this simultaneous model, there are any 2 endogen variables and there are 3 exogenous variables. Because of not all of the variables are endogen variables so the demand and supply function can be identified. The supply function was derives one exogenous variables (Lb) that's why the supply function just identified. The demand function derives 2 exogenous variables (ER and GDP) and made the demand function over identification.

5.1.3 Simultaneous equation method

There are any three kind of method to solving the simultaneous problems, but not all of it has a good identification in solving the problems. There are:

A) The failed of OLS method in simultaneous method

We cannot estimating the demand and supply function in simultaneous by OLS method if there is any one or more independent variables correlated with residual variables because the estimator what we gain isn't consistent or bias.

B) Indirect least square method

If we having simultaneous variables in just identified so the method that we use is Indirect Least Square (ILS) that is a method to gain estimation coefficient of structural model with OLS method from reduced form model. There are 3 kind of ILS procedure to estimating the supply structural variables:

1) Gain reduced form model from structural variables function
2) OLS estimation into reduced form model individually
3) Gain coefficient of structural variables function from reduced form.

C) Two Stage Least Squares (TSLS)

Beside the Indirect Least square, the Two Stage Least Squares (TSLS) also generally used in estimating simultaneous problems. This model is used when the problems is over identification. In many cases, we often find over identification problems rather than just identification. This method will give more details of parameters rather than others method because other method usually giving more than one parameter in the result of estimation.

5.2 Research Method

The research method used in this research by simultaneous model is Two Stage Least Squares (2SLS). The 2SLS used in this research because if there is no simultaneous equation or simultaneity problem, the OLS estimators produce consistent and efficient estimators. On the other hand, if there is simultaneity, OLS estimators are not even consistent. 2SLS will give estimators that are consistent and efficient. This method usually used in simultaneous model when using over identification. The over identification is used when in analysis of function have more than one different variable.

There are the advantages of using TSLS method rather than OLS method and ILS method:

1) To solving econometric model where conclude a huge amount of variables, TSLS method giving more an economize method.

2) Doesn't likes ILS method where giving multiple parameter in model of over identification, the TSLS will only giving one parameter.
3) This method easiest to use because only need to find exogenous variables.
4) Even though TSLS designed in solving over identification, its also capable used in just identification.
5) If R^2 values in regression result really high suppose 0.8 point, the TSLS will give the closer analysis rather than other method.
6) Only TSLS capable giving standard error from the analysis of coefficient.

The writer also used literature study. This literature study uses a source of the theories that are related to the research.

5.3 Research Subject

The research was concentrated on the Japan's demand of shrimp imported from Indonesia and Indonesian shrimp supply to Japan. The research sought what variables that had impacts on the Japan's shrimp demand and Indonesian shrimp supply. Are they has simultaneity condition which from the independent variables capable to influencing the dependent variables.

5.4 Research Setting

This section analyzes the reasons why the Japanese government import shrimp from Indonesia. The reason is because Japan is a fish consumer's country.

Right know Japan is well known as a high consumer on fishery products. With their high consumption, they will require a lot of kind of fish product. One of the fish products is shrimp. It is known that shrimp is needed in producing a lot of food. Because of that Japan is has high demand on this shrimp. Since Indonesia is one of the biggest shrimp producers, Japan will demand shrimp from Indonesia. Trading between Indonesia and Japan will create advantages between the two countries. Indonesia will a have loyal customer on shrimp selling and Japan also has a loyal producer on their fishery products that they needs.

5.5 Data Source

The data used in this research analysis were the data taken from books, literature study and secondary data. They are:

a. International Financial Statistics (IFS), various editions.
b. Statistical Year Book of Indonesia (Statistik Indonesia), various editions.
c. Indonesian Foreign Trade Statistic (Biro Pusat Statistik), various editions.
d. Fishery department, various editions.

5.6 Research Variables

Based on the data used in this research variables in this thesis are categorized into two kind of variables; endogenous variable and exogenous variable. Both variables are described as follows:

- endogenous variable

In the context of simultaneous-equation models, the jointly dependent variables are called endogenous variables. In this research there are:

Q_t^d = the volume of Japan demand for shrimp from Indonesia.

Q_t^s = Indonesian shrimp supply to Japan.

P = The price of shrimps (US $/kgs)

- Exogenous variable

The variables that are truly no stochastic or can be so regarded are called exogenous or predetermined variables. In this research consist of four variables, they are:

GDPj = The GDP of Japan (million Yen/capita)

Lb = Total labor working in shrimp production (people)

Ld = Total land used in shrimp production (Ha)

ER = the exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

5.7 Technique of Data Analysis

The basic theory that is used in this research is the demand and supply theory. This demand is affected by the price of related goods, income of the importer country and the exchange rate between both countries. The supply side affected by the price of related goods, the total labor that used in Production, land that used in production, the exchange rate between Indonesia and Japan. The model is:

Demand function: Qd = f (P, ER, GDPj)

Supply function: Qs = f (P, ER, Lb, Ld)

Where: Q = the volume of export shrimps (tons)

P = the price of shrimps (US $/kgs)

ER = the exchange rate Rupiah vis-à-vis US Dollar (Rp/US$)

$GDPj$ = The GDP of Japan (million Yen)

Lb = Total labor in shrimps production (people)

Ld = land in shrimps production (Ha)

To achieve the research objectives, the regression analysis is conducted by using time series data from 1982 until 2003. In this analysis we use logarithmic or non logarithmic model is used because:

- According to logarithmic model, it is not linier.
- According to Non logarithmic model, it is linier.
- In general logarithmic model, it is more valid than linear model. The linear model can solving the problems that as the reason of this research doing, there is getting the best valid data analysis about the simultaneous correlation between demand and supply in Indonesian supply of shrimp to Japan and Japan shrimp Import from Indonesia.

Logarithmic regression model can be writing as follow:

$$\text{Log}Q_t^d = \beta_0 + \beta_1\text{Log}P + \beta_2\text{Log}ER + \beta_3\text{Log}GDPj + e_{1t}$$

$$\text{Log}Q_t^s = \gamma_0 + \gamma_1\text{Log}P + \gamma_2\text{Log}ER + \gamma_3\text{Log}Lb + \gamma_4\text{Log}Ln + e_{2t}$$

Balance condition: $Q_t^d = Q_t^s$

Where: . βo, γ_0 : Constant . e_{1t} and e_{2t} : Error terms

. β_1,β_2,β_3 : Regression coefficient of each variable

Or in Non Logarithmic regression model can be writing as follow:

$$Q_t^d = \beta_0 + \beta_1 P + \beta_2 ER + \beta_3 GDPj + e_{1t}$$

$$Q_t^s = \gamma_0 + \gamma_1 P + \gamma_2 ER + \gamma_3 Lb + \gamma_4 Ln + e_{2t}$$

Balance condition: $Q_t^d = Q_t^s$

Where:

. $\beta o, \gamma_0$: Constant

. $\beta_1, \beta_2, \beta_3$: Regression coefficient of each variable.

. e_{1t} and e_{2t} : Error terms

5.8 Analysis Method

5.8.1 Simultaneous Identification

There are any 3 simultaneous identification, there is

a) Under identification

From the demand and supply example, there are

Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \mu_{1t}$ $\alpha_1 < 0$

Su*pply function* $Q_t^s = \beta_0 + \beta_1 P_t + \mu_{2t}$ $\beta_1 > 0$

$$Q_t^d = Q_t^s$$

Where Q^d = quantity demanded

Q^s = Quantity supplied

t = time

In this simultaneous model, there are any 2 endogen variables and there are no exogenous variables. Because of all of the variables are endogen variables so the demand and supply function can't be identified. With the information only price and quantity without any other information, we cannot estimating that both function because we cannot exactly sure that we really estimating demand function or supply function.

b) Justidentification

From the demand and supply example, there are

Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \alpha_2 ER_t + \mu_{1t} \quad \alpha_1 < 0$

Supply *function* $Q_t^s = \beta_0 + \beta_1 P_t + \mu_{2t} \quad \beta_1 > 0$

$Q_t^d = Q_t^s$

Where ER = exchange rate

In this simultaneous model, there are any 2 endogen variables and there is one exogenous variable. Because of not all of the variables are endogen variables so the demand and supply function can be identified. With one more information of exogenous, we can estimate that both function because we can exactly sure that we really estimating demand function.

c) Overidentification

Lets back to the demand and supply model above and we include one more independent variables (GDP and Labor), there are

Demand function $Q_t^d = \alpha_0 + \alpha_1 P_t + \alpha_2 ER_t + \alpha_3 GDP_t + \mu_{1t}$ $\alpha_1 < 0$

Su*pply function* $Q_t^s = \beta_0 + \beta_1 P_t + \beta_2 Lb_t + \mu_{2t}$ $\beta_1 > 0$

$Q_t^d = Q_t^s$

Where GDP = Gross Domestic Product

Lb = Labor

In this simultaneous model, there are any 2 endogen variables and there are 3 exogenous variables. Because of not all of the variables are endogen variables so the demand and supply function can be identified. The supply function was derives one exogenous variables (Lb) that's why the supply function just identified. The demand function derives 2 exogenous variables (ER and GDP) and made the demand function over identification.

5.8.2 Identification Process

From the data, we have 7 variables, there are:

Q = the volume of export shrimps (tons)

P = the price of shrimps (US $/kgs)

ER = the exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

GDPj = The GDP of Japan (million Yen)

Lb = Total labor in shrimps production (people)

Ld = land in shrimps production (Ha)

And the model is

Demand function: Qd = f (P, ER, GDPj)

Supply function: Qs = f (P, ER, Lb, Ld)

All analysis using 2SLS and in demand point of view because of:

The formula to fulfill the identification is as follow:

$K - k \geq m-1$

Where: K = the value of exogenous variable in simultan model

k = the value of exogenous variable in the function

m = the value of endogenous variable in the function

- if there is no exogenous variable, the formula cannot be identified.

- if there is $K - k = m-1$, the formula is just identification.

- if there is $K - k > m-1$, the formula is over identification

Demand function: Qd = f (P, ER, GDPj)

$4 - 2 \geq 2 - 1$

$2 > 1$ .....» **over identification**

Supply function: Qs = f (P, ER, Lb, Ld)

$4 - 3 \geq 2 - 1$

$1 = 1$ .....» **just identification**

5.8.3 Estimation method

The research method used in this research by simultaneous model is Two Stage Least Squares (2SLS). The 2SLS used in this research because if there is no simultaneous equation or simultaneity problem, the OLS estimators produce consistent and efficient estimators. On the other hand, if there is simultaneity, OLS estimators are not even consistent. 2SLS will give estimators that are consistent and efficient. This method usually used in simultaneous model when using over identification. The over identification is used when in analysis of function where having more than one different variable.

Consider the following model:

Logarithmic regression model can be writing as follow:

$$LogQ_t^d = \beta_0 + \beta_1 LogP + \beta_2 LogER + \beta_3 LogGDPj + e_{1t}$$

$$LogQ_t^s = \gamma_0 + \gamma_1 LogP + \gamma_2 LogER + \gamma_3 LogLb + \gamma_4 LogLn + e_{2t}$$

Non Logarithmic regression model can be writing as follow:

$$Q_t^d = \beta_0 + \beta_1 P + \beta_2 ER + \beta_3 GDPj + e_{1t}$$

$$Q_t^s = \gamma_0 + \gamma_1 P + \gamma_2 ER + \gamma_3 Lb + \gamma_4 Ld + e_{2t}$$

Balance condition: $Q_t^d = Q_t^s$

. $\beta o, \gamma_0$: Constant

. $\beta_1, \beta_2, \beta_3$: Regression coefficient of each variable.

. e_{1t} and e_{2t} : Error terms

Where

Q = the volume of export shrimps (tons)

P = the price of shrimps (US $/kgs)

ER = the exchange rate Rupiah vis-à-vis US Dollar (Rp/US$)

GDPj = The GDP of Japan (million Yen)

Lb = Total labor in shrimps production (people)

Ld = land in shrimps production (Ha)

The supply function was derives 3 exogenous variables (ER, Lb, Ld) that's why the supply function over identified. The demand function derives 2 exogenous variables (ER, *GDPj*) and made the demand function over identification.

To solving the model, it's using 2 steps from OLS (2SLS). The procedure from 2SLS is:

Stage 1. To get rid of the likely correlation between Q_t^s and e_{2t}, first model regression on all exogenous variables should be in simultaneous model system. In this Q_t^d and Q_t^s into GDPj, Lb, Ld, Q_{t-1}^d, Q_{t-1}^s

Where Q_{t-1}^d : Quantity demanded in a year period before

Q_{t-1}^s : Quantity supplied in a year period before

$$Q_t^d = \hat{I}I_{10} + \hat{I}I_{11}\,GDPj + \hat{I}I_{12}\,Lb + \hat{I}I_{13}\,Ld + \hat{I}I_{14}\,Q_{t-1}^d + \hat{I}I_{15}\,Q_{t-1}^s + \hat{e}_{1t}$$

$$Q_t^s = \hat{I}I_{20} + \hat{I}I_{21}\,GDPj + \hat{I}I_{22}\,Lb + \hat{I}I_{23}\,Ld + \hat{I}I_{24}\,Q_{t-1}^d + \hat{I}I_{25}\,Q_{t-1}^s + \hat{e}_{1t}$$

Stage 2 in the 2nd step we change Q^d and Q^s in structural model with the value that gained from $\hat{Q}_t^d$ and $\hat{Q}^s$ on reduced form model and then doing a regression with OLS method. The model there is:

$$Q_t^d = \beta_{10} + \beta_{11} \hat{Q}_t^s + \beta_{12}P + \beta_{13}ER + \beta_{14}GDPj + \upsilon_{1t}$$

$$Q_t^s = \gamma_{20} + \gamma_{21} \hat{Q}^d + \gamma_{22}P + \gamma_{23}ER + \gamma_{24}Lb + \gamma_{24}Ld + \upsilon_{2t}$$

Where:

$$\upsilon_{1t} = e_{1t} + \beta_{11} \hat{e}_{2t}$$

$$\upsilon_{2t} = e_{2t} + \gamma_{21} \hat{e}_{1t}$$

5.8.4 Testing the model

a) Statistical test

T- Statistic Test

T- Stats test is used to know the correlation between the dependent variable with independent variable individually. In this research, the writer used one tail test because this research has a strong theoretical expectation.

- Hypothesis that used one tail test positive:

☞ Ho : $\beta_i < 0$; i= 1.2….etc

Individually, the independent variables negatively affect the dependent variable.

☞ Ha : $\beta_i > 0$; i= 1.2….etc

Individually, the independent variables positively affect the dependent variable. It would be applied in ER, Lb, Ln, and Cp.

- Hypothesis that used one tail test negative:

☞ Ho : $\beta_i > 0$; i= 1.2....etc

Individually, the independent variables positively affect the dependent variable.

☞ Ha : $\beta_i < 0$; i= 1.2....etc

Individually, the independent variables negatively affect the dependent variable. It would be applied in P and GDP on demand.

The following hypothesis will be examined individually:

H_0 : $\beta_i = 0$: means that the independent variable individually does not have an impact on the dependent variables.

H_a : $\beta_i > 0$: means that the independent variable individually have impacts on the dependent variable.

The decision will be made with the parameter (α) 5% based on the following rules:

a. When the value of computed t < critical value (t table value), H_o is accepted. In this case the independent variable individually does not influence the dependent variable significantly.

b. When the value of computed t > critical value (t table value), H_o is rejected. In this case the independent variable individually influences the dependent variable significantly.

F- Statistic Test

This test is used to detect the correlation between both dependent variable and independent variables simultaneously. The testing of F test is the same as the testing for t test. Hypothesis is formulated as follows:

☞ Ho : $\beta_1 = \beta_2 = \beta_3 = 0$

Hence the all independent variables simultaneously do not affect the dependent variable.

☞ Ho : $\beta_1 \neq \beta_2 \neq \beta_3 = 0$

Hence the all independent variables simultaneously affect the dependent variable.

With using F – stats table:

1. If F-statistic < F-table

df denominator = (n-k), df numerator = (k-1)

Ho is accepted and Ha is rejected

2. If F-statistic > F-table

df denominator = (n-k), df numerator = (k-1)

Ho is rejected and Ha is accepted

Coefficient of Determination (R^2)

It is an important property of R^2 because it is a no decreasing function of the number of explanatory variables or regressors present in the model; as the number of regressor

increase. R^2 almost invariably increases and never decreases. R^2 is used to detect how far the independent variable influences the dependent variable in the model (Gujarati, 1995: 207). R^2 is being a measure of the goodness of fit of a sample least squares linear regression in a body of data. The number of R^2 is between 0 – 1. The closer the number of R^2 to 1 the better the model explains about the relationship between dependent variable and independent variables.

b) Classical Assumption Test

This test basically is to detect that the TSLS method is needed. Actually, the simultaneity analysis needs an classical assumption is only to improvement action that by OLS method in simultaneity problems will occurs an problem in multicollinearity or in autocorrelation and heterocedasticity (Damodar N. Gujarati).

In order to fixing the regression result in problems, the Two Stage Least Square is needed in regression method if it is presence of multicollinearity or autocorrelation or heterocedasticity.

Multicollinearity Test

According to Gujarati (1995:320) multicollinearity means the existence of a perfect or exact linear relationship among some or all explanatory variables of regression model. If perfect multicollinearity

appears in regression problem, in simple term it can be said that Least Square (LS) solution can not be achieved. In the regression analysis, multicollinearity gives into these several conditions below:

a. Two independent variables having perfect correlation (because of that vectors that show the variables are collinear).

b. Two independent variables almost having perfect correlation (for the example correlation between them is close +1 or -1).

c. Linear combination from several independent variables having perfect correlation (or close to perfect) with other independent variable.

d. Linear combination from one sub-collection of independent variables having perfect correlations (or close) with one linear combination from other sub-collection of independent variable.

(Makridakis,S;Wheelwright.S.CandMcGee.V.E(1999)*Forecasting: Methods and Applications*,2nd.Binarupa Aksara)

To detect multicollinearity, the correlation method is used. The multicollinearity is predicted to happen when R^2 is high, say in excess of 0.8. If R^2 is high, the F test in most cases will reject the hypothesis that the partial slope coefficients are simultaneously equal to zero.

Autocorrelation Test

The term autocorrelation may be defined as correlation between members of series of observations ordered in time (as in time series

data) or space (as in cross-sectional data) (Gujarati, 1995: 400). If there is autocorrelation in the model, it will raise the value of residual and the impact is the number of t-test, f-test and R^2 will decline.

In other words, the presence of autocorrelation on the model makes the data become not valid.

According to Sriyana (2001) the causes of autocorrelation are:

a. The presence of backward lag operations on the model with time series data.
b. Mistake in function type.
c. Lack of data or the data were gone.
d. There is a data transformation.

In testing the autocorrelation is using Lagrange Multiplier test (LM-test). This test use the level of degree (χ^2) to express that there is no autocorrelation. The rule is when χ^2 statistic is bigger than the value of χ^2 table, hence H_o denied and also on the contrary.

Heterocedasticity Test

Heterocedasticity is a situation when there is a relationship between the values of independent variables with the residual value from the model. To detect the heterocedasticity, the writer used one of the formal methods; that is the White test. The White model is:

$$E^2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \delta_1 X_1^2 + \delta_2 X_2^2 + \delta_3 X_3^2 + \delta_4 X_1 X_2 +$$

$\delta_5 X_1 X_3 + \delta_6 X_2 X_3 + \varepsilon$ (3.7.1.3 a)

That is, the squared residual from the original regression on the original X variable, there squared values, and the cross product of the regressors.

Under the null hypothesis that there is no heterocedasticity, it can be shown that sample size (n) tomes the R^2 obtained from the regression asymptotically follows the chi-square distribution with df equal to the number of independent variables (excluding the constant term) in the auxiliary regression. That is:

n. $R^2 = X^2$ df (3.7.1.3 b)

If the chi-square value obtained in (3.7.1.3 b) exceeds the critical chi-squared value at the chosen level of significance, the conclusion is there is heterocedasticity in the model. If it does not exceed the critical chi-square value, there is no heterocedasticity, which is to say that in the auxiliary regression (3.7.1.3 a), $\alpha_2 + \alpha_3 + \alpha_4 + \alpha_5 + \alpha_6 = 0$

c) Simultaneous test (Hausman Specification Test)

Suppose after using the Classical assumption test and the result is free from of multicollinearity or autocorrelation or heterocedasticity, its means that there is no simultaneity problem, the OLS estimators is one of identificater method to produce consistent and efficient estimators. On the other hand, if there is simultaneity, OLS estimators are not even

consistent. In the presence of simultaneity, the method of two-stage least square (2SLS) and instrumental variables will give estimators that are consistent and efficient. Oddly, if we apply these alternative methods when there is in fact no simultaneity, this method yield estimators that are consistent but not efficient (with smaller variance). All this discussion suggests that we should check for the simultaneity problem before we discard OLS in favor of the alternatives.

The simultaneity problem arises because some of the regressor are endogenous and are therefore likely to be correlated with the disturbance term. Therefore, a test of simultaneity is essentially a test of whether (an endogenous) regressor is correlated with the error term. If it is, the simultaneity problem exists, in which case alternatives to OLS must be found, if it is not, we can use OLS. To find out which is the case in a concrete situation, we can use Hausman's specification error test.

A version of the Hausman specification error test that can be used for testing the simultaneity problem can be explained as follow:

To fix ideas, consider the following 2 equation model:

$Q_t^d = \beta_0 + \beta 1 P_t + \beta_2 ER_t + \beta_3 GDPj_t + e_{1t}$ ..... (a)

$Q_t^s = \gamma_0 + \gamma_1 P_t + \gamma_2 ER_t + \gamma_3 Lb_t + \gamma_4 Ld_t + e_{2t}$ ..... (b)

. $\beta o, \gamma_0$: Constant

. $\beta_1, \beta 2, \beta 3$: Regression coefficient of each variable.

. e_{1t} and e_{2t} : Error terms

Where

Q_t^d = the demand volume of export shrimps (tons)

Q_t^s = the supply volume of export shrimps (tons)

P = the price of shrimps (US $/kgs)

ER = the exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

GDPj = The GDP of Japan (million Yen)

Lb = Total labor in shrimps production (people)

Ld = land in shrimps production (Ha)

Assume that ER, GDPj, Lb, Ld are exogenous. Of course, Q_t^d, Q_t^s, P are endogenous.

By Hausman test proceeds, first from demand and supply equation we obtain the following reduced form equations:

$$P = \hat{I}I_0 + \hat{I}I_1 GDPj_t + \hat{I}I_2 Lb_t + \hat{I}I_3 Ld_t + \upsilon_t \quad \text{.....(1)}$$

$$ER = \hat{I}I_4 + \hat{I}I_5 GDPj_t + \hat{I}I_6 Lb_t + \hat{I}I_7 Ld_t + w_t \quad \text{.....(2)}$$

$$Q = \hat{I}I_8 + \hat{I}I_9 GDPj_t + \hat{I}I_{10} Lb_t + \hat{I}I_{11} Ld_t + g_t \quad \text{.....(3)}$$

Where υ_t, g_t and w_t are the reduced form of the error terms. Estimating (1) by OLS we obtain

$$\hat{P} = \hat{I}I_0 + \hat{I}I_1 GDPj_t + \hat{I}I_2 Lb_t + \hat{I}I_3 Ld_t$$

Therefore,

$$P = \hat{P} + \acute{\upsilon}_t \quad \text{.....(4)}$$

Estimating (2) by OLS we obtain

$$\hat{ER} = \hat{I}I_0 + \hat{I}I_1 GDPj_t + \hat{I}I_2 Lb_t + \hat{I}I_3 Ld_t$$

Therefore,

$$ER = \hat{ER} + \hat{w}_t \quad \text{.....(5)}$$

Where ($P^{\wedge}$ are estimated $P^{\wedge}_t$ and $\acute{\upsilon}_{t)}$ and ($ER^{\wedge}$ are estimated $ER^{\wedge}_t$ and $\hat{w}_{t)}$ are the estimated residuals. Substituting (4), (5), and (b) we get:

$$Q_t = \gamma_0 + \gamma_1 P^{\wedge}_t + \gamma_2 ER^{\wedge}_t + \gamma_1 \hat{w}_t + \gamma_2 \acute{\upsilon}_t + e_{2t}$$

Now under the null hypothesis that there is no simultaneity, the correlation between $\hat{w}_t$, $\acute{\upsilon}_t$ and e_{2t} should be zero, asymptotically. Essentially, then, the hausman test involves the following step:

Step 1 Regress P_t, ER_t, $GDPj_t$ to obtain υ_t

Step 2 Regress P_t, ER_t, Lb_t, Ld_t to obtain υ_t

Step 3 Regress Q_t on $P^{\wedge}$ and $\acute{\upsilon}_t$ and perform a t test on the coefficient of $\acute{\upsilon}_t$

Regress Q_t on $ER^{\wedge}$ and $\acute{\upsilon}_t$ and perform t test on the coefficient of $\hat{w}_t$

If it's significant, do not reject the hypothesis of simultaneity; otherwise, reject it. For efficient estimation, however, Pindyck and Rubinfeld suggest regressing (Q_t on $P^{\wedge}$ and $\acute{\upsilon}_t$) and (Q_t on $ER^{\wedge}$ and $\hat{w}_t$).

CHAPTER VI

DATA ANALYSIS

6.1 Research Description

The aim of this research is to analyze the demand of Indonesian shrimps export to Japan in the statistical year 1982-2003. Based on the data used in this thesis research variables are categorize two kind of variables: endogenous variable and exogenous variable. Both variables are as follows:

- endogenous variable

  In the context of simultaneous-equation models, the jointly dependent variables are called endogenous variables. In this research there are:

  Q_t^d = the volume of Japan demand for shrimp from Indonesia.

  Q_t^s = Indonesian shrimp supply to Japan.

  P = the price of shrimps (US $/kg's)

- Exogenous variable

  The variables that are truly no stochastic are called exogenous or predetermined variables. This research consists of four variables, they are:

  ER = the exchange rate Rupiah vis-à-vis Japan Yen (Rp/¥)

  $GDPj$ = The GDP of Japan (million Yen/capita)

  Lb = Total labor working in shrimp production (people)

  Ld = Total land used in shrimp production (Ha)

The type of data being observed and examined in this research is time series data. The data used in this research are the annual data from 1982 until 2003. The data used in this research analysis were the data taken from books, literature study and secondary data. They are:

a. International Financial Statistics (IFS), in the various editions.
b. Statistical Year Book of Indonesia (Statistik Indonesia), in the various editions.
c. Indonesian Foreign Trade Statistic (Biro Pusat Statistik), in the various editions.
d. Fishery department, in the various editions.

6.1.1 Choosing Regression Model

To choose the best model for this research, the writer use Non-logarithmic model. The analysis used in this research is 2SLS regression method.

The formulas to fulfill the identification are as follow:

$K - k \geq m-1$

Where: K = the value of exogenous variable in simultaneous model

k = the value of exogenous variable in the function

m = the value of endogenous variable in the function

- If there is no exogenous variable, the formula cannot be identified.
- If there is $K - k = m-1$, the formula is just identification.
- If there is $K - k > m-1$, the formula is over identification

Demand function: Qd = f (P, ER, GDPj)

4 -2 ≥ 2 – 1

2 > 1 .....» over identification

Supply function: Qs = f (P, ER, Lb, Ld)

4 -3 ≥ 2 – 1

1 = 1 .....» just identification

The other reasons why the writer not using the least square regression because:

Table 6.1

Demand regression using least square

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-22.79455	3.868189	-5.892823	0.0000
LOGP	0.615859	0.190096	3.239726	0.0045
LOGER	-0.131795	0.063957	-2.060701	0.0541
LOGGDP	2.686591	0.325592	8.251392	0.0000
R-squared	0.953999	Mean dependent var		12.96892
Adjusted R-squared	0.946332	S.D. dependent var		0.544119
S.E. of regression	0.126053	Akaike info criterion		-1.141266
Sum squared resid	0.286008	Schwarz criterion		-0.942894
Log likelihood	16.55392	F-statistic		124.4308
Durbin-Watson stat	1.503963	Prob(F-statistic)		0.000000

Table 6.2

Supply regression using least square

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.783232	6.881990	-0.404423	0.6909
LOGP	1.254094	0.355941	3.523324	0.0026
LOGER	0.104185	0.152718	0.682204	0.5043
LOGLB	0.965129	0.572468	1.685910	0.1101

LOGLD	0.042138	0.131599	0.320202	0.7527
R-squared	0.812617	Mean dependent var		12.96892
Adjusted R-squared	0.768527	S.D. dependent var		0.544119
S.E. of regression	0.261784	Akaike info criterion		0.354124
Sum squared resid	1.165026	Schwarz criterion		0.602088
Log likelihood	1.104641	F-statistic		18.43087
Durbin-Watson stat	0.976812	Prob(F-statistic)		0.000005

- Both in demand and supply regression of price shows positives value in regression coefficient, it is supposed to be in demand and supply coefficient shows different value (positive and negative).
- The exchange rate also has the same problem like price variable where both in demand and supply have negative effects. It is not fit with the economics laws that the demand and supply values automatically have different effect in variable results.

These two small problems can be an improvement that the least squares regression method cannot be used in simultaneity problems. By least squares, it is will be impossible to apply simultaneity regression in the demand and supply cases. The regressions of least squares are only capable to the demand and supply individually and the result of course will not fit with the goals of simultaneity analysis.

6.2 Research Findings

6.2.1 Regression Result Analysis

The first step in analyzing the data is by regressing the data in the computer program that is competent and representative with this research.

The computer program that is used by the writer is Eviews 3.0 in order to make the data estimation easier. The Eviews computer program also helps the writer to reduce and avoid computing error. At first, we try using linear regression method. The regression result of demand and supply in linear models are shown in table 6.3 and 6.4 below:

Table 6.3
Demand regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-448400.7	1037398.	-0.432236	0.6707
P	-79925.69	325895.5	-0.245249	0.8090
ER	-5164.409	10011.96	-0.515824	0.6123
GDP	4.279969	5.486168	0.780138	0.4454
R-squared	0.369166	Mean dependent var		484745.1
Adjusted R-squared	0.264027	S.D. dependent var		216245.9
S.E. of regression	185514.9	Sum squared resid		6.19E+11
F-statistic	8.250940	Durbin-Watson stat		1.000222
Prob(F-statistic)	0.001154			

Table 6.4
Supply regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1262353.	448445.9	-2.814950	0.0119
P	171444.8	68751.35	2.493694	0.0232
ER	2271.867	4206.510	0.540083	0.5961
LB	0.816340	1.311825	0.622294	0.5420
LD	-0.515389	1.200587	-0.429281	0.6731
R-squared	0.267492	Mean dependent var		484745.1
Adjusted R-squared	0.095137	S.D. dependent var		216245.9
S.E. of regression	205702.4	Sum squared resid		7.19E+11
F-statistic	5.033632	Durbin-Watson stat		1.481760
Prob(F-statistic)	0.007321			

From the data regression result above it can be seen that an irrational result in price coefficient result in both demand and supply regression.

When the result and the original data are analyzed and compared, they do not fit to each other in the results.

The price coefficients in regression result have too high value in influencing the quantity of shrimps that demanded and supplied.

In generally, logarithmic model is more valid than linear model in the result. The log linear model can solve the problems smoother and give more valid data analysis about the simultaneous correlation between demand and supply in Indonesian supply of shrimps to Japan and Japan shrimps import from Indonesia. This is the reason why the researcher uses the log linear method.

The regression result of demand in log linear model is shown in table 6.5 below:

Table 6.5
Demand regression Result

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:50
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.89409	15.14581	-1.643629	0.1176
LOGP	-0.340403	1.923887	-0.176935	0.8615
LOGER	-0.158349	0.196437	-0.806103	0.4307
LOGGDP	2.901992	1.535263	1.890224	0.0749

R-squared	0.948633	Mean dependent var	12.96892
Adjusted R-squared	0.940071	S.D. dependent var	0.544119
S.E. of regression	0.133202	Sum squared resid	0.319371
F-statistic	108.3095	Durbin-Watson stat	1.334063
Prob(F-statistic)	0.000000		

Notes: Significant at α=5%

From the data regression result above it can be seen that the regression estimation model for the demand of Indonesian shrimp export to Japan (X), price of shrimp (P), the exchange rate between countries (ER) and Japan GDP are:

$$\text{Log(X)} = -24.89409 - 0.340403\text{LogP} - 0.158349\text{LogER} + 2.901992\text{LogGDP} + \mu_i$$

$$\text{Se} = (15.14581) \quad (1.923887) \quad (0.196437) \quad (1.535263)$$

$$t = (-1.643629) \quad (-0.176935) \quad (-0.806103) \quad (1.890224)$$

The supply regression result in logarithmic model is shown in the table 6.6 below:

Table 6.6
Supply regression Result

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:54
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.606572	14.04053	-0.114424	0.9102
LOGP	3.860058	1.638541	2.355790	0.0307
LOGER	0.119007	0.311337	0.382245	0.7070
LOGLB	0.526205	1.192592	0.441228	0.6646
LOGLD	-0.075581	0.276276	-0.273568	0.7877

R-squared	0.221789	Mean dependent var	12.96892
Adjusted R-squared	0.038680	S.D. dependent var	0.544119
S.E. of regression	0.533492	Sum squared resid	4.838426
F-statistic	5.078069	Durbin-Watson stat	1.407480
Prob(F-statistic)	0.007053		

Notes: Significant at α=5%

From the data regression result above it can be seen that the regression estimation model for the supply of Indonesian shrimp export to Japan (Y), price of shrimp (P), the exchange rate between countries (ER), labor in shrimp production (Lb), and land in shrimp production (Ld) are as follows:

Log(Y) = -1.606572+ 3.860058LogP + 0.119007LogER + 0.526205LogLB – 0.075581LogLD + μ_i

Se = (14.04053) (1.638541) (0.311337) (0.526205) (0.276276)

t = (-0.114424) (2.355790) (0.382245) (0.441228) (-0.273568)

6.2.2 Statistical Result Analysis

6.2.2.1 T test

The t test is used to test the correlation between the dependent variable with independent variable individually. After the data has been regressed, it can be seen all the computed t value of each independent variables and then only need to compared it with the value of the computed t table. The way to find the critical t value is:

T table = t α df (n-k)

Where:

α = level of significance

df = degree of freedom

n = number of data

k = number of parameter

6.2.2.1.1 Demand function

In this research the writer estimated the critical t value between $\alpha = 0.05$ and df = 19 (22-2-1) where as the result value in the t table is 1.729. When the value of computed t value < critical value, the individual independent variable does not influence the dependent variable significantly. Otherwise when the computed t value > critical t value, the individual independent variable will influence the dependent variable significantly.

From the result of regression below it can be seen about the significance or insignificance from each computed t value of all independent variables.

Table 6.7
The Comparison Value of t-statistic and t-table

Variable	t-statistic	A	t-table	result
P	-0.176935	5%	-1.729	Not significant

ER	**-0.806103**	**5%**	**-1.729**	**Not significant**
GDP	**1.890224**	**5%**	**1.729**	**Significant**

a. T Test on Price of shrimps

H_o: $\beta_i \geq 0$

H_a: $\beta_i < 0$

Computed t value is -0.176935

Critical t value with $\alpha = 5\%$ and df = 19 is -1.729

After observe the data above it can be concluded that the computed t value is lower than the critical t value, so the H_o is accepted or H_a is rejected statistically. It means that the price of shrimps has no significant effect on the demand of shrimps export from Indonesia, and ceteris paribus.

b. T Test on Exchange Rate

H_o: $\beta_i \geq 0$

H_a: $\beta_i < 0$

Computed t value is -0.806103

Critical t value with $\alpha = 5\%$ and df =19 is -1.729

After observe the data above it can be concluded that the computed t value is lower than the critical t value, so the H_o is accepted or H_a is rejected statistically. It means

that the exchange rate has no significant effect on the demand of shrimps export from Indonesia, and ceteris paribus.

c. T Test on Japan GDP

H_o: $\beta_i \leq 0$

H_a: $\beta_i > 0$

Computed t value is 1.890224

Critical t value with $\alpha = 5\%$ and df =19 is 1.729

After observe the data above it can be concluded that the computed t value is higher than the critical t value, so the H_o is rejected or H_a is accepted statistically. It means that the Japan GDP has significant effect on the demand of shrimps export from Indonesia, and ceteris paribus.

6.2.2.1.2 Supply function

In this research the writer estimated the critical t value between $\alpha = 0.05$ and df = 18 (22-3-1) where as the result value in the t table is 1.734. When the value of computed t value < critical value, the individual independent variable does not influence the dependent variable significantly. Otherwise when the computed t value > critical t

value, the individual independent variable will influence the dependent variable significantly.

From the result of regression below it can be seen about the significance or insignificance from each computed t value of independent variables.

Table 6.8
The Comparison Value of t-statistic and t-table

Variable	t-statistic	A	t-table	result
P	2.355790	5%	1.734	Significant
ER	0.382245	5%	1.734	Not significant
LB	0.441228	5%	1.734	Not significant
LD	-0.273568	5%	-1.734	Not significant

a. T Test on Price of shrimps

H_o: $\beta_i \leq 0$

H_a: $\beta_i > 0$

Computed t value is 2.355790

Critical t value with $\alpha = 5\%$ and df = 18 is 1.734

After observe the data above it can be concluded that the computed t value is higher than the critical t value, so the H_o is rejected or H_a is accepted statistically. It means that the price of shrimps has a significant effect on the supply of shrimps export from Indonesia, and ceteris paribus.

b. T Test on Exchange Rate

H_o: $\beta_i \leq 0$

H_a: $\beta_i > 0$

Computed t value is 0.382245

Critical t value with $\alpha = 5\%$ and df =18 is 1.734

After observe the data above it can be concluded that the computed t value is lower than the critical t value, so the H_o is accepted or H_a is rejected statistically. It means that the exchange rate has no significant effect on the supply of shrimps export from Indonesia, and ceteris paribus.

c. T Test on Labor in shrimps production

H_o: $\beta_i \leq 0$

H_a: $\beta_i > 0$

Computed t value is 0.441228

Critical t value with $\alpha = 5\%$ and df =18 is 1.734

After observe the data above it can be concluded that the computed t value is lower than the critical t value, so the H_o is accepted or H_a is rejected statistically. It means that labor has no significant effect on the supply of shrimps export from Indonesia, and ceteris paribus.

d. T Test on Land in shrimps production

H_o: $\beta_i \leq 0$

H_a: $\beta_i > 0$

Computed t value is -0.273568

Critical t value with $\alpha = 5\%$ and df =17 is -1.734

After observe the data above it can be concluded that the computed t value is lower than the critical t value, so the H_o is accepted or H_a is rejected statistically. It is means that land has no significant effect on the supply of shrimps export from Indonesia, and ceteris paribus.

6.2.2.2 F Test

This test is used to detect the correlation between dependent variable and all the independent variables (simultaneously). The testing of F test is the same as the testing for t test. Hypotheses are formulated as follows:

► H_o: $\beta_1 = \beta_2 = \beta_3 = 0$

Hence, the independent variables simultaneously do not affect the dependent variable.

► H_o: $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$

Hence, the independent variables simultaneously affect the dependent variables.

This decision will use parameter at 5% (α = 5%) based on this following rule:

a. If F-statistic $\leq$ F-table

H_o is accepted and H_a is rejected, the independent variables simultaneously do not have impact on the dependent variable.

b. If F-statistic > F-table

H_o is rejected and H_a is accepted, the independent variables simultaneously have impact on the dependent variable.

The F test is close similarly with the T test that is by comparing the value of the computed value and the table value (critical f value). To find the critical f value the degree of freedom should be for numerator (k-1) and the degree of freedom for denominator (n-k).

6.2.2.2.1 Demand function

With the level of significance α = 5%, the degree of freedom for numerator is two and the degree of freedom for denominator is 19 (22-2-1), therefore it can be said that the value of f table is in point (2:19) that is in point 3.52. Based on the result above, it is known that the f value from the regression is 108.3095. The writer based on the comparison between f value and computed f value can conclude that the computed f value is higher than the critical f value. It is

means that H_o is rejected and H_a is accepted the independent variable and simultaneously influences dependent variable. As a result, the price of shrimp, exchange rate and Japan GDP simultaneously and significantly has impact on the demand of Indonesian shrimps export to Japan.

6.2.2.2.2 Supply function

With the level of significance $\alpha = 5\%$, the degree of freedom for numerator is three and the degree of freedom for denominator is 18 (22-3-1), therefore it can be said that the value of f table is in point (3:18) that is in point 3.16. When look above, already know that the f value from the regression is 5.078069. . The writer based on the comparison between f value and computed f value can conclude that the computed f value is higher than the critical f value. It is means that H_o is rejected and H_a is accepted the independent variable simultaneously influences dependent variable. As a result, the price of shrimp, exchange rate, labor in shrimps production and land in shrimps production simultaneously and significantly has impact on the supply of Indonesian shrimps export to Japan.

6.2.3 Goodness of Fit (R^2)

6.2.3.1 Demand function

The result of regression (table 6.5) above it can be seen that the value of coefficient determination (R^2) is 0. 948633. This value shows a low measurement for the independent variables to explain their impact on the dependent variable in the simultaneous model. It means that the variation of the dependent variable can be explained by the independent variables about 94.8633%, while the rest 5.1367% are explained by factors outside the model.

6.2.3.2 Supply function

The result of regression (table 6.6) above it can be seen that the value of coefficient determination (R^2) is 0.221789. This value shows a low measurement for the independent variables to explain their impact on the dependent variable in the simultaneous model. It means that the variation of the dependent variable can be explained by the independent variables about 22.1789%, while the rest 77.8211% are explained by factors outside the model.

6.2.4 Classical Assumption Test

6.2.4.1 Multicollinearity

To test the multicollinearity the writer uses correlation matrix test. The writer in this test detects multicollinearity by comparing the correlation among the independent variables. The decision from this test is when r-value is lower than 0.7, it means that there is no multicollinearity (Damodar N. Gujarati). With the help from Eviews computer program, the writer can search the multicollinearity among all the variables and the result that is shown on table 6 .9 and 6.10 below:

Table 6.9

Correlation Matrix Multicollinearity Result

Demand Multicollinearity Test

	LOGP	LOGER	LOGGDP
LOGP	1.000000	0.319170	0.474864
LOGER	0.319170	1.000000	0.901707
LOGGDP	0.474864	0.901707	1.000000

The table shown that there is multicollinearity between exchange rate and Japan GDP (Shown in ER and GDP Multicollinearity test in point 0.901707). By this improvement, the demand function facing multicollinearity on the model and need TSLS regression to gain the best estimation method.

Table 6.10

Correlation Matrix Multicollinearity Result

Supply Multicollinearity Test

	LOGP	LOGER	LOGLB	LOGLD
LOGP	1.000000	0.319170	0.333711	0.309548
LOGER	0.319170	1.000000	0.923654	0.710109
LOGLB	0.333711	0.923654	1.000000	0.662965
LOGLD	0.309548	0.710109	0.662965	1.000000

The table shown that there is multicollinearity between land and Exchange rate (Shown in ER and LB Multicollinearity test in point 0.923654). By this improvement, the supply function also facing multicollinearity on the model and need TSLS regression to gain the best estimation method.

6.2.4.2 Autocorrelation

In this research, a treatment of autocorrelation should not be set up. In simultaneity problem, there is a need to know whether any autocorrelation occurs or not by comparing the computed D-W Statistic with the critical D-W Statistic to make the decision.

6.2.4.2.1 Demand function

Table 6.11

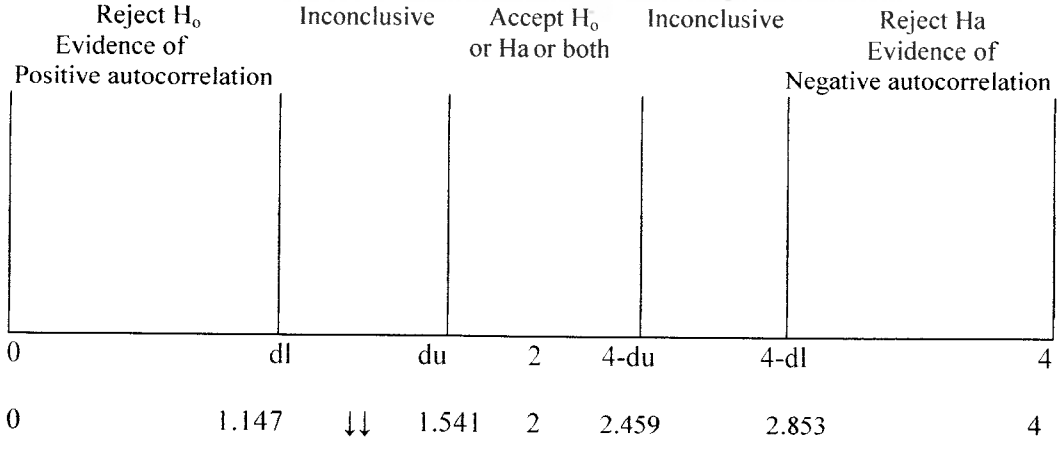
The Result of demand regression of autocorrelation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.89409	15.14581	-1.643629	0.1176
LOGP	0.340403	1.923887	0.176935	0.8615
LOGER	-0.158349	0.196437	-0.806103	0.4307
LOGGDP	2.901992	1.535263	1.890224	0.0749
R-squared	0.948633	Mean dependent var		12.96892
Adjusted R-squared	0.940071	S.D. dependent var		0.544119
S.E. of regression	0.133202	Sum squared resid		0.319371
F-statistic	108.3095	Durbin-Watson stat		1.334063
Prob(F-statistic)	0.000000			

The result is the computed D-W statistic =1.334063, D-W table (α =5%, k=3, n=22) dl = 1.147 du = 1.541 4-du = 2.459 4-dl = 2.853

Table 6.12

D-W Statistic



Legend: H_0 = No Positive autocorrelation

Ha = No Negative autocorrelation

From the result it can be seen that the D-W Statistic placed between dl<d<du meaning the decision is inconclusive and as a result the autocorrelation cannot be decided. Other method to find autocorrelation is by using LM Test, there is:

Table 6.13

Breusch-Godfrey Serial Correlation LM Test

Demand Multicollinearity Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.270859	Probability	0.005673
Obs*R-squared	5.680472	Probability	0.058412

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 11/10/06 Time: 16:43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.48462	16.48424	0.818031	0.4254
LOGP	1.793430	2.016864	0.889217	0.3871
LOGER	0.171614	0.217327	0.789656	0.4413
LOGGDP	-1.387847	1.659511	-0.836299	0.4153
RESID(-1)	0.535474	0.267602	2.001007	0.0627
RESID(-2)	-0.391691	0.251085	-1.559995	0.1383

R-squared	0.258203	Mean dependent var	8.43E-15
Adjusted R-squared	0.026392	S.D. dependent var	0.123321
S.E. of regression	0.121683	Akaike info criterion	-1.147794
Sum squared resid	0.236908	Schwarz criterion	-0.850237
Log likelihood	18.62574	F-statistic	1.113850
Durbin-Watson stat	2.099748	Prob(F-statistic)	0.391868

The probability in Obs*R-squared showed in point 0.058412. It is means that the value is more than 0.05

(α=5%) and the result of regression above that there is has no autocorrelation.

6.2.4.2.2 Supply function

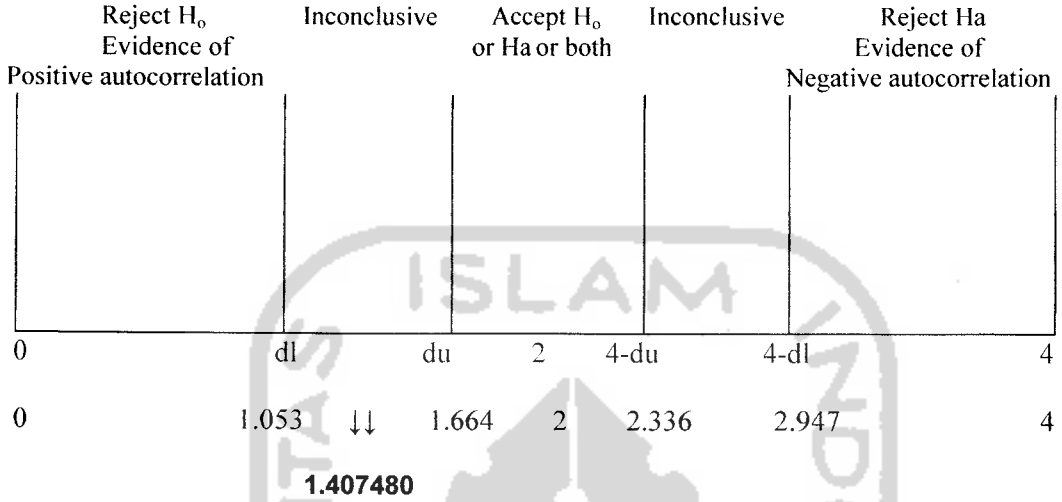
Table 6.14

The Result of supply regression of autocorrelation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.606572	14.04053	-0.114424	0.9102
LOGP	3.860058	1.638541	2.355790	0.0307
LOGER	0.119007	0.311337	0.382245	0.7070
LOGLB	0.526205	1.192592	0.441228	0.6646
LOGLD	-0.075581	0.276276	-0.273568	0.7877
R-squared	0.221789	Mean dependent var		12.96892
Adjusted R-squared	0.038680	S.D. dependent var		0.544119
S.E. of regression	0.533492	Sum squared resid		4.838426
F-statistic	5.078069	Durbin-Watson stat		1.407480
Prob(F-statistic)	0.007053			

The result is the computed D-W statistic = 1.407480, D-W table (α =5%, k=3, n=22) dl = 1.053 du = 1.664 4-du = 2.336 4-dl = 2.947

Table 6.14 6.15
D-W Statistic



Legend: H_0 = No Positive autocorrelation

Ha = No Negative autocorrelation

From the result it can be seen that the D-W Statistic placed between dl<d<du meaning the decision is inconclusive and as a result the autocorrelation cannot be decided. Other method to find autocorrelation is by using LM Test, there is:

Table 6.15

Breusch-Godfrey Serial Correlation LM Test

Supply Multicollinearity Test

Breusch-Godfrey Serial Correlation LM Test:			
Obs*R-squared	5.482483	Probability	0.064490

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 11/10/06 Time: 16:59

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.38520	14.70009	1.046605	0.3119
LOGP	1.023802	1.588834	0.644373	0.5291
LOGER	0.279188	0.313265	0.891218	0.3869
LOGLB	-1.450831	1.281924	-1.131761	0.2755
LOGLD	-0.020954	0.255024	-0.082166	0.9356
RESID(-1)	0.491829	0.259499	1.895301	0.0775
RESID(-2)	-0.504079	0.276397	-1.823750	0.0882

R-squared	0.249204	Mean dependent var	2.11E-14
Adjusted R-squared	-0.051115	S.D. dependent var	0.480001
S.E. of regression	0.492116	Akaike info criterion	1.673167
Sum squared resid	3.632672	Schwarz criterion	2.020316
Log likelihood	-11.40483	F-statistic	0.829798
Durbin-Watson stat	2.212234	Prob(F-statistic)	0.564972

The probability in Obs*R-squared showed in point 0.064490. Its means that the value is more than 0.05 (α=5%) and the result of regression above that there is has no autocorrelation.

6.2.4.3 Heterocedasticity

To detect whether there is heterocedasticity or not, the writer use White Test. White test decision is based on comparison between computed chi-square (χ^2) values with the critical chi-square value. If computed χ^2 > critical χ^2, meaning that heteroce-dasticity is accepted. If computed χ^2 < critical χ^2, meaning that heterocedasticity is rejected.

6.2.4.3.1 Demand function

Table 6.16

Demand Heterocedasticity Test

White Heteroskedasticity Test:

F-statistic	1.405587	Probability	0.275763
Obs*R-squared	7.917609	Probability	0.244202

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/09/06 Time: 14:50
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-62.41205	40.49679	-1.541160	0.1441
LOGP	-0.869555	0.584607	-1.487418	0.1576
LOGP^2	0.204497	0.128518	1.591191	0.1324
LOGER	-0.091746	0.076756	-1.195291	0.2505
LOGER^2	0.013669	0.011049	1.237164	0.2350
LOGGDP	9.829397	6.251713	1.572273	0.1367
LOGGDP^2	-0.380384	0.241290	-1.576459	0.1358

R-squared	0.359891	Mean dependent var	0.014517
Adjusted R-squared	0.103848	S.D. dependent var	0.017718
S.E. of regression	0.016773	Akaike info criterion	-5.084718
Sum squared resid	0.004220	Schwarz criterion	-4.737568
Log likelihood	62.93190	F-statistic	1.405587
Durbin-Watson stat	2.537482	Prob(F-statistic)	0.275763

$$ESS = R^2\left[\frac{RSS}{\left(1 - R^2\right)}\right]$$

$$ESS = 0.359891\left[\frac{0.004220}{\left(1 - 0.359891\right)}\right]$$

$$ESS = 0.002373$$

$$\chi^2 = \frac{ESS}{2} = 0.0011865$$

With df = 6, α = 5%, it will obtain critical χ^2 value = 12.5916.

Since 0.0011865 < 12.5916, it means that Heteroscedasticity is rejected.

Other method is from probability result. Suppose the value is less than 0.05 meaning that there is any heterocedasticity. Whereas if the value more than 0.05 meaning that there is no heterocedasticity. The regression result is less than 0.05 at point 0.244202 and it is means that Heteroscedasticity is accepted.

6.2.4.3.2 Supply function

Table 6.17

Supply Heterocedasticity Test

White Heteroskedasticity Test:

F-statistic	7.807378	Probability	0.000675
Obs*R-squared	18.20986	Probability	0.019707

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/09/06 Time: 14:54
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.037538	221.1523	0.031822	0.9751
LOGP	-34.02967	5.667987	-6.003838	0.0000
LOGP^2	7.443753	1.249725	5.956311	0.0000
LOGER	0.802076	0.604194	1.327514	0.2072
LOGER^2	-0.031947	0.100876	-0.316691	0.7565
LOGLB	-5.732079	31.23869	-0.183493	0.8572
LOGLB^2	0.221991	1.220262	0.181921	0.8585
LOGLD	12.27634	6.962973	1.763089	0.1014
LOGLD^2	-0.553297	0.311492	-1.776282	0.0991

R-squared	0.827721	Mean dependent var	0.219928
Adjusted R-squared	0.721703	S.D. dependent var	0.290587

S.E. of regression	0.153296	Akaike info criterion	-0.620806
Sum squared resid	0.305495	Schwarz criterion	-0.174471
Log likelihood	15.82887	F-statistic	7.807378
Durbin-Watson stat	1.946350	Prob(F-statistic)	0.000675

$$ESS = R^2\left[\frac{RSS}{(1-R^2)}\right]$$

$$ESS = 0.827721\left[\frac{0.305495}{(1-0.827721)}\right]$$

$$ESS = 1.4677623$$

$$\chi^2 = \frac{ESS}{2} = 0.7338812$$

With df = 8, α = 5%, it will obtain critical χ^2 value = 15.5073.

Since 0.7338812 < 15.5073, it means that Heteroscedasticity is rejected.

Other method is from probability result. Suppose the value is less than 0.05 meaning that there is any heterocedasticity. Whereas if the value more than 0.05 mean that there is no heterocedasticity. The regression result is less than 0.05 at point 0.019707 and it is means that Heteroscedasticity is accepted.

6.3 Simultaneity test (Hausman Specification Test)

From the regression in classical assumption, it can be seen that there are multicollinearity and heterocedasticity result (it can be seen from classical as-

sumption test above). Other fact that proves about there is no need simultaneity test is shown in the identification formula as follow:

$K - k \geq m-1$

Where: K = the value of exogenous variable in simultaneity model

k = the value of exogenous variable in the function

m = the value of endogenous variable in the function

- If there is no exogenous variable, the formula cannot be identified.
- If there is $K - k = m-1$, the formula is just identification.
- If there is $K - k > m-1$, the formula is over identification

Demand function: Qd = f (P, ER, GDPj)

$4 - 2 \geq 2 - 1$

$2 > 1$ .....» **over identification**

Supply function: Qs = f (P, ER, Lb, Ld)

$4 - 3 \geq 2 - 1$

$1 = 1$ .....» **just identification**

From the formula above it can be seen that both between demand and supply facing simultaneous problem from the identification method (over identification for demand and just identification for supply).

In the presence of simultaneity, the method of two-stage least square (2SLS) and instrumental variables will give consistent estimators and efficient rather than OLS estimators in simultaneity test (Damodar N Gujarati). Based on this reason, the simultaneity test cannot be used and the regression using TSLS method chosen for the best result.

6.4 Research Discussion

6.4.1 Demand regression

6.4.1.1 Price of shrimps

The price of shrimps is one of the factors used in this research. Using price as the factor to analyze is very important because price of related goods highly affects the demand of the goods itself.

The hypothesis for this variable is prices of shrimps influencing the demand on Indonesian shrimps export to Japan is negative. It means that the increase in price of shrimps makes the Japan demand of shrimp's decreases. This hypothesis is correct since there is a law of demand saying that "*when the price of a commodity is raised (and other things being equal), buyers tend to buy less of the commodity. Similarly, when the price is lowered, other things being equal, quantity demanded increases.*" Sadono Sukirno, Makroekonomi teori pengantar.

The statistical test below supports the hypothesis correctly. The resulted coefficient from the regression for price of shrimps is in the value -0.340403. The probability condition is because of in the Japan shrimp product is consumed by citizen almost everyday. In this country, shrimp is categorized as one of major daily con-

sumption that is why most of Japan people not reduce their consumption for shrimp even the price increase.

6.4.1.2 Exchange Rate

The other factor used in this research is the exchange rate between the two countries, in this case between Indonesia and Japan. Based on the data, the regression coefficient of the exchange rate is -0.158349. Actually based on the research, the exchange rate does not significantly affect the demand for shrimps. The probability condition is because of the value of Japan Yen does not have a significant effect to value in Rupiah that is why the quantity of demanded does not significantly decrease.

.

6.4.1.3 Japan GDP

Another factor used in this research is the analysis of Japan GDP, it can be seen that the income of a country can make change in the export demand by using GDP regression analysis. Based on the statistical test, the coefficient value of GDP of Japan is 2.901992. The value shows the impact of Japan GDP on the demand of Indonesian shrimps export to Japan. When the Japan GDP increases by 1 % the quantity demanded of Indonesian shrimps export will increase by 2.9019 % holding that all variables are constant. This statistical result fits the previous hypothesis that stated a

positive relationship between the Japan GDP and the demand of Indonesian shrimps export to Japan. The probability condition is because of supposed when Japan GDP increase made Japan peoples increase in income also and as a result can made them increasing their daily consumption for shrimps.

6.4.2 Supply regression

6.4.2.1 Price of shrimps

The price of shrimps is one of the factors used in this research. Using price as the factor to analyze is very important because price of related good highly affects the supply of the good itself.

The hypothesis for this variable is prices of shrimps influencing the demand on Indonesian shrimps export to Japan is positive. It means that the increase in price of shrimps makes the Indonesian supply of shrimp's increases. According to Samuelson (1995:39), laws of supply are "*when ceteris paribus involved, then if the price (P) of goods increase, so the quantity (Q) produced or supplied also increase and vice versa*". Sadono Sukirno, Makroekonomi teori pengantar.

The statistical test result supports the hypothesis correctly. The resulted coefficient from the regression for price of shrimps is

in the value of 3.860058. The value shows the impact of price of shrimps on the supply of Indonesian shrimps export to Japan. When the price of shrimps increases by 1 % the quantity supplied of Indonesian shrimps export will increase by 3.86 % holding that all variables are constant. This statistical result fits the previous hypothesis that stated a positive relationship between the price of shrimps and the supply of Indonesian shrimps export to Japan. The probability condition occurs because when the international price of shrimp increase, it made the Indonesian shrimps producers can obtain higher income. This condition will stimulate producers to supply more shrimp products to Japan.

6.4.2.2 Exchange Rate

The other factor used in supply research is the exchange rate between the two countries, in this case between Indonesia and Japan. Based on the data, the regression coefficient of the exchange rate is 0.119007 and statistically not significant. The probability condition is because of the value of Japan Yen does not have a significant effect to value in Rupiah that is why the quantity of supplied does not significantly increase.

6.4.2.3 Labor in shrimp production

Another factor used in this research is the analysis of Japan GDP, it can be seen that the increase in labor can make change in the supply of export by using labor regression analysis. Based on the statistical test, the coefficient value of labor is 0.526205 and statistically not significant. The probability condition is caused by the increase of labor value does not have a significant influence in shrimps quantity supplied to Japan.

6.4.2.3 Land in shrimp production

Another factor used in this research is the analysis of land that used in the shrimp production. It can be seen that the increase in land of shrimp production can make change in the supply of export by using land regression analysis. Based on the statistical test can be seen that the coefficient value of labor is -0.075581.

It disagrees with the hypothesis about the positive relationship between both variables labor and the supply of Indonesian shrimps export to Japan. The regression fact mentioned that there is a negative relationship between land and shrimps export supply. This condition may happen because of some reasons, there are:

- When the lands of shrimp production increase, it does not mean the shrimp production increase. It may have disturbance things

in production likes bad season and shrimps disease where made the shrimp production decrease.

- The Japan peoples taste also has a negative effect to quantity of demand even the shrimp production increased by the increase of land in shrimp production. Suppose the Japan peoples taste for Indonesian shrimp reduces year by year, and they prefer to choose tuna for their daily consumption. This condition will affect their demand for Indonesian shrimps production and of course will make negative affect for quantity of shrimp supplied.

CHAPTER VII

CONCLUSION AND IMPLICATION

7.1 Conclusion

1. Even Indonesia included in major exporter of shrimp to biggest importer countries, Indonesian shrimp export generally is still influenced by world economic condition because most Indonesian shrimps are generally imported to developed countries. This condition made Indonesia still included as price taker in world shrimp trade. And also the market dependence by importer still quiet high. The growth of Indonesia shrimp export can be disturbed if the high market concentration in the Japan made market facing maximum of shrimps demand and made them can't import much more.
2. In shrimp production process to fulfil market demand, Indonesia is incapable to be a leader. As so far, Indonesia is still not capable to sell new shrimp specification in size, new product and also new package. Indonesia still sells a product based on market demand.
3. Based on the research, concerning the factors that influence the export of Indonesian shrimps to Japan by using the method of simultaneous Model in demand and supply, the conclusions are:
   a. From that investigation on the result as a whole (F test) in demand and supply function, Computed f value is higher than critical f value. This indicate that all independent variable (Price of shrimps, Exchange rate,

Japan GDP, Labor in shrimps production, and land used in shrimps production influence simultaneously to the change of dependent variable (Quantity of Japan demand for Indonesian shrimps and the quantity of Indonesian supply for shrimps to Japan).

b. Based on the analysis, its found that the price of Indonesian shrimps is does not affect significantly to demand but significantly in supply. In conclusion, the demand is not sensitive to price but supply is really sensitive to price.

c. Based on the result of examination, it indicates that the exchange rate, Japan GDP, Labor in shrimps production and land in shrimps production do not affect significantly either to Demand and Supply.

d. Based on the result of the regression, there is any multicollinearity and autocorrelation in the model of this research. That's why the TSLS method used to gain best estimation of the function. The result shown that all independent variables (price of shrimps, exchange rate, GDP of Japan, labor in shrimps production and land in shrimps production) affect the dependent variable (the volume of Japan demand for Indonesian shrimps and the volume of Indonesian shrimps export to Japan).

7.2. Implication

1. Based on the analysis of the price of shrimps, it shows that the variable gives negative effect to the demand volume of Indonesian shrimps

exported to Japan. It means that when the price of shrimps increases, the export of shrimps to Japan will be decreases. Different in supply point of view that the price of shrimps having positive effect in supply, it's means that when the price of shrimps increase made the supply of shrimps to Japan increase as well.

2. Based on the analysis of the exchange rate between Rupiah to Japan Yen, it shows that the variable is affected negatively to the demand volume of Indonesian shrimps export to Japan. It means that when Rupiah appreciates, it will make the price of shrimps getting expensive so the demand of shrimps by Japan will also decrease. Different in supply point of view that the exchange rate having positive effect in supply, it means that when the exchange rate increase will make the price of shrimps getting expensive so the supply of shrimps to Japan will also increase.
3. Based on the analysis of Japan GDP, it shows that the variable is affected positively by the volume of Indonesian shrimps export to Japan. It means that when the income of Japan increases, the demand of Indonesian shrimps also increases.
4. Based on the analysis of labor, it shows that the variable is affected positively by the volume of Indonesian shrimps export to Japan. It means that when the total labor used in shrimp's production increases, the supply of Indonesian shrimps also increases.

5. Based on the analysis of land, it shows that the variable is affected negatively to the volume of Indonesian shrimps export to Japan. It means that when the total land used in shrimp's production increases, the supply of Indonesian shrimps decreases. Actually, it does not fulfill the hypothesis and supply laws. This condition sometimes can happen because of many reasons, but because of the limitation of the study make writer cannot show any improvement about why it can happen. Usually, this condition is caused by internal problems likes the increase of domestic market demand for shrimps, shrimps disease which made shrimps production decrease, bad seasons and etc. Basically, sometimes market has their own rules in demand and supply.

7.3. Suggestion

1. To increase the shrimps export to Japan, exporter should watch the different price between domestic market and international market because this variable show the highest influence rather than other variables used in this analysis. It's better if exporter keep the price stable in market to gain maximum income.
2. To increase the shrimps export to Japan, we should improve the shrimp's local production by increasing the labor skill because in the research we see that labor also having a good contribution in shrimps supply.
3. To increase the shrimps export to Japan, its good when using a good technology likes TED (Turtle Excluder Devices) because some of

exported country impose a high standard for sea shrimps. The government should help giving a low credit that can help producer to improve their capability to increase their shrimp's production quality.

4. Government should help to increase the Indonesian shrimp's production. Up to 1996, Indonesia is only capable to supply no more than 30% of total world shrimps supply. Government by agricultural department cooperate with GAPINDO can help producers by training and course.
5. To increase the shrimps export to Japan, we should watch for Japan GDP because in the research we see that GDP also having a good contribution in shrimps demand.
6. Exporter needs to know well the condition in importer country by fulfilling the quality and healthy standard.
7. The government should made a policy to limits the sea shrimps exploitation because in long term will have negative affect to the shrimps production.
8. Exporter can reduce their dependence from Japan market by finding out a new market. As we know that about 65% the shrimps export goes to Japan and 11%to uni Europe. From this fact, we can try to increase the contribution to Europe country.
9. Shrimps entrepreneur can create product differentiation with new specification and package which is unavailable in the market. New package with Indonesian characteristics can influence the market

preference into Indonesian shrimps product. This condition can make Indonesia easy to increase the export quantity.

10. it's better if GAPINDO cooperate with all shrimps producer in the world. This cooperation hopefully can increase the infestation in this sector. Beside that, the cooperation can be a media for any confirmation and coordination to put them into policy which exists in transaction.

BIBLIOGRAPHY

Sukirno, Sadono (2004). " Makroekonomi Teori pengantar", 3rd edition. Jakarta: PT RajaGrafindo Persada.

Widarjono, Agus (2005) "Ekonometrika teori dan Aplikasi untuk Ekonomi dan Bisnis, Yogyakarta: Penerbit Ekonisia Fakultas Ekonomi UII Yogyakarta

Gujarati, Damodar N (1995). "Basic Econometrics", 3rd edition. Singapore: McGraw-Hill. Singapore.

Chacholiades, Miltiades: "International Economics", McGraw – Hill Publishing Company, 1995

Pugel, A, Thomas and Lindert, A, Peter. "International Economics", 11th edition University of South Carolina at Davis, Mc Graw Hill, 1990.

Insukindro ; Maryatmo, R ; Aliman: "Basic Econometric and Main Economic Indicator Arrangement", PT Grafik Mulia. Makassar, 2001.

International Financial Statistics, various editions 1985 – 2002.

Krugman, Paul (1995), "Growing World Trade: Causes and Consequences", Brooking Paper on Economy Activity", 25th Anniversary Issue, 327-77

Mankiw, Gregory. "Principle of Microeconomics", 2nd edition. Harvard University, USA: Harcourt College Publishers (2001).

Prema-Chandra Athukorala and Bambang H. Santosa; "Gains From Export Growth: Do Linkages Matters?"; retrieved from: *www.econpapers.hhs.se*. Taken on October 14th, 2005

Jusuf, Gellwyn and Dahuri, Rokhmin (March 1999) "THE IMPACT OF THE ECONOMIC CRISIS ON INDONESIA'S FISHERY SECTOR". *www.econpapers.hhs.se.*

The World Bank Agriculture and Rural Development Discussion Paper Food Safety and Quality Standards in Japan *Compliance of Suppliers from Developing Countries Theo H. Jonker Hiroshi Ito Hiroji Fujishima* Internet www.worldbank.org E-mail ard@worldbank.orgAll rights reserved. Taken on October 14th, 2005

Samuelson. Paul. A and Nordhaus. William. D, 1995: "Economics", Fifteenth Edition McGraw – Hill Publishing Company,

Statistical Year Book of Indonesia1982 – 2003., various editions,

Yana van der Meulen Rodgers2005; "Indonesia's Macroeconomic and Trade Performance", www.hiid.harvard.edu Taken on October 14th,

Yana van der Meulen Rodgers; "Indonesia's Macroeconomic and Trade Performance", *www.hiid.harvard.edu*

Riedel, James (1976), "A Balanced Growth Version of the Linkage Hypothesis: AComment". Quarterly Journal of Economy, 90 (3), 319-22.

Falaise, Franqoise and Boel, Louis (1999), "A new technology for sustainable shrimps farming", INFOFISH International, number 3, FAO Taken on October 14th, 2005

FAO Fishery Department (1997), GLOBEFISH Commodity Update Shrimps, FAO Taken on October 14th, 2005

APPENDICES

RESEARCH DATA

The data based on demand side:

Year	Quantity Demanded (Ton)	Price of shrimp (US $/kg's)	Exchange Rate (Rp/Yen)	Japan GDP (Million Yen)
1982	167,020.5	7.71	3.10	270.601
1983	170,263.9	8.12	4.35	281.767
1984	168,051.8	7.78	4.35	300.543
1985	175,168.0	7.31	5.65	320.419
1986	237,712.8	9.02	10.23	334.609
1987	275,408.6	9.28	13.50	348.425
1988	393,816.1	9.75	13.84	371.419
1989	389,140.4	8.10	12.66	396.197
1990	446,419.6	7.72	13.98	424.537
1991	481,220.6	9.07	15.62	451.297
1992	488,884.8	8.56	16.62	463.145
1993	630,008.0	10.25	18.96	465.972
1994	763,376.2	11.93	22.05	469.240
1995	889,193.1	13.53	22.50	482.930
1996	775,517.6	11.67	20.60	510.802
1997	698,820.4	10.01	43.00	521.862
1998	636,139.2	7.19	70.67	515.835
1999	517,688.6	10.26	71.20	511.837
2000	611,380.0	11.31	84.00	513.534
2001	565,569.2	9.52	79.83	505.304
2002	585,140.0	8.65	73.77	503.027
2003	598,452.0	7.91	79.53	511.644

Source: Indonesian Statistics, Center Bureau of Statistic 2003

The data based on supply side:

Year	Quantity supplied (Ton)	shrimp Prices (US $/kg's)	Exchange Rate (Rp/Yen)	Labor (person)	Land (Ha)
1982	167,020.5	7.71	3.10	188,655	21,741
1983	170,263.9	8.12	4.35	197,041	242,308
1984	168,051.8	7.78	4.35	211,348	225,197
1985	175,168.0	7.31	5.65	214,287	238,868
1986	237,712.8	9.02	10.23	219,708	241,445
1987	275,408.6	9.28	13.50	238,023	263,162
1988	393,816.1	9.75	13.84	243,667	268,743
1989	389,140.4	8.10	12.66	250,991	269,887
1990	446,419.6	7.72	13.98	252,105	268,326
1991	481,220.6	9.07	15.62	268,183	290,933
1992	488,884.8	8.56	16.62	277,835	304,506
1993	630,008.0	10.25	18.96	291,939	331,761
1994	763,376.2	11.93	22.05	309,279	326,908
1995	889,193.1	13.53	22.50	324,909	332,365
1996	775,517.6	11.67	20.60	340,914	344,759
1997	698,820.4	10.01	43.00	359,852	363,135
1998	636,139.2	7.19	70.67	372,824	406,973
1999	517,688.6	10.26	71.20	445,304	419,282
2000	611,380.0	11.31	84.00	310,528	436,211
2001	565,569.2	9.52	79.83	338,269	449,954
2002	585,140.0	8.65	73.77	415,074	458,012
2003	598,452.0	7.91	79.53	467,380	481,066

Source: Indonesian Statistics, Center Bureau of Statistic 2003

Regression Demand Function

Using Least Squares

Dependent Variable: LOGQ
Method: Least Squares
Date: 11/09/06 Time: 14:49
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-22.79455	3.868189	-5.892823	0.0000
LOGP	0.615859	0.190096	3.239726	0.0045
LOGER	-0.131795	0.063957	-2.060701	0.0541
LOGGDP	2.686591	0.325592	8.251392	0.0000

R-squared	0.953999	Mean dependent var	12.96892
Adjusted R-squared	0.946332	S.D. dependent var	0.544119
S.E. of regression	0.126053	Akaike info criterion	-1.141266
Sum squared resid	0.286008	Schwarz criterion	-0.942894
Log likelihood	16.55392	F-statistic	124.4308
Durbin-Watson stat	1.503963	Prob(F-statistic)	0.000000

Using Two-Stage Least Squares

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:50
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.89409	15.14581	-1.643629	0.1176
LOGP	-0.340403	1.923887	-0.176935	0.8615
LOGER	-0.158349	0.196437	-0.806103	0.4307
LOGGDP	2.901992	1.535263	1.890224	0.0749

R-squared	0.948633	Mean dependent var	12.96892
Adjusted R-squared	0.940071	S.D. dependent var	0.544119
S.E. of regression	0.133202	Sum squared resid	0.319371
F-statistic	108.3095	Durbin-Watson stat	1.334063
Prob(F-statistic)	0.000000		

Classical Assumption Test

Multicollinearity

	LOGP	LOGER	LOGGDP
LOGP	1.000000	0.319170	0.474864
LOGER	0.319170	1.000000	0.901707
LOGGDP	0.474864	0.901707	1.000000

Autocorrelation

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:50
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-24.89409	15.14581	-1.643629	0.1176
LOGP	-0.340403	1.923887	-0.176935	0.8615
LOGER	-0.158349	0.196437	-0.806103	0.4307
LOGGDP	2.901992	1.535263	1.890224	0.0749

R-squared	0.948633	Mean dependent var	12.96892
Adjusted R-squared	0.940071	S.D. dependent var	0.544119
S.E. of regression	0.133202	Sum squared resid	0.319371
F-statistic	108.3095	Durbin-Watson stat	1.334063
Prob(F-statistic)	0.000000		

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.270859	Probability	0.005673
Obs*R-squared	5.680472	Probability	0.058412

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 11/10/06 Time: 16:43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.48462	16.48424	0.818031	0.4254
LOGP	1.793430	2.016864	0.889217	0.3871
LOGER	0.171614	0.217327	0.789656	0.4413
LOGGDP	-1.387847	1.659511	-0.836299	0.4153
RESID(-1)	0.535474	0.267602	2.001007	0.0627
RESID(-2)	-0.391691	0.251085	-1.559995	0.1383

R-squared	0.258203	Mean dependent var	8.43E-15
Adjusted R-squared	0.026392	S.D. dependent var	0.123321
S.E. of regression	0.121683	Akaike info criterion	-1.147794
Sum squared resid	0.236908	Schwarz criterion	-0.850237
Log likelihood	18.62574	F-statistic	1.113850
Durbin-Watson stat	2.099748	Prob(F-statistic)	0.391868

Heteroscedasticity

White Heteroskedasticity Test:

F-statistic	1.405587	Probability	0.275763
Obs*R-squared	7.917609	Probability	0.244202

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/09/06 Time: 14:50
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-62.41205	40.49679	-1.541160	0.1441
LOGP	-0.869555	0.584607	-1.487418	0.1576
LOGP^2	0.204497	0.128518	1.591191	0.1324
LOGER	-0.091746	0.076756	-1.195291	0.2505
LOGER^2	0.013669	0.011049	1.237164	0.2350
LOGGDP	9.829397	6.251713	1.572273	0.1367
LOGGDP^2	-0.380384	0.241290	-1.576459	0.1358

R-squared	0.359891	Mean dependent var	0.014517
Adjusted R-squared	0.103848	S.D. dependent var	0.017718
S.E. of regression	0.016773	Akaike info criterion	-5.084718
Sum squared resid	0.004220	Schwarz criterion	-4.737568
Log likelihood	62.93190	F-statistic	1.405587
Durbin-Watson stat	2.537482	Prob(F-statistic)	0.275763

Regression Supply Function

Using Least Squares

Dependent Variable: LOGQ
Method: Least Squares
Date: 11/09/06 Time: 14:52
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.783232	6.881990	-0.404423	0.6909
LOGP	1.254094	0.355941	3.523324	0.0026
LOGER	0.104185	0.152718	0.682204	0.5043
LOGLB	0.965129	0.572468	1.685910	0.1101
LOGLD	0.042138	0.131599	0.320202	0.7527

R-squared	0.812617	Mean dependent var	12.96892
Adjusted R-squared	0.768527	S.D. dependent var	0.544119
S.E. of regression	0.261784	Akaike info criterion	0.354124
Sum squared resid	1.165026	Schwarz criterion	0.602088
Log likelihood	1.104641	F-statistic	18.43087
Durbin-Watson stat	0.976812	Prob(F-statistic)	0.000005

Using Two-Stage Least Squares

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:54
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.606572	14.04053	-0.114424	0.9102
LOGP	3.860058	1.638541	2.355790	0.0307
LOGER	0.119007	0.311337	0.382245	0.7070
LOGLB	0.526205	1.192592	0.441228	0.6646
LOGLD	-0.075581	0.276276	-0.273568	0.7877

R-squared	0.221789	Mean dependent var	12.96892
Adjusted R-squared	0.038680	S.D. dependent var	0.544119
S.E. of regression	0.533492	Sum squared resid	4.838426
F-statistic	5.078069	Durbin-Watson stat	1.407480
Prob(F-statistic)	0.007053		

Classical Assumption Test

Multicollinearity

	LOGP	LOGER	LOGLB	LOGLD
LOGP	1.000000	0.319170	0.333711	0.309548
LOGER	0.319170	1.000000	0.923654	0.710109
LOGLB	0.333711	0.923654	1.000000	0.662965
LOGLD	0.309548	0.710109	0.662965	1.000000

Autocorrelation

Dependent Variable: LOGQ
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:54
Sample: 1982 2003
Included observations: 22
Instrument list: C LOGER LOGGDP LOGLB LOGLD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.606572	14.04053	-0.114424	0.9102
LOGP	3.860058	1.638541	2.355790	0.0307
LOGER	0.119007	0.311337	0.382245	0.7070
LOGLB	0.526205	1.192592	0.441228	0.6646
LOGLD	-0.075581	0.276276	-0.273568	0.7877

R-squared	0.221789	Mean dependent var	12.96892
Adjusted R-squared	0.038680	S.D. dependent var	0.544119
S.E. of regression	0.533492	Sum squared resid	4.838426
F-statistic	5.078069	Durbin-Watson stat	1.407480
Prob(F-statistic)	0.007053		

Breusch-Godfrey Serial Correlation LM Test:

Obs*R-squared	5.482483	Probability	0.064490

Test Equation:
Dependent Variable: RESID
Method: Two-Stage Least Squares
Date: 11/10/06 Time: 16:59

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.38520	14.70009	1.046605	0.3119
LOGP	1.023802	1.588834	0.644373	0.5291
LOGER	0.279188	0.313265	0.891218	0.3869
LOGLB	-1.450831	1.281924	-1.131761	0.2755
LOGLD	-0.020954	0.255024	-0.082166	0.9356
RESID(-1)	0.491829	0.259499	1.895301	0.0775
RESID(-2)	-0.504079	0.276397	-1.823750	0.0882

R-squared	0.249204	Mean dependent var	2.11E-14
Adjusted R-squared	-0.051115	S.D. dependent var	0.480001
S.E. of regression	0.492116	Akaike info criterion	1.673167
Sum squared resid	3.632672	Schwarz criterion	2.020316
Log likelihood	-11.40483	F-statistic	0.829798
Durbin-Watson stat	2.212234	Prob(F-statistic)	0.564972

Heteroscedasticity

White Heteroskedasticity Test:

F-statistic	7.807378	Probability	0.000675
Obs*R-squared	18.20986	Probability	0.019707

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/09/06 Time: 14:54
Sample: 1982 2003
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.037538	221.1523	0.031822	0.9751
LOGP	-34.02967	5.667987	-6.003838	0.0000
LOGP^2	7.443753	1.249725	5.956311	0.0000
LOGER	0.802076	0.604194	1.327514	0.2072
LOGER^2	-0.031947	0.100876	-0.316691	0.7565
LOGLB	-5.732079	31.23869	-0.183493	0.8572
LOGLB^2	0.221991	1.220262	0.181921	0.8585
LOGLD	12.27634	6.962973	1.763089	0.1014
LOGLD^2	-0.553297	0.311492	-1.776282	0.0991

R-squared	0.827721	Mean dependent var	0.219928
Adjusted R-squared	0.721703	S.D. dependent var	0.290587
S.E. of regression	0.153296	Akaike info criterion	-0.620806
Sum squared resid	0.305495	Schwarz criterion	-0.174471
Log likelihood	15.82887	F-statistic	7.807378
Durbin-Watson stat	1.946350	Prob(F-statistic)	0.000675

Demand Regression using linear model

Dependent Variable: Q
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:17
Sample: 1982 2003
Included observations: 22
Instrument list: C ER GDP LB LD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-448400.7	1037398.	-0.432236	0.6707
P	-79925.69	325895.5	-0.245249	0.8090
ER	-5164.409	10011.96	-0.515824	0.6123
GDP	4.279969	5.486168	0.780138	0.4454

R-squared	0.369166	Mean dependent var	484745.1
Adjusted R-squared	0.264027	S.D. dependent var	216245.9
S.E. of regression	185514.9	Sum squared resid	6.19E+11
F-statistic	8.250940	Durbin-Watson stat	1.000222
Prob(F-statistic)	0.001154		

Supply Regression using linear model

Dependent Variable: Q
Method: Two-Stage Least Squares
Date: 11/09/06 Time: 14:26
Sample: 1982 2003
Included observations: 22
Instrument list: C ER GDP LB LD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1262353.	448445.9	-2.814950	0.0119
P	171444.8	68751.35	2.493694	0.0232
ER	2271.867	4206.510	0.540083	0.5961
LB	0.816340	1.311825	0.622294	0.5420
LD	-0.515389	1.200587	-0.429281	0.6731

R-squared	0.267492	Mean dependent var	484745.1
Adjusted R-squared	0.095137	S.D. dependent var	216245.9
S.E. of regression	205702.4	Sum squared resid	7.19E+11
F-statistic	5.033632	Durbin-Watson stat	1.481760
Prob(F-statistic)	0.007321		